DOCUMENT RESUME

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ABSTRACT

This document contains the learning modules developed during the Nabisco Richmond Facility's workplace literacy project. The first section is the facilitator's guide and the second is the participants' copy. Modules are included on the following topics: listening, problem solving, applied math (including calculator usage and military time), graph comprehension, and reading comprehension. Each unit includes activities for minimum, moderate, and maximum skill levels of employees, as well as activities for total group and individualized instruction. Activities include worksheets and tests, with test answers and teaching ideas included in the instructor's copy only.

REACH

Richmond Enhanced Academics for Change

Nabisco Richmond Model

Skills Effectiveness Training for Workplace Literacy: The Non-Intrusive Determination of Workplace Literacy Skills Requirements in a Union Environment

Facilitator Copy

The material presented in this curriculum is the result of a detailed task analysis of jobs in one Nabisco Facility. The job tasks have been correlated to the academic skills necessary to perform each job task accurately, safely, and efficiently. Whenever possible, actual job situations and materials have been utilized. However, to protect proprietary information, similar scenarios have been created.

Foreword

To the facilitator:

This is the first of a series of modules custom designed to enhance the basic workplace literacy skills of listening, reading, graph comprehension, applied math, problem identification and problem solving.

This first module covers communication skills in general with emphasis on practicing and developing listening and speaking skills in a workplace environment.

This module is intended to

1. serve as an orientation to the program and to encourage a high comfort and high motivation level with the participant.

2. lay the foundation for the subsequent modules.

3. establish the credibility of the program.

The learning activities in this and all subsequent modules have been designed to meet three levels of assessed need for this workplace. Just as the three skill levels require different complexities of thought, so too do the learning activities require different complexities of thought.

The learning activities are color coded to indicate the skill level for which they are designed.

Minimum level activities - yellow
Moderate level activities - blue
Maximum level activities - pink

Also, the learning activities will indicate whether the material is designed for individualized instruction or group instruction. In general the goal is:

Listening - total group activities
Reading - individualized activities
Graph Comprehension - individualized activities
Applied Math - individualized activities
Problem Identification - individualized and occupational group activities
Problem Solving - individualized and occupational group activities

Content Outline

Minimum Level Listening

1. Communicating with Co-Workers
   a. Recording Spoken Information
   b. Receiving Calls
   c. Asking Questions
   d. Notifying Others of Needs/Problems

2. Communicating with Supervisors

3. Communicating within a Work Group

Moderate Level Listening

4. Receiving Directions and Details
   a. Safety Meetings
   b. Following Oral/Auditory Directions
      (1.) Supervisory Instructions
      *(2.) Computer/Mechanical Alarms

Maximum Level Listening

5. Problem Identification/Troubleshooting
   a. Listening to people/Understanding complaints
   *b. Listening to things/detecting abnormal noises in machinery or equipment

6. Problem Solving

*on the job training

Table of Contents
Listening Skills

Total Group
Listening
YELLOW -
MINIMUM LEVEL

Activity: 1 - Find Your Twin

Objective(s): This activity will enable participants
1. To demonstrate ability to listen as distinguished from hearing.
2. To follow simple, oral directions.
3. To practice listening (especially interpretation and evaluation), speaking and analytical skills.
4. To practice observing detail in a simple schematic.
5. To practice translating observations into accurate descriptions.

Materials Required:
Ten sets of identical cards of a simple schematic (20 participants)

You need to know:

About Listening -
1. All jobs require good listening and speaking skills.
2. Hearing is sensing or receiving sound and recognizing it. It's physical!
3. Listening is hearing sound but also...
   Interpreting the meaning of the sound and
   Evaluating the sound and deciding how to use it and
   Reacting to the sound based on what you heard and how you evaluated the sound.
4. The average listener remembers only about 50% - one-half of what he has heard 20 minutes after he has heard it!
5. If 100 million people make a listening mistake on their jobs each week and it costs $10 to correct or redo their work, American companies would spend an additional one billion dollars per week!

Activity 1 - Find Your Twin (continued)

Directions:

1. You will each be given a card with a drawing of a GMP board (Good Manufacturing Procedure) on it.

2. One, and only one, other participant will have a GMP board that is identical to yours in every detail.

3. By carefully analyzing all the details of your board and then milling around asking and answering comparison questions about your board with other participants, find the twin for your board.

4. The person who has the twin picture of your board is going to be your partner for the next activity and so the two of you should sit down together.

5. You cannot look at another person's card until you are sure you have found a match. Analyze, ask questions and listen!

Facilitator:

Allow the participants 5-10 minutes to mill around and find their "match". Occasionally remind participants to

Hear
Interpret
Evaluate
and React to what others are saying.

Activity: 2 - Getting To Know You

Objective(s): This activity will enable participants
1. To follow simple, oral directions.
2. To practice listening and speaking skills.
3. To practice short term memory skills.
4. To become familiar with other program participants.
5. To provide insight and familiarity for the facilitator.

Materials Required:
1. List of topics

You need to know:

About Speaking - In this era of increasing diversity, it's very important to understand that a person's cultural background as well as their gender and position has a lot to do with their verbal and nonverbal communication styles.

1. Nonverbal Skills or What Do You Look Like?
   These nonverbal speaking skills make up more than one half of the meaning in any message that's being sent.
   (a) Appearance
   (b) Body Language-communicates even when you don't mean to
      1. positive gestures-open palms, body leaning forward, relaxed appearance
      2. negative gestures-arms crossed, hands hidden or clenched, tense appearance
      3. distance, space and touching

2. Vocal Skills and Tone or What Do You Sound Like?

3. Verbal or Language Skills or What Do You Say?

Activity: 2 - Getting To Know You (continued)

Directions:

1. You and your partner will discuss the topics that will be read to you in a moment.

2. Use what you've learned about communicating through listening and speaking during this exchange.

3. Later, you and your partner will introduce each other to the rest of the grou using only the information you've gained through this conversation.

4. No notes can be taken. Listen and stretch your memory! Mentally arrange the information about your partner in a way that will be easy for you to remember and retell.

5. The topics are:
   THE NAME THEY PREFER TO BE CALLED-ONE NAME ONLY
   THEIR FAVORITE NABISCO® PRODUCT - AS A CONSUMER
   THE MOST INTERESTING PART OF THEIR PRESENT JOB
   ONE OF THEIR JOB DUTIES THAT THEY KNOW THEY DO REALLY WEL
   FIVE OTHER DUTIES OR RESPONSIBILITIES OF THEIR CURRENT JOB
   ONE THING THEY WOULD CHANGE ABOUT THEIR PRESENT JOB IF THEY COULD.

Facilitator:

Don't write the topics.
Read the list of topics at least twice and help the participants remember the topics and their order by synthesizing each topic down to one or two words, i.e. Name
Product
Interesting Part
One Duty
Five Duties
Change

Activity: 3 - The Communication Process

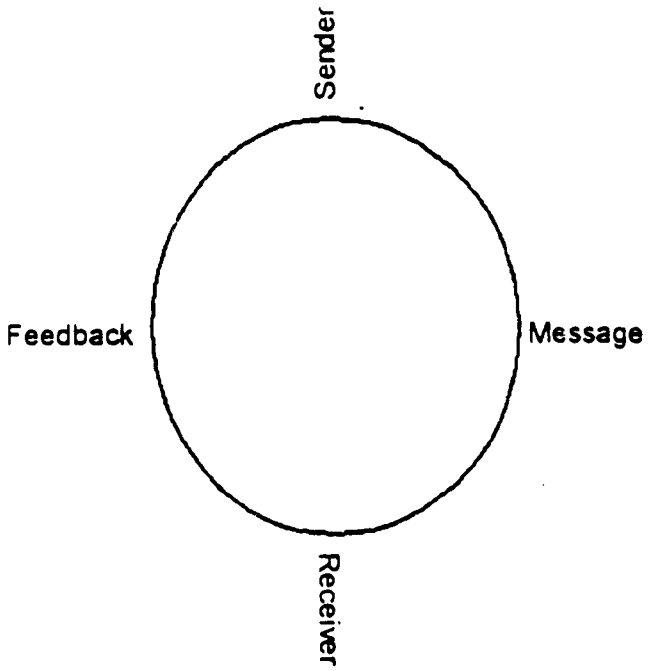
Objective(s): This activity will enable participants
1. To practice listening skills, as they draw according to simple, oral directions.
2. To learn communication concepts.
3. To develop their analytical skills.

Materials Required:
Pencil or Pen

You need to know:

About The Communication Process -
Everything we do is communication. And everything we do to communicate is done either to give or get information, to control, to follow social rules, or to share feelings. The complete communication process is a closed loop which starts when a sender wants to send a message to a receiver using whatever means is appropriate and available to him. The process ends with the positive feedback that the message was received and understood.

1. Sender - the person who has information to communicate to another person.
2. Message - the actual facts or information that are communicated.
3. Receiver - the person who receives the message and responds with feedback.
4. Feedback - everything that is sent back to the sender of the message that indicates that the message was received.
5. Channel or means - the method of communication. For example, the telephone, a meeting, smoke signals, body language, etc.


Sender
Feedback
Message
Receiver

Activity: 3 - The Communication Process (continued)

Directions:

1. On the opposite page, in the middle of the first blank space, draw a circle about 3 inches wide. It's okay that the circle is not perfectly round.

2. Outside the circle at the 12 o'clock position, write the word Sender.

3. Outside the circle at the 3 o'clock position, write the word Message.

4. Outside the circle at the 6 o'clock position, write the word Receiver.

5. Outside the circle at the 9 o'clock position, write the word Feedback.

6. Now, you have a closed loop model to use as you proceed with breaking down recent communications you've had into their parts.

7. Draw another circle in the next blank space and fill in this model with the names and one of the messages from a conversation you had today with your partner.

8. Now, in the last two spaces, draw a model for two recent work situations. One model should be of you sending a message and one model should be of you receiving a message. It's okay to use non-verbal messages. Just te us what the communication channel was.

9. We'll discuss some of these later.

Facilitator:

On the flip chart, write the words Sender, Message, Receiver and Feedback after reaching Step 1. You may want to circulate among the participants, offerin guidance to anyone who asks for help.

Later, encourage everyone to share one of their work situation communications.

Activity: 4 - Workplace Communication Problems

Objective(s): This activity will enable participants
1. To gain and practice communication barrier concept skills.
2. To develop minimum level reading and writing skills.
3. To develop and practice analytical skills.

Materials Required:
Pencil or pen

You need to know:

About Barriers in Effective Workplace Communication

1. Sender Barriers
   -Deadlines
   -Personal biases - expressing an opinion as if it were fact
   -Faulty assumptions - assuming that the receiver knows more than he actually does know
   -Ignoring or misinterpreting the receiver's feedback

2. Receiver Barriers
   -Deadlines
   -Attitudes
   -Personal Biases or Perceptions
   The attitudes and perceptions of people have a lot to do with communication. Perception refers to how you see things and what your senses tell you so that what you see and hear makes sense to you. Sometimes people hear what they want to hear rather than what was really said. How you perceive or see or hear other people and their communications is a result of many factors:
   1. the physical differences between you and the person.
   2. the differences in your past experiences and backgrounds.
   3. the differences in the language used.
   4. the setting in which you're communicating.
   5. how you feel at the time of the communication.

Activity: 4 - Workplace Communication Problems (continued)

You need to know: (continued)

3. Message Barriers
   -Inaccurate or incomplete information
   -Inappropriate words
   -Environmental noise
   -Sloppy handwriting or typing
   -Torn or dirty pages of printed material

You need to know:

Ways to Overcome Workplace Communication Barriers

If you are a sender	If you are a receiver
1. Organize your thoughts and the information before sending the message. 2. Send complete and accurate information. 3. Use clear language. 4. Stay calm and, if possible, get away from noise and distractions. 5. Set realistic deadlines. 6. Ask for and listen to the receiver's feedback.	1. Listen carefully for key words. 2. Ask questions if you don't understand completely. 3. Set realistic deadlines. 4. Listen with an open mind.

Activity: 4 - Workplace Communication Problems

Problem 1	Problem 2
Sender-	
Message-	
Receiver-	
Barriers-	
Problems-	
Solutions-	

Activity: 4 - Workplace Communication Problems (continued)

Directions:

1. As a group, we will analyze a workplace communication problem about notifying others of the needs, problems or current status of an assignment station.

2. We will follow the order of the chart on the opposite page as we discuss this problem (Problem 1). You make take notes if you'd like.

3. Afterwards, think about a workplace communication problem that you have been a part of or have witnessed.

4. Fill in Problem 2 on the chart with your workplace communication problem.

Facilitator:

Solicit several examples from the participants for Problem 1.

Several examples should be discussed in full before selecting one to be filled in for Problem 1.

Activity: 5 - Active Listening and Removing Barriers Role Play

Objective(s): This activity will enable participants
1. To practice all the listening and speaking skills learned at this point.
2. To demonstrate an understanding of the consequences of ineffective communication (e.g. lost time, sub-standard product, etc.).
3. To demonstrate an understanding of the basic elements of effective communication.

Materials Required:
None

You need to know:

About Active Listening v. Passive Listening

Active Listening is a way of getting the sender of a message more involved with the receiver of a message. It helps everyone get the feedback and the answers they need. It is necessary for good two-way communication and for problem solving.

To get the right message, the receiver feeds the message back to the sender without adding anything to the message. It shows that the receiver has heard the message that is intended whether he agrees with the message or not. The sender will usually agree with the feedback or will send a new message that clarifies what he meant. Active listening is useful for decoding messages or getting at the hidden meanings in messages.

Activity: 5 - Active Listening and Removing Barriers Role Play (continued)

You need to know: (continued)

Steps in Active Listening

1. The sender sends a coded message.
2. The receiver receives the message.
3. The receiver decodes the message.
4. The receiver feeds back what the message is - nothing more or less - with no evaluations.
5. The sender either agrees with the receiver's interpretation or, if not, starts the message over again, clarifying the message and most likely revealing at least some of the hidden meanings in the message.

Passive Listening is the process of quietly taking in the statements and questions of the sender of a message. There is no feedback indicating that the message was received or understood.

Techniques for Listening Effectively

1. Prepare to listen by minimizing distractions and making eye contact with the sender when possible.
2. Know why and what you're listening for. What is the central idea being expressed and what are the important details?
3. Learn to recognize the ways most senders organize the information they're communicating -
   a. Chronological order - first, next, then
   b. Order of importance - most important, least significant, highest priority
   c. Comparison and contrast - like, different, in contrast, same
   d. Cause and effect - because, so, therefore
4. Look for nonverbal signals and try to determine what they mean.
5. Try to listen with an open mind even when the ideas are new and/or you don't agree with them.
6. Know yourself and your listening style. Make your style work for you or improve your listening style where necessary.

Activity: 5 - Active Listening and Removing Barriers Role Play (continued)

Directions:

1. You and your partner will develop a role play situation for a workplace communication problem that each of you has been a part of or witnessed.

2. Take turns being yourself in one role play and being the other person for your partner in another role play.

3. Nothing has to be written down.

4. Develop a "before" effective communication version of the role play and an "after" effective communication version of the same situation. In between the two versions, briefly discuss what you think were the reasons for and the consequences of the miscommunication.

5. You and your partner should be prepared to present your role plays (no more than 3 minutes each) to the entire group.

Facilitator:

Use one of the examples discussed in Activity 4 to do a role play with volunteer participants. This will guide the other participants as they develop thei own situations. Emphasis should be on reasons for and the consequences of the miscommunication.

Activity: 6 - Listening Practice

Objective(s): This activity will enable participants
1. To develop listening skills through practice.
2. To practice recording spoken information.
3. To practice remembering oral details.

Materials Required:
1. Teacher-dictated listening practice materials
2. Participant worksheets and pencil

Directions:

1. This is a practice exercise, not a test. RELAX!

2. Do your best.

3. We'll discuss problem areas when we're done.

4. Listen carefully to the directions for each exercise.

Facilitator:

This activity represents a change in pace and focus.

Although participants need to be alert, the atmosphere should be relaxed as they are developing their listening skills but not competing with each other.

The scripts for these exercises are on the page opposite the exercise.

Activity: 6 - Listening Practice Worksheet

Facilitator:

Dictation for Exercise b - Like and Don't Like

John and Mary like computers.

Bob likes Monday start-up but doesn't like Saturday clean-up.

Ann likes Saturday clean-up but she and Mary don't like overtime.

Although John likes overtime, he and Mary don't like Saturday clean-up.

Bob likes overtime.

Although Mary likes Monday start-up, Ann and John don't like it at all.

Activity: 6 - Listening Practice Worksheet

a. Make a ✓ on the number you hear.

a.	10	✓ 11	100	b.	12	✓ 20	22	c.	3	13	✓ 30
d.	✓ 4	14	40	e.	5	15	✓ 50	f.	6	✓ 16	60
g.	✓ 7	17	70	h.	8	18	✓ 80	i.	✓ 9	19	90

b. Make a ✓ when you hear **like**.
Make an **x** when you hear **don't like**.

	Overtime	**Computers**	**Saturday Clean-Up**	**Monday Start-Up**
Ann	X	✓	✓	X
Bob	✓	✓	X	✓
John	✓	✓	X	X
Mary	X	✓	X	✓

c. Listen and circle the number you hear:

555-4212	555-4202
311-9762	**311-9752**
254-8976	254-9976
778-2056	778-2046
626-5339	**636-5339**
255-9509	251-9509
782-8886	**872-8886**
874-0402	**874-0482**

Activity: 6 - Listening Practice Worksheet

Facilitator: Read the entire number.

d. Listen and write the missing numbers.

7**20-1206**-8524

928-**7191-75**34

413-25**32-6987**

976-4445-7160

753-**3113-41**42

835-27**42-2553**

6**43-6263**-7045

591-**0402-82**38

e. Listen and write the lot ID number you hear.

0882260000

0901410000

0883620000

0879650000

0914320000

0782320000

0699470000

0714320000

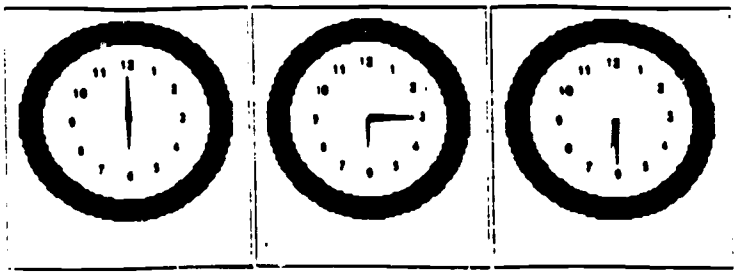
Activity: 6 - Listening Practice Worksheet

f. Listen and circle the number you hear:

1%	.1%	.01%	10%
2%	20%	.2%	.02%
3%	30%	.3%	.03%
40%	4%	.4%	.04%
50%	5%	.5%	.05%
60%	6%	.6%	.06%
70%	7%	.7%	.07%
80%	8%	.8%	.08%
90%	9%	.9%	.09%

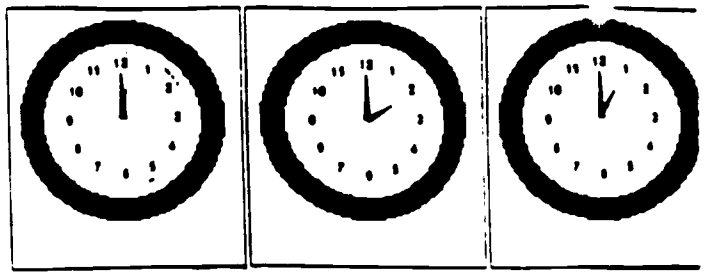
Activity: 6 - Listening Practice Worksheet

g. Listen and identify the time you hear.



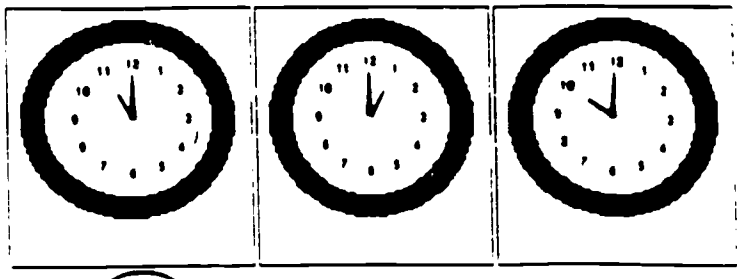
1. a (1. b) 1. c

6:15



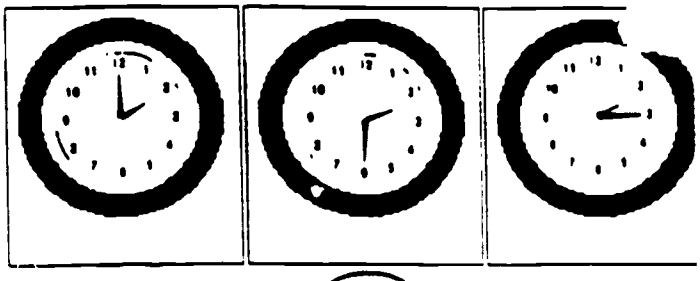
2. a 2. b (2. c)

1:00



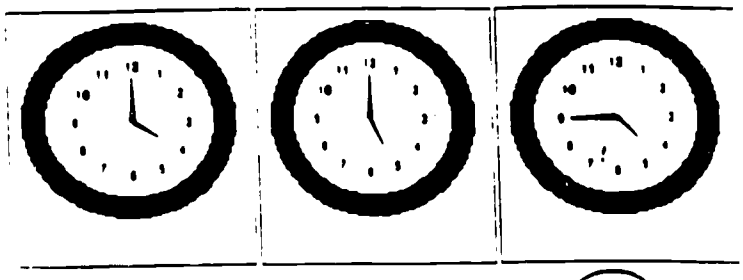
(3. a) 3. b 3. c

11:00



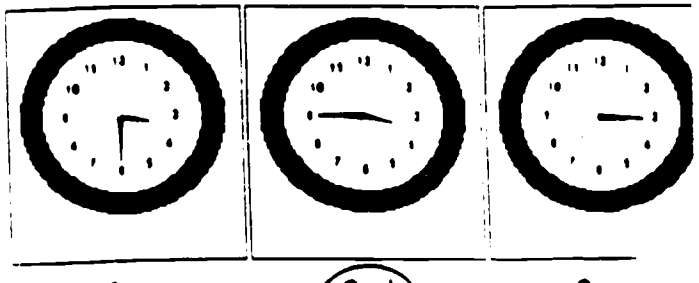
4. a (4. b) 4. c

2:30



5. a 5. b (5. c)

4:45



6. a (6. b) 6. c

3:45

Activity: 6 - Listening Practice Worksheet

h. **Listen and circle the address you hear.**

1.	**655 Broad Street**	665 Broad Street
2.	**82 East Avenue**	83 East Avenue
3.	428 Pine Street	**448 Pine Street**
4.	144 Brook Road	**1404 Brook Road**
5.	**139 Lake Avenue**	1?9 Lake Avenue
6.	**5206 Main Street**	5026 Main Street
7.	5790 Plum Street	**5719 Plum Street**
8.	**4304 Laburnum Avenue**	434 Laburnum Avenue

i. **Listen and write the missing numbers.**

1. 3**42** Franklin Street
2. 12**20** Carolina Avenue
3. **411** Bay Road
4. **78**68 Grand Avenue
5. 76**63** First Street
6. 5**05** River Road
7. 1**8**92 Madison Avenue
8. 2**17** Penny Lane

Activity: 6 - Listening Practice Worksheet

Facilitator:

k. Ask after the food order dictation.

   a. How many french fries were ordered? - **3**

   b. What kind of sandwich was on rye bread? - **ham and swiss**

   c. Should the tuna salad or chicken salad have mayo? - **tuna salad**

   d. Was there an equal number of sandwiches and sodas? - **yes, 3 of each**

   e. Was the chicken salad sandwich on wheat bread? - **no, on white**

   f. Was this a take out order? - **yes**

Activity: 6 - Listening Practice Worksheet

j. **Listen and write the number you hear.**

1.	work order number	21117
2.	lot ID	0545155000
3.	extension	4412
4.	assignment stations	816, 698 and 713
5.	a salt reading of	.02%
6.	a dough temperature of	78°

k. **Food Order Dictation**

Take notes as needed to help you remember the items. Visualize each item as you hear it.

1 chicken salad on white, hold the mayo

1 tuna salad on wheat toast

1 ham and swiss on rye

3 large orders of fries

2 colas

1 diet ginger ale

an order of onion rings

to go

Activity: 6 - Listening Practice Worksheet

Facilitator:

I. Ask after the dictation

a. Which ingredients do we need 1 gallon of ? - **almonds and soy nuts**

b. Do we need whole or sliced almonds? - **Neither, we need slivered almonds**

c. Do we need ½ gallon or ¾ gallon of coconut? - **½ gallon**

d. How many total gallons of sesame seeds and sunflower seeds do we need? - **1 total gallon**

e. Would 6 cups of maple syrup be too much? - **No, 8 cups are needed**

f. True or false - 8 cups of raisins are needed - **False, 8 pounds of raisins are needed**

g. The primary ingredient in this recipe is _____? - **Rolled oats - 3½ gallons.**

h. True or false - It takes 75 minutes in a 360° oven to bake the granola. - **False, it takes 45 to 60 minutes in a 375° oven.**

Activity: 6 - Listening Practice Worksheet

I. Granola Recipe

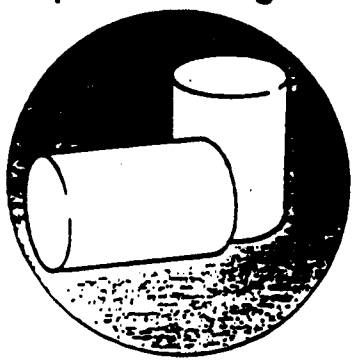
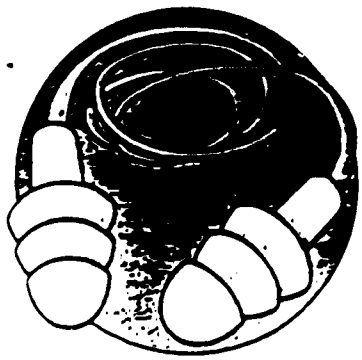
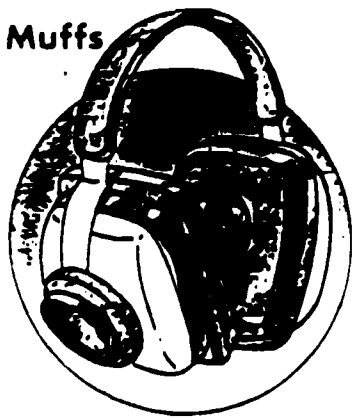
Take notes as needed to help you remember the recipe accurately.

3½ gallons rolled oats
1 gallon slivered almonds
1 gallon soy nuts
¾ gallon buckwheat groats
¾ gallon wheat flakes
½ gallon coconut
½ gallon sesame seeds
½ gallon sunflower seeds
⅓ cup sea salt
mix
add 8 cups pure maple syrup and 6 cups soy oil
mix
spread evenly on 10 large sheet pans
bake at 375° for 45 - 60 minutes 'till golden brown
let cool
remove from trays and break down large clumps while adding 8 pounds of raisins
eat and enjoy

Activity: 6 - Listening Practice Worksheet

m. Hearing Protection Dictation

Hearing protectors block out enough noise to bring the decibel level down to a safe dose providing they fit properly. Depending on the type, brand, and **Noise Reduction Rating (NRR)** they reduce noise by about 20 to 30 decibels — often a crucial difference for your ears. Hearing protectors are required whenever noise is 85-90 decibels or more. You can also use this **rule of thumb:** if you have to raise your voice to talk to people standing only three feet away, you should probably wear hearing protectors.

TYPE	DESCRIPTION	FIT FOR SAFETY
Disposable Plugs 	Disposable plugs are placed inside the ear canal to block out noise. They are commonly made of an expandable foam. One size fits most everyone. They roll up into a thin cylinder for insertion. Once they're inside your ear canal, they expand to form a good seal.	Roll and compress the plug lengthwise between your fingertips. Reach one hand around the back of your head and pull up on the outer ear to straighten the ear canal. Insert until you feel it plugging, then **hold** it **in place for a moment** until **it begins** to **expand.**
Reusable Plugs 	Reusable plugs are preformed to fit the ear. They are usually made of a flexible rubber or silicon. They may be flanged or cone-shaped, and are often joined by a cord so that they're not easily lost.	Reach one hand around the back of your head and pull up on the outer ear to straighten the ear canal. **Insert the plug until you feel it sealing** and **the fit is comfortable.** Be sure to use plugs that are the right size for your ears. Ask your supervisor for assistance.
Muffs 	Earmuffs resemble stereo headphones. The soft plastic cushions, filled with foam or liquid, should form a good seal against noise. If you wear glasses with wide temples, you may want to choose another type of protector. If you're exposed to very loud noise, you can wear earmuffs and plugs together.	Muffs offer good protection if **the cushions fit tightly around your ears.** Check to see that the cushions are flexible and that there are no areas where the sound can penetrate. Keep your hair from underneath the cushions. Don't defeat their purpose by wearing radio earphones under them.

Activity: 6 - Listening Practice Worksheet

m. Listen carefully to the dictation on hearing protection.
Later, you will answer questions by filling in the blanks below with the letter of the correct type of hearing protection.

c	a. Disposable Plugs
a	b. Reusable Plugs
b	c. Muffs
a	
b	
c	
b	
a	
c	
c	

Facilitator:

m. Based on what you heard, which type of hearing protection is described in each sentence?

c	a. They look like headphones.
a	b. They need to be rolled up or squeezed before going into ear.
b	c. They are preformed to fit the ear.
a	d. They expand inside the ear canal.
b	e. They are usually made of rubber or silicon.
c	f. They are filled with foam or liquid.
b	g. They are often joined by a cord.
a	h. They are made of expandable foam.
c	i. They may not work well with eyeglasses.
c	j. They are not put inside the ear canal.

Total Group
Listening
BLUE -
MODERATE LEVEL

Activity: 6 - Listening Practice Worksheet

n. Directions for Surviving a Hotel Room Fire

Jot down only the key words you need to remember the directions you'll hear. Try to group the items in a way that makes sense to you - similar topics (using the phone), order of importance, etc. Try to picture these directions in your minds eye.

1. Use the phone to give your location to the front desk.
2. If you need to let the smoke out of your room, open a window.
3. If smoke is coming into your room from outside, keep the window closed.
4. Fill the bathtub with water for fighting the fire.
5. Turn on the bathroom fan.
6. Stuff wet towels and sheets in the cracks of the door and walls.
7. Use the ice bucket to wet the door and walls if they get hot.
8. Cover your mouth and nose with wet towels to filter the smokey air.
9. Move flammable things away from the windows and doors and keep those things wet.

Facilitator:

Read the instructions for this exercise to the group. It's important to point out to the participants to listen first and then group items together in a way that will help them remember what they heard. After dictating the directions, ask for volunteers to give the directions back to you. Ask how they grouped the items in order to remember them easily.

Activity: 6 - Listening Practice Worksheet

o. **Directions for Emergency Medical Care at Nabisco**
Again, jot down only the key words you need to remember the directions you'll hear. Try to group the items in a way that makes sense to you and that will be easy for you to remember.

Facilitator:

This exercise, like Exercise n, should focus on developing a method to use in remembering spoken details. Ask volunteers how they grouped the items in their mind in order to remember them easily.

Activity: 6 - Listening Practice

o. Emergency Medical Care Procedures

These procedures apply when no nurse is on duty in the Medical Department.

1. Call Security (EXT.4272) to open Medical Department.

2. Control bleeding - large dressings are in Medication Room in drawer marked emergency dressing.

3. Arrange transportation:

   A) Call Rescue Squad if seriously injured or Life Support if severe emergency. Otherwise, call Groome Transportation or East End Cab. Give one ticket for trip out and one ticket for return trip. Tickets are on the nurse's desk in Medical Department.
   B) Injured employees are not to drive themselves under any conditions.
   C) No other employee is to drive an injured employee to medical care.

4. Notify medical facility chosen that injured person is in transit. Give name of employee and specifics of accident.

5. Instruct employee to give hospital the following information:

   A) Order for Medical treatment slip (on nurse's desk).
   B) Identify as Nabisco employee and Worker's Compensation.
   C) Dr. Dale Slagel is plant physician.

6. Notify or help injured employee contact family if desired.

7. Instruct injured employee to report to Medical Department prior to returning to work.

8. If specialist is needed, Stuart Circle Emergency Room has specific instructions as to which specialist to use.

9. Leave a note in Medical giving employee's name, type of injury, and medical facility used.

Activity: 6 - Listening Practice Worksheet

p. **Listen carefully to the newspaper article about a bakery.**
Try to remember as many facts as you can. Also, listen for the main ideas and for the order of the production process. Be prepared to answer questions on the article. You may take notes as you'd like.

Facilitator:

Be sure to give the participants a break beforehand in preparation for this long dictation.

Tell all participants that some questions on the dictation will require recognizing or recalling facts. Other questions will require understanding the concepts and process talked about in the article.

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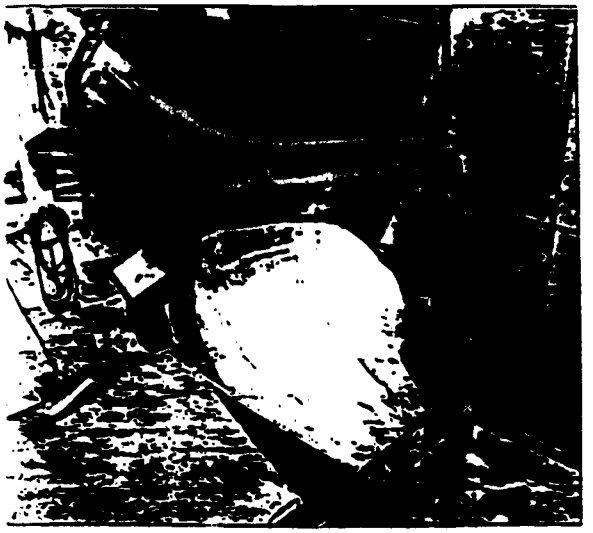
Sweet situation



DOUGHT FUL. Mike McMasters operates a special motorized hoist, which places the dough in a machine that rolls it out into a mass about ready to be cut into doughnuts.

A look behind the scenes at the Dunkin' Donuts factory

PHOTOS BY P. KEVIN MORLEY
STORY BY GREGORY L. GILLIGAN
TIMES-DISPATCH STAFF

After 21 years on the job, Tom Carroll knows a lot about making doughnuts.

He used to get up early each morning to roll out the dough, cut it by hand and then dip it into hot oil to make dozens of doughnuts at a Dunkin' Donuts store.

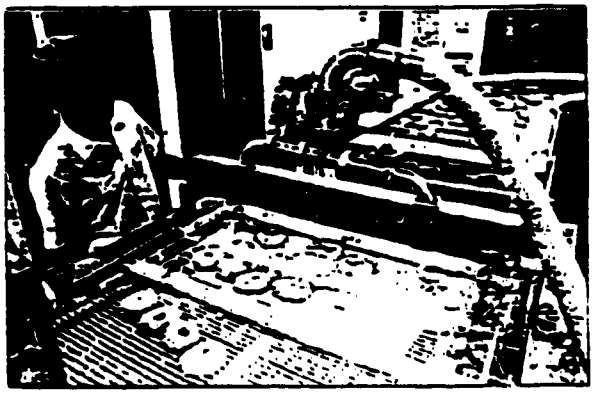
Carroll still gets up early — at 4 a.m. — to go to work, but now a machine does much of the work for him and others.

In fact, the system that Dunkin' Donuts Inc. recently began using at its new central bakery in Richmond makes thousands more doughnuts than Carroll and his fellow workers could ever make by hand.

"I know what doughnuts are supposed to look like and taste like, and there's no difference with these than with the ones I used to make by hand," Carroll said. "They're good."

Instead of making doughnuts at each store — a time-consuming process that requires a large number of workers — Dunkin' Donuts, the country's largest doughnut retailer, decided to test a new concept using a central bakery. Under the concept, the company would lower production costs and expand its sales outlets by distributing its products from the bakery.

HOT ACTION. Doughnuts are fried in vegetable shortening for 4.5 seconds on each side. Mike McMasters checks to make sure each is flipped over.



GLAZE WATERFALL. Alphonso Meredith watches as glaze is sprayed on fresh doughnut.

ZAPPED. With the help of a conveyor, Wanda Dickens squirts raspberry filling into the doughnuts.

30,000 made daily

In late February, the chain opened the $1.5 million production facility in the Dabney Center industrial park, north of West Broad Street near Westwood Avenue.

There, about 30,000 doughnuts — or 2,500 dozens — are made daily and shipped twice a day currently to 11 stores in the area.

The bakery eventually will be able to produce more than 15,000 dozens daily and will distribute to as many as 30 outlets.

"And we will make up to 30 different varieties of doughnuts every day," said Terry Soley, Dunkin' Donuts' area manager, who oversees operations at the bakery and company-owned stores. "That's impressive when you consider they're being made from a central facility."

◆ ◆ ◆

It takes about an hour and a half to make a doughnut at the Dunkin' Donuts bakery — from the moment workers begin mixing the dough until frosting or colorful sprinkles are put on the doughnuts at the end of the process.

Workers began arriving at 8 p.m. to make doughnuts that will be ready for sale in stores that will open at 6 the next morning.

About 70 percent of the goods that Dunkin' Donuts sells daily is produced on that 8 p.m. to 4 a.m. shift. A second shift arrives around 5 a.m. and works until 1 p.m.

By midnight — or 9 a.m. on the second shift — doughnuts are rolling off the conveyor belts like a steady rainfall. The aroma from the doughnuts is pervasive, even blocks outside of the building.

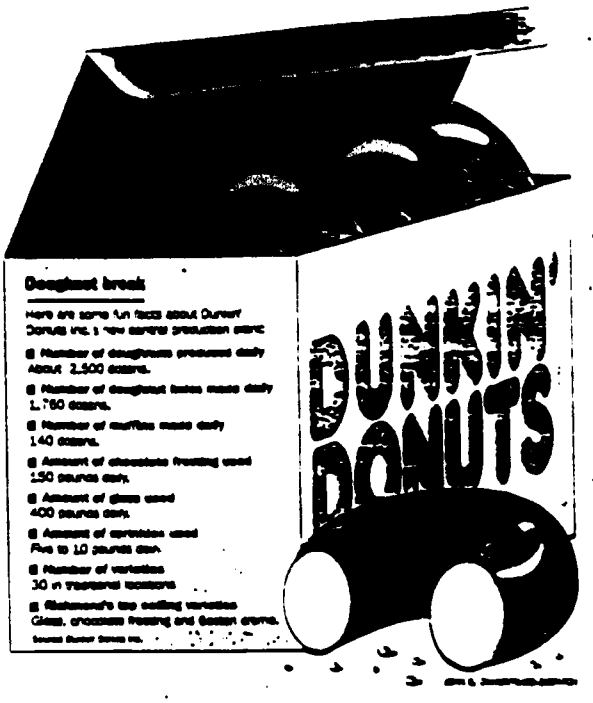
The process starts with a bag of yeast — about 10,000 pounds are used weekly — that is mixed with water to make the dough.

After about 16 minutes of mixing, the dough is put through an extruder that rolls the dough into a one-inch thick sheet. From there, the dough goes to a machine that cuts it into ring doughnuts or oval doughnuts for filling.

The newly formed doughnuts then fall onto a conveyor belt, where employees, like Carroll, check each one.

"It's like Lucy at the chocolate factory," said William Beale, the chain's retail store manager, referring to an "I Love Lucy" television episode in which Lucille Ball and

PLEASE SEE DUNKIN', PAGE E14 ▶



READY TO ROLL. Danette Glass slides a tray of glazed doughnuts onto a rack, which later is placed on a truck for delivery to area stores.

Dunkin' Donuts cookin' with central bakery

Concept was tested in markets such as Las Vegas, Boston

P. KEVIN MORLEY/TIMES-DISPATCH

ON THEIR WAY. Dunkin' Donuts trucks deliver doughnuts and other goods to 11 outlets in the Richmond area.

▼ DUNKIN' *FROM PAGE E13*

Vivian Vance were working in a chocolate candy factory.

Doughnuts then are placed onto moving trays that go through an enclosed box of moist heat so the dough can rise for 35 minutes before heading to the fryer.

A waterfall of glaze

What's next? The doughnuts are dropped into hot vegetable shorting, where they float for 45 seconds on each side — enough time to get a golden coating.

"You've got to watch to make sure that all of the doughnuts are flipped," worker Mike McMasters said as he turned over a couple of doughnuts.

Then it is time for the doughnuts to go through a waterfall of glaze before spending the next 30 to 45 minutes on a spiral cooling conveyor.

The last step is the finishing section, where the ring doughnuts get a coating of frosting or powered sugar and the shell doughnuts are zapped with lemon or cherry filling.

"My friends ask me all the time how we get the fillings inside them," said employee Wanda Dickens. "It's easy, I tell them. All you have to do is put the doughnut up against a prong [that holds the various fillings] and squeeze it and it fills it up."

All along the process, employees can — and are encouraged to — eat doughnuts. McMaster's favorite, for instance, is the chocolate honey dipped.

Even Soley, who has been working for the Dunkin' Donuts chain for 31 years, walks into the production plant and grabs at least one doughnut a day.

"I still love them," Soley said.

In the center of the 12,000-square-foot production plant, Dunkin' Donuts employees make — and sometimes just bake — five varieties of muffins, three types of croissants, three kinds of bagels and four varieties of cookies.

35 employed at the central bakery

The 30 types of doughnuts, and the muffins, croissants, bagels and cookies are placed on racks ready to go to stores.

Trucks leave the center between 4 a.m. and 5 a.m. — for products made from the night shift — and then again between 1 p.m. and 2 p.m.

The central bakery employs about 35 workers. There are about eight to 10 people per shift, compared with about four employees needed to make doughnuts at each store.

◆ ◆ ◆

Producing doughnuts from a central bakery is not new for Dunkin' Donuts, but the scale of the operation represents a change in direction for the company.

The company chose the Richmond area to test the distribution plan because area roads allow doughnuts and pastries to be delivered to stores within 30 minutes.

Dunkin' Donuts had tested the concept on a much smaller scale in markets such as Las Vegas and downtown Boston. Those bakery operations served up to five stores. A [illegible] Richmond center will serve six times that many.

"The concept is a good one," Soley said. "We can open a lot more stores and a lot quicker than before."

That's because the central bakery allows the company to spend less on real estate and labor by building small drive-through stores and opening outlets in strip shopping centers. "We can go into nontraditional locations," Soley said.

Opportunity to broaden

The concept also gives the company extra selling points that it might use when trying to attract new franchise operators.

Instead of having to worry about buying real estate, constructing a building and then learning how to make doughnuts, now a franchisee simply would find a location and start up operations, Soley said.

"They'll leave the production side to us," he said.

Dr. David J. Urban, a marketing professor at Virginia Commonwealth University, said the new system allows Dunkin' Donuts an opportunity to broaden its network.

"And the good thing is they still maintain control over the product," Urban said. "It allows them to capitalize on their brand name while at the same time they don't have to make the investment in the real estate."

Expects to have 30 stores by 1995

There are five locally-owned franchise locations in the Richmond area, all of which make doughnuts at their stores.

The company now has 11 units — eight traditional stores and three located at gasoline stations — that are served by the central bakery.

By the end of 1995, the chain expects to have as many as 30 stores throughout the area. Four stores will open this fall.

Dunkin' Donuts will test the concept for another six months before deciding whether to roll it out elsewhere. If the concept works here, company officials say the chain could try a similar distribution system in a dozen or more other cities.

◆ ◆ ◆

A frequent question facing central bakeries such as Dunkin' Donuts' is whether the goods will be fresh when they reach consumers.

A lot of companies operate similar facilities. For instance, Ukrop's Super Markets Inc., the area's No. 1 grocer, makes all of its doughnut products at a central bakery.

Freshness is such a major concern for Dunkin' Donuts that the chain pledged not to sell any doughnuts that were made more than 12 hours earlier.

"We will sell no doughnut after its time," Bode said.

The freshness issue

Maintaining quality standards will be a challenge for Dunkin' Donuts, said VCU's Urban.

"You've got to maintain the freshness standards when you distribute to a variety of locations," Urban said. "Consumers don't want to get a dried out doughnut.

Freshness is an issue that rival Krispy Kreme Doughnut Corp. highlights. The Winston-Salem, N.C.-based chain has one store in the area, and expects to open a second on Midlothian Turnpike by late August.

Krispy Kreme stores [illegible] behind the counter so customers can watch doughnuts being made.

"People want hot, fresh doughnuts," said Jack McAleer, Krispy Kreme's executive vice president of sales and marketing. "That is what has made us unique. Dunkin' Donuts has to know what their customers really want, and, I'm sure, that they have done their research."

Krispy Kreme has 100 stores in the Southeast, while Dunkin' Donuts has more than 2,300 stores nationwide with annual sales of $1.2 billion.

◆ ◆ ◆

Officials from Dunkin' Donuts say they are keeping their doughnuts fresh and their coffee hot.

Customers will be the ultimate judges.

Consider an elderly Richmond couple who were eating doughnuts and sipping coffee one morning last week at the chain's store on Forest Hill Avenue.

They liked the doughnuts, even though none was made at the store.

Misses the feedback

"That's OK. These are really good," said the woman, who asked that her name and her husband's not be used.

"As long as they're fresh, that's all that matters," her husband said.

Now that he works at the central bakery, Carroll misses hearing comments like those. He also misses seeing his finished product on display at a store.

"In the retail store you see the product and you hear the comments, but you don't get that kind of feedback here," the doughnut maker said. "But we're still making them so people are out there eating [illegible]

Activity: 6 - Listening Practice Worksheet

p. Newspaper Article Dictation

Facilitator:

Ask the following questions of volunteers after the dictation. Encourage participants to risk answering the questions by reminding them that we're still developing listening skills. Help participants when necessary by re-reading relevant paragraphs.

1. How many different kinds or varieties of doughnuts are made every day?
   30
2. How many doughnuts are made every day in the centralized facility?
   30,000 or 2500 dozen dozen doughnuts
3. How long does it take to make a doughnut at the centralized bakery?
   1½ Hours
4. How much yeast is used on a weekly basis?
   10,000 lbs
5. How are the fillings put into the doughnuts?
   With a prong that, when squeezed, inserts filling into the doughnut
6. In addition to doughnuts, the centralized bakery makes:
   muffins (5 kinds) **bagels (3 kinds)**
   croissants (3 kinds) **cookies (4 kinds)**
7. Why was Richmond, Virginia chosen to test the centralized facility?
   Because the areas' roads allow doughnuts and pastries to be delivered to stores within 30 minutes.
8. Who is the primary competitor for this centralized bakery?
   Krispy Kreme
9. What is the primary issue for both this centralized bakery and its rival?
   freshness
10. What has the bakery pledged to consumers?
    Not to sell any doughnuts made more than 12 hours earlier or keeping their doughnuts fresh and their coffee hot.
11. What would you say is the main idea of the newspaper article?

Activity: 6 - Listening Practice Worksheet

p. Newspaper Article Dictation

12. What was the old concept Dunkin Donuts operated under?

Old Concept
Company used to make doughnuts at each store

13. What was difficult about the old concept?
-time consuming
-large number of workers required

14. What is the new concept Dunkin Donuts operates under?

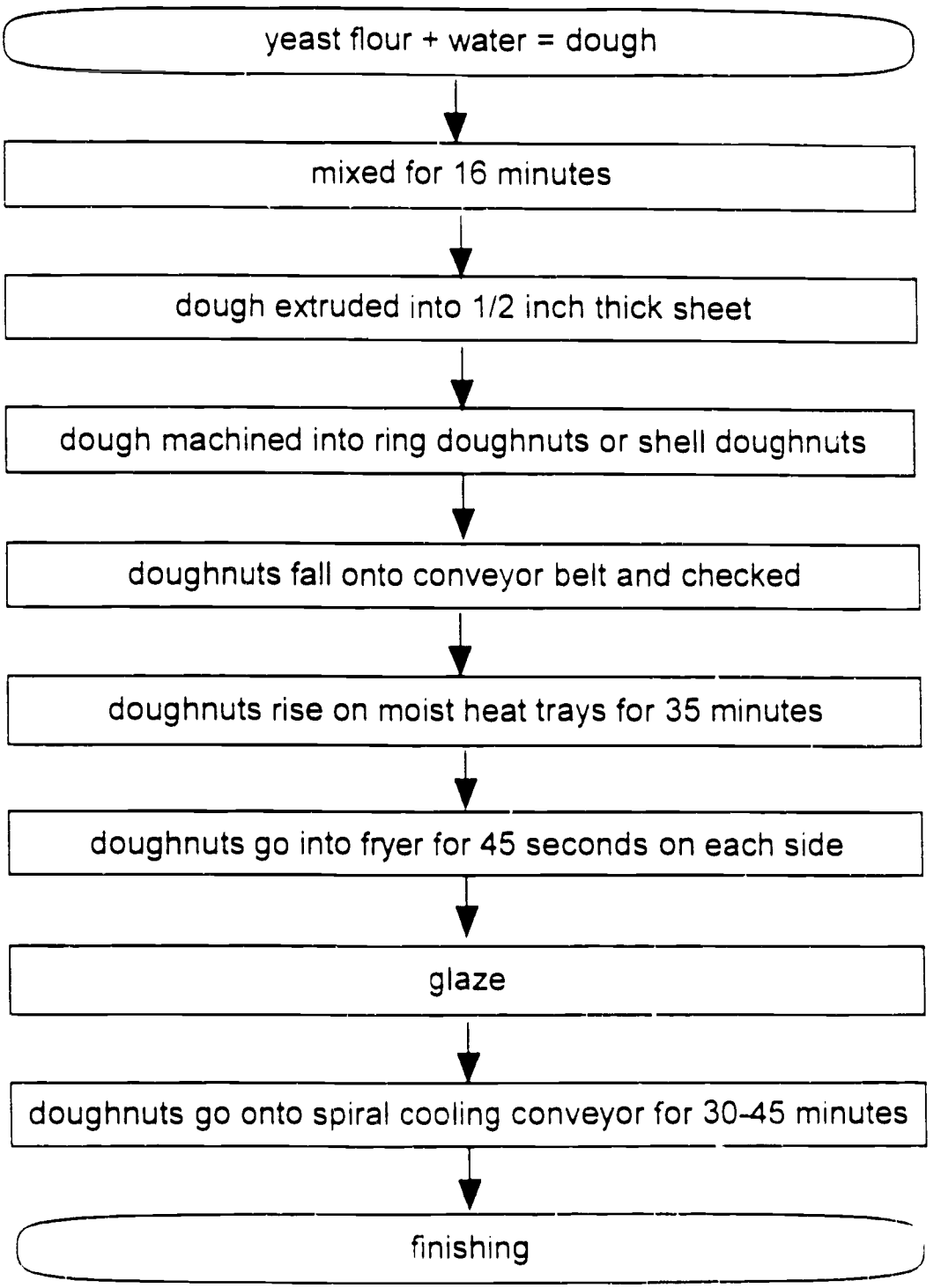
New Concept
Central Bakery

15. What are the benefits of the new concept?
-lower production costs
-expand sales outlets by distributing products from the bakery

Activity: 6 - Listening Practice Worksheet

p. Newspaper Article Dictation

16. What is the production process at Dunkin Donuts?



17. How does Dunkin Donuts production process compare with Nabisco's production process?

Activity: 6 - Listening Just For Fun

q. "Once upon a time there were four people named Everybody, Somebody, Nobody and Anybody. When there was an important job to be done, Everybody was sure that Somebody would do it. Anybody could have done it, but Nobody did it.

"When Nobody did it, Everybody got angry because it was Everybody's job. Everybody thought that Somebody would do it, but Nobody realized that Nobody would do it.

"So it ended up that Everybody blamed Somebody when Nobody did what Anybody could have done in the first place."

Facilitator:

Participants can be helped in enjoying this activity if four volunteers assume the names Everybody, Somebody, Nobody and Anybody and briefly stand everytime they hear their name called as the piece is read.

This activity is intended to provide a little comic relief at the end of Activity 6.

Activity: 7 - Giving and Following Oral Directions

Objective(s): This activity will enable participants
1. To develop an appreciation for the skills involved in giving and following oral directions.
2. To practice giving and following oral directions.
3. To develop analytical skills.
4. To reinforce listening and speaking skills.

Materials Required:
1. Two different graphic designs
2. Blank paper, pencils

You need to know:

About Following Oral Directions

1. Use active listening to follow directions. To listen actively, you must
   - Give the sender your full attention and plan what you are going to do.
   - Check to be sure that you understand the directions.
   - Clarify the task that you are to do by getting more information if needed.

2. Plan the task
   - Pay attention to key words in the directions.
   - Pay attention to the order or sequence of the directions.
   - Picture yourself carrying out the directions as they are told to you.
   - Think as the sender is talking and recreate the directions in your mind.

3. Check your understanding
   When the directions have been given, check your understanding by
   - summarizing the directions
   - asking questions if necessary

Activity: 7 - Giving and Following Oral Directions (continued)

You need to know: (continued)

About Giving Oral Directions

1. Know the correct process for completing a task yourself. The people who know what they are talking about are the people who are best able to give good directions.

2. Plan exactly what you're going to say as you give the directions. Put the steps in order.

3. Think about what materials or equipment are needed to complete the task accurately.

4. Think about the receivers of your directions. Don't talk down to the receivers but don't assume that they know more than they do.

5. If completing the task involves any personal safety issues or risk of equipment damage, it's important to include precautions in your directions.

6. Check the receiver's understanding of your directions by asking him to repeat the directions or whether he has any questions.

7. Clarify your directions if the receiver is confused and unsure of what to do. Try to understand what might be leading to the confusion.

Activity: 7 - Giving and Following Oral Directions (continued)

Directions:

1. You and your partner will take turns giving and following oral directions from each other.

2. One of you should sit down with a blank sheet of paper. Your job is to draw the picture that your partner directs you to draw.

3. The other one of you will be given the picture. Your task is to explain to your partner how to draw this picture.

4. You may not rehearse.

5. You may not show the picture.

6. You may not use any visual aids.

7. You must keep your hands at your sides.

   The object is for your partner to have a picture exactly like yours when the exercise is completed.

   When you are through, discuss the experience with your partner. Analyze what made the task so difficult. What would the two of you suggest to make the task easier and to achieve a better result?

8. Now, switch roles. You will be given another picture to direct.

Task: how to _____

Words to explain: _____

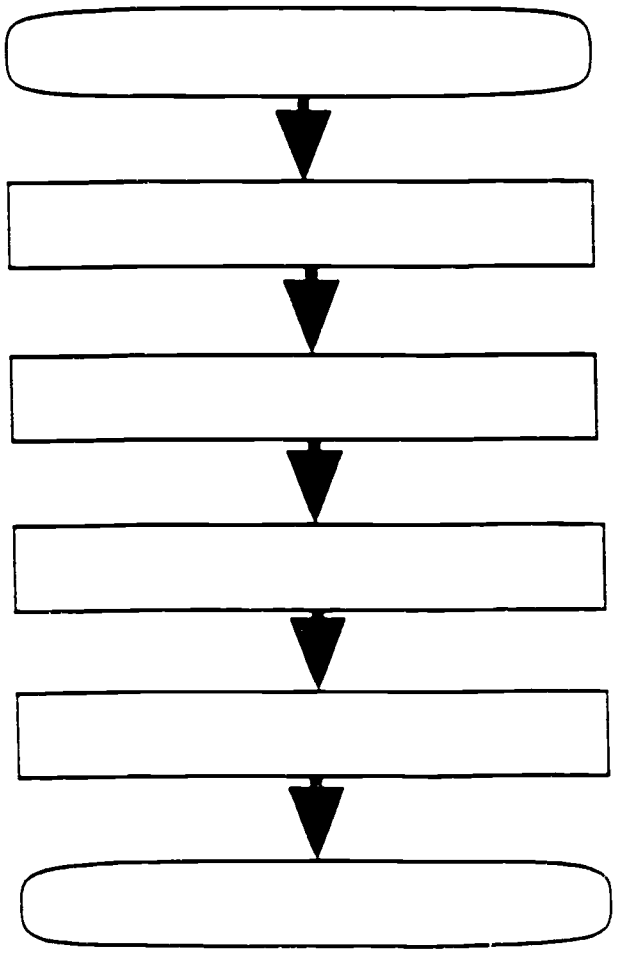
_____

_____

Materials needed: _____

_____

Main steps in performing the task:



Safety Warnings:

_____

_____

_____

_____

Task: how to _____

Words to explain: _____

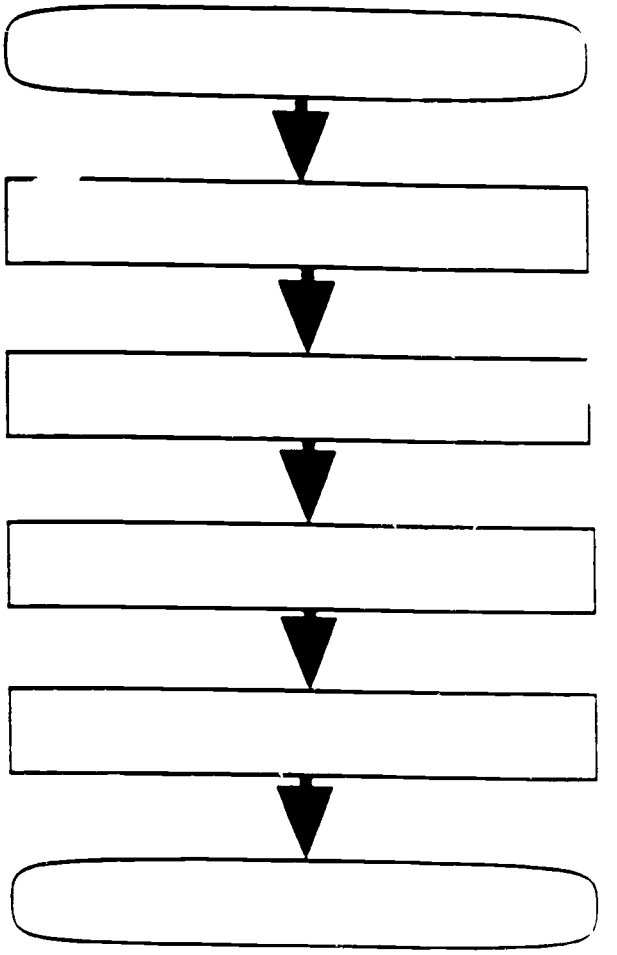
_____

_____

Materials needed: _____

_____

Main steps in performing the task:



Safety Warnings:

_____

_____

_____

_____

Activity: 8 - Planning for and Giving Oral Directions

Objective(s): This activity will enable participants
1. To develop analytical skills.
2. To reinforce all of the communication concepts to date through practice.
3. To develop minimum level reading and writing skills.
4. To develop skill in sequencing instructions.
5. To practice giving and following oral directions.

Materials Required:
1. Planning forms
2. Pencil
3. Any task materials brought by participants

Directions:

1. You and your partner were previously asked to come prepared to direct each other on a simple task from your everyday life and from your work life.

2. Use the planning form on the opposite page to help you organize your thoughts as you prepare to teach your partner these tasks.

3. When both of you are ready, take turns with your partner giving and listening to oral directions.

Facilitator:

Participants should be asked to come prepared to direct a partner in doing a task from their everyday life and from their work life. The tasks should be of the participant's choice with the stipulation that they be "doable" within the confines of the REACH program and building. For example, a participant could direct his partner on how to make a certain kind of sewing stitch, provided the participant brought all necessary materials with him to the program.

Participants who may not be prepared should be encouraged to complete a planning form with directions for wearing a dust mask or lifting heavy objects/boxes. See next page for steps.

Activity: 8 - Planning for and Giving Oral Directions

Facilitator:

Use as needed.

• Directions for Putting on a Dust Mask

1. Place the dust mask against your face with the straps hanging down.
2. Place the respirator under your chin and pull the top strap high on the back of your head.
3. Pull the bottom strap over your head and down to just below your ears.
4. Place the fingertips of both hands on either side of the nosepiece. Gently press in until the nosepiece is molded to your nose.
5. Place both hands over the mask and breathe out. If air leaks around the mask, adjust the nosepiece or straps.

• Directions for Handling Heavy Equipment and Materials

Use proper lifting techniques when moving heavy equipment and materials:
1. get a solid foot hold
2. bend knees
3. keep back straight
4. use legs and arms to lift
5. wear gloves
6. avoid pinch points

Get help with lifting when you need it - from another person or a device such as a dolly, hand truck, etc. Make sure lifting devices are in safe working order.

Activity: 9 - Sequencing Oral Directions

Objective(s): This activity will enable participants
1. To develop skill in sequencing instructions.
2. To develop analytical skills.

Materials Required:
1. Set of emergency evacuation diagrams of Nabisco facility.

Directions:

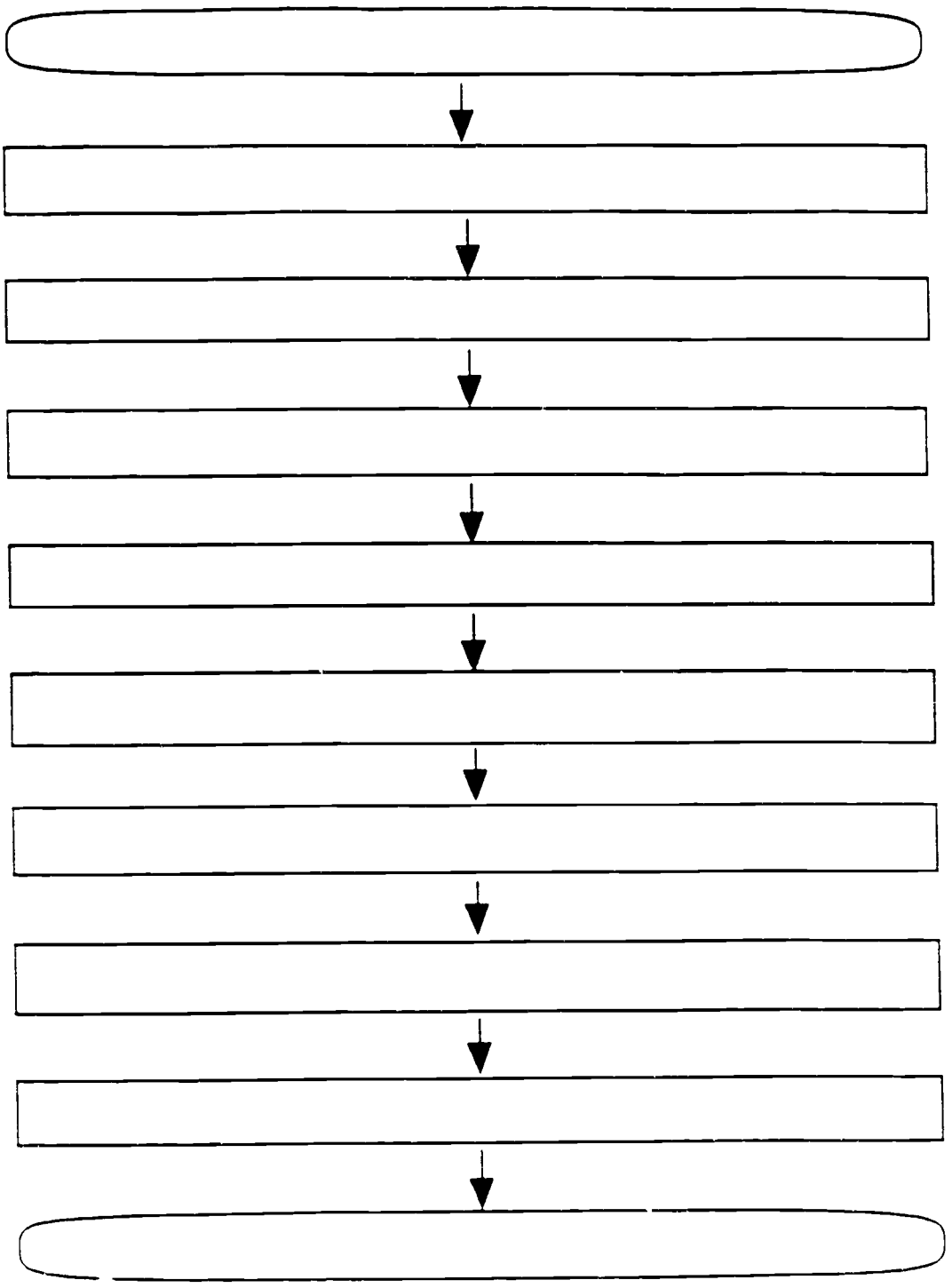
1. Study the set of diagrams on the following pages and find your work statior at Nabisco.

2. Mentally plan how to give directions for evacuating the plant from your wor station. Try to envision the route you should take.

3. Fill in the flow chart on the next page with directions for evacuating your work station in an emergency.

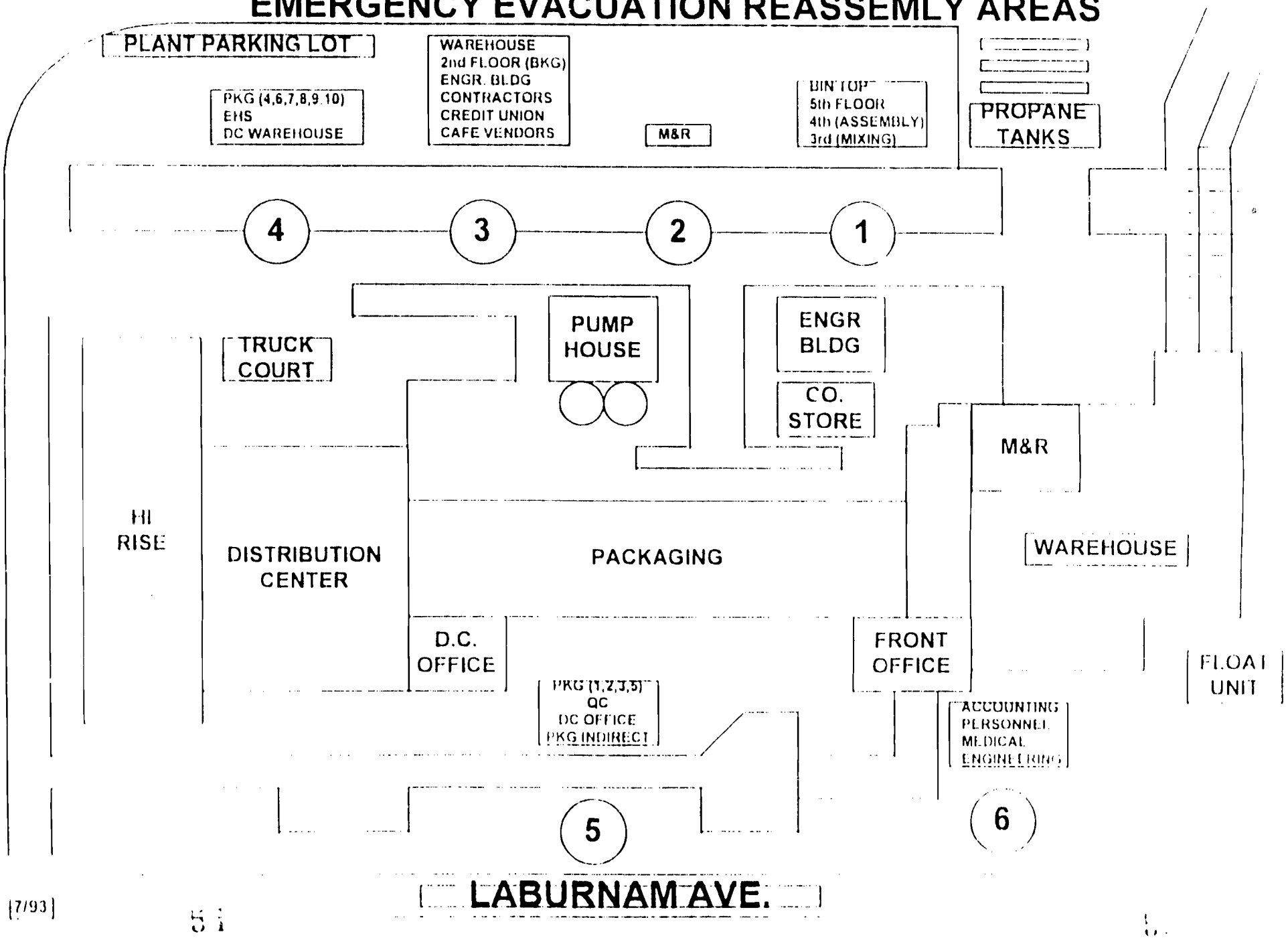
4. Be prepared to give your directions orally to other participants.

Activity 9 - Sequencing Oral Directions
Flow Chart



NABISCO, INC. RICHMOND BAKERY / D.C.

EMERGENCY EVACUATION REASSEMLY AREAS



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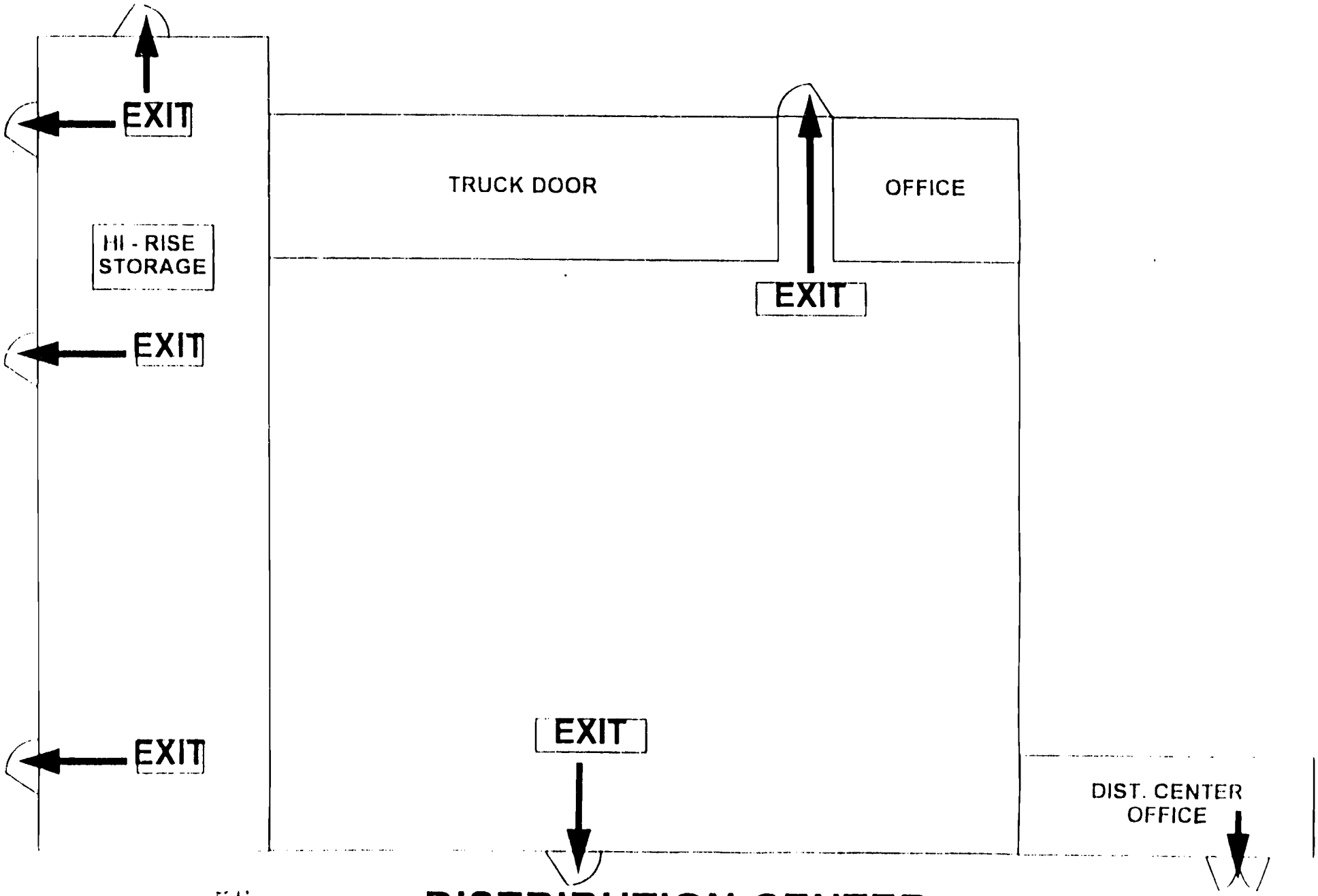
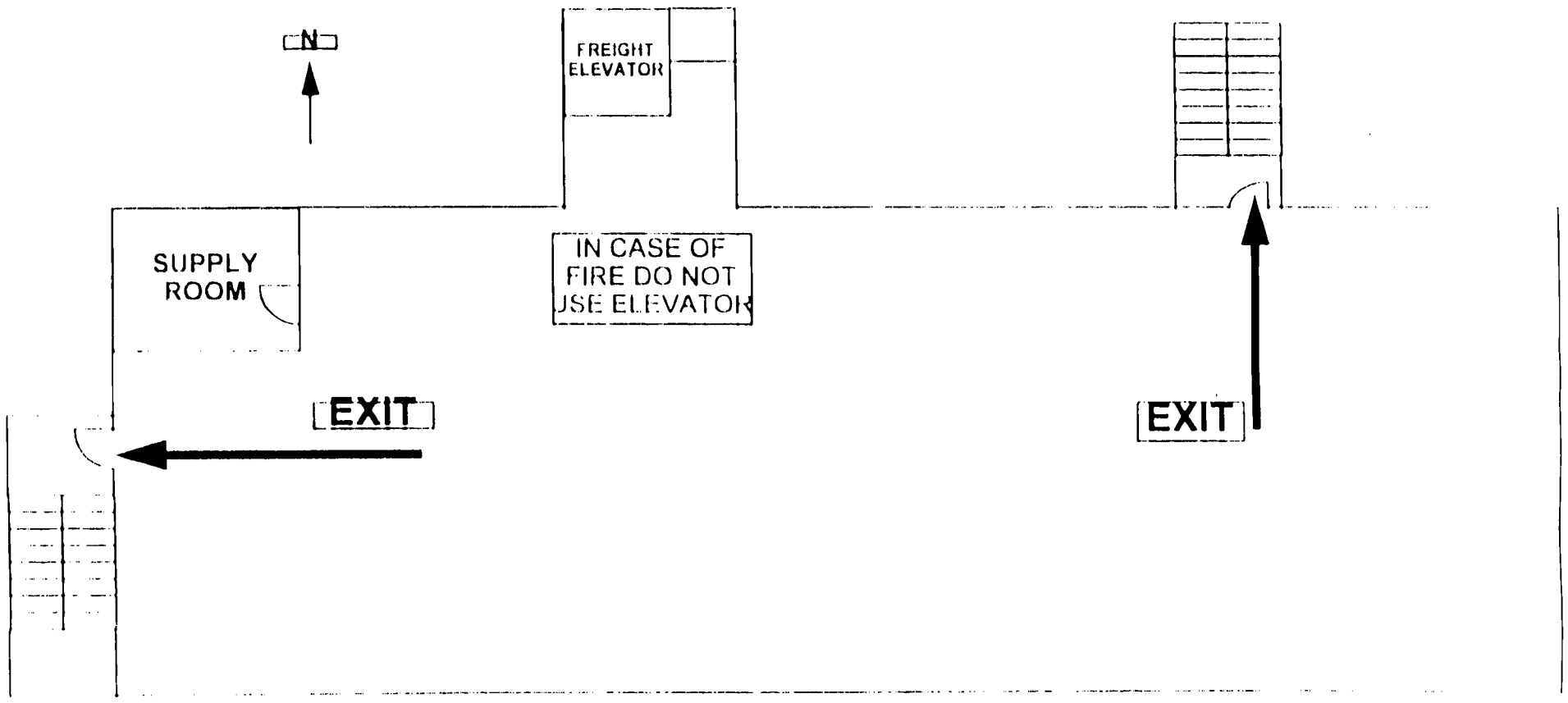


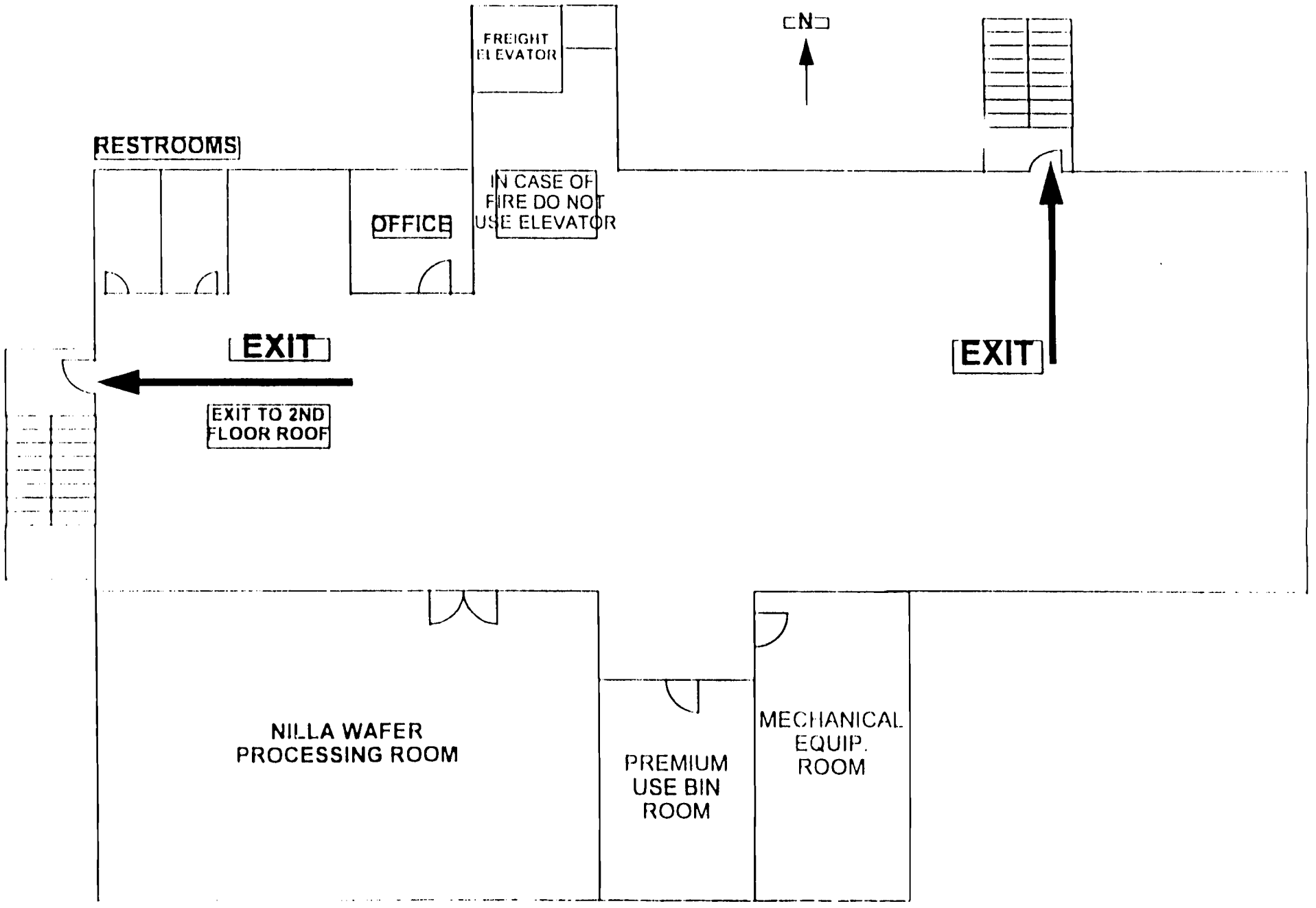
DISTRIBUTION CENTER

NABISCO BRANDS RICHMOND BAKERY / D.C.



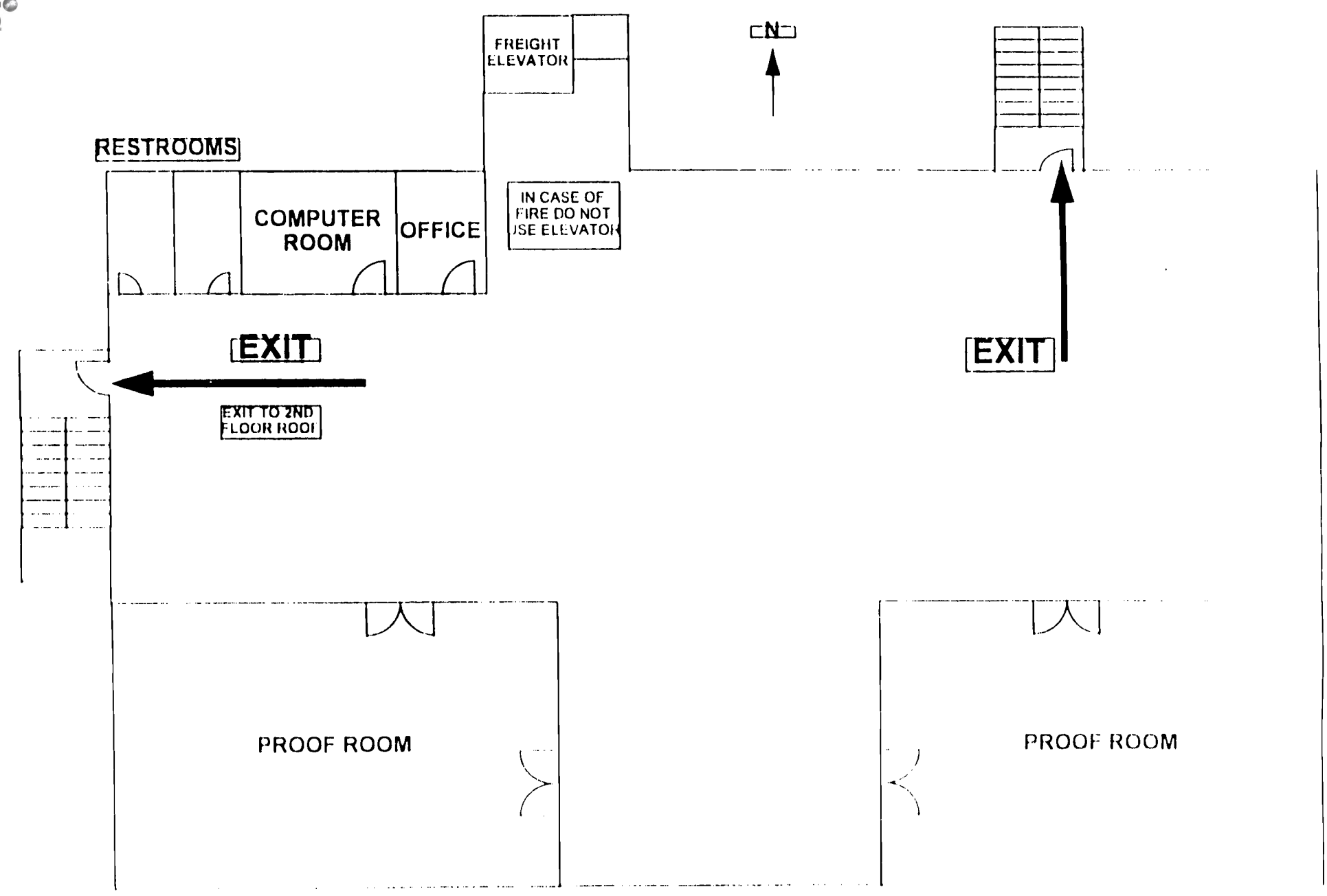
5TH FLOOR - USE BIN AREA

NABISCO, INC. RICHMOND BAKERY / D.C.



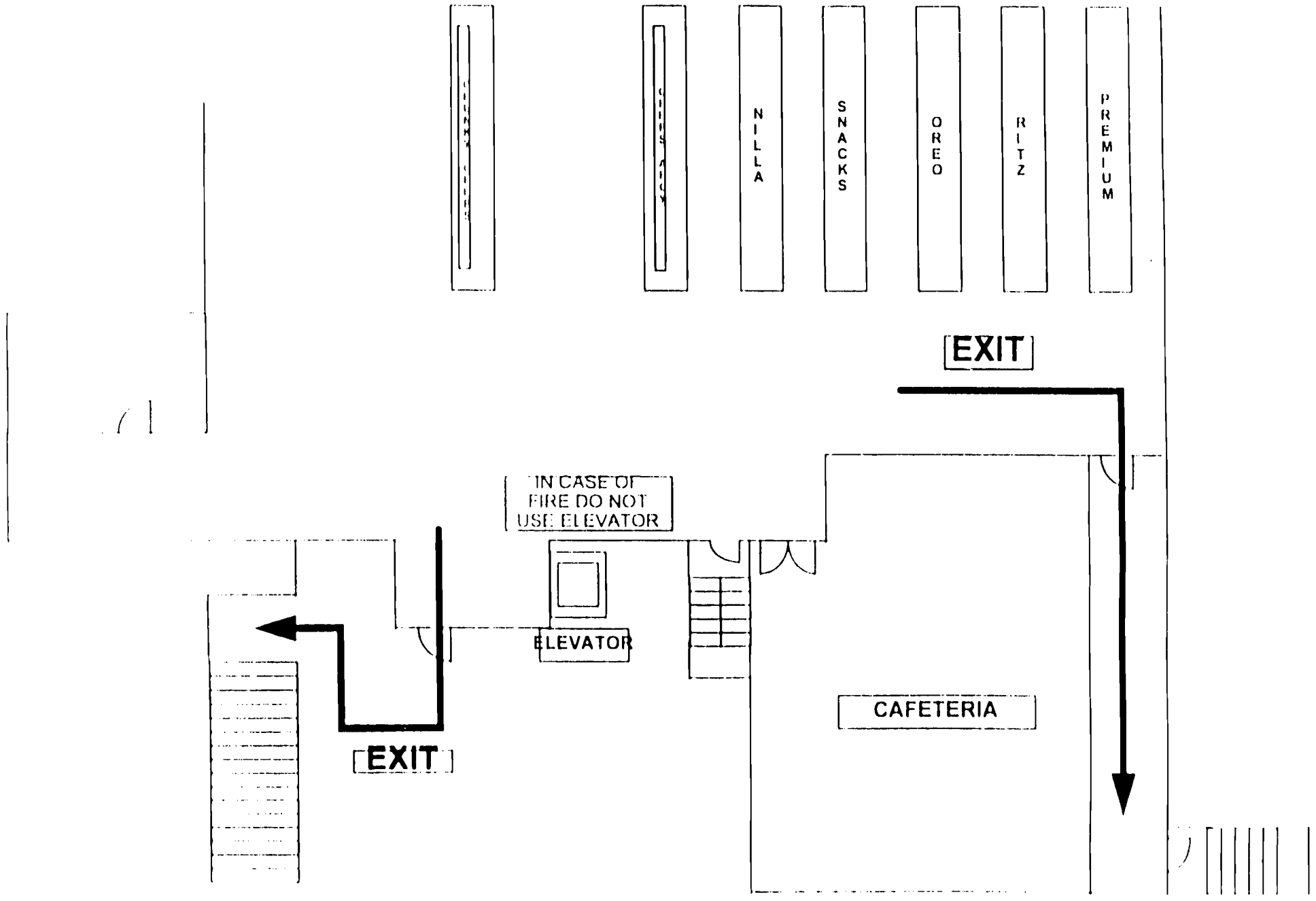
4TH FLOOR - ASSEMBLY

NABISCO, INC. RICHMOND BAKERY (D.C.)



3RD FLOOR - MIXING

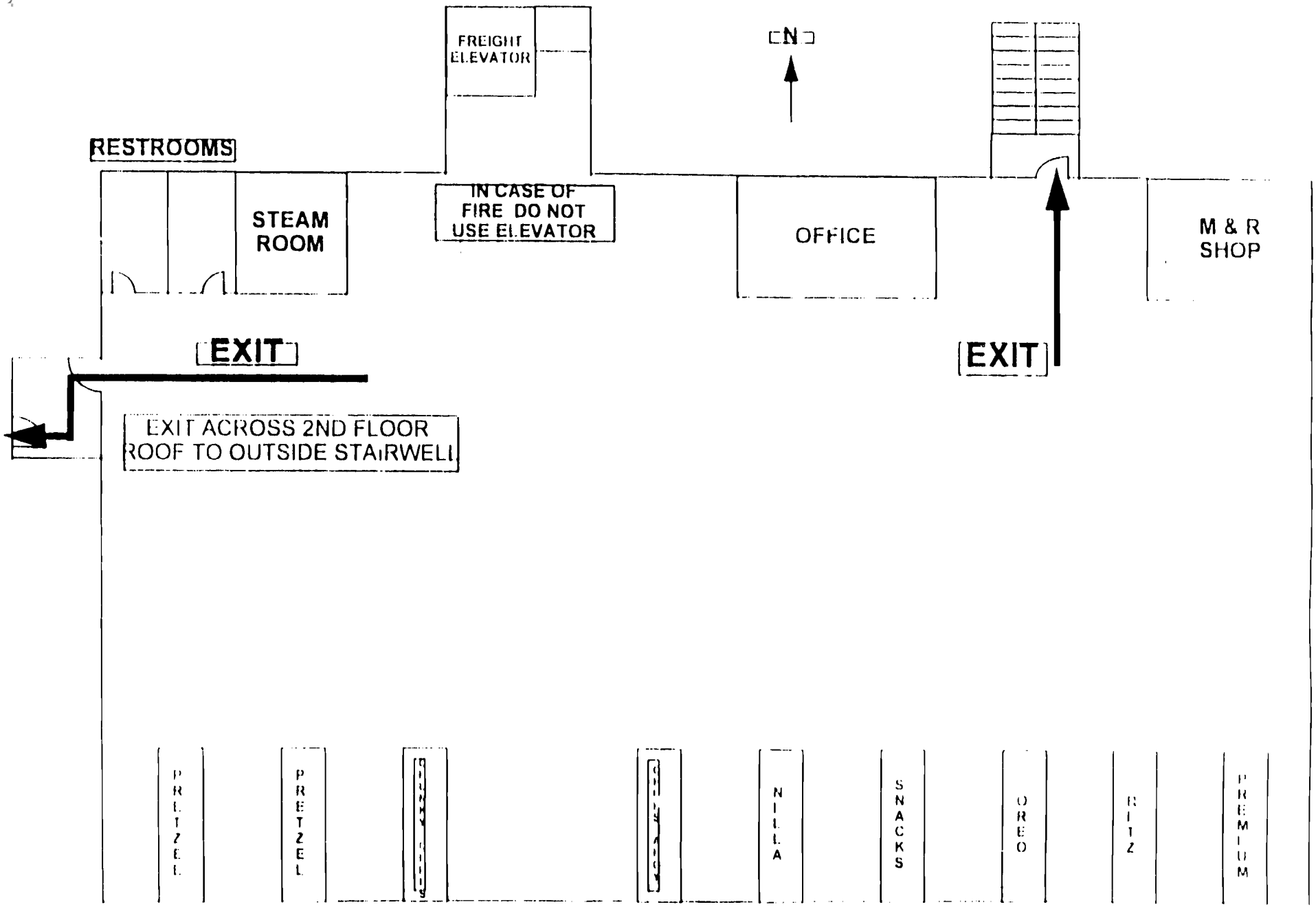
NABISCO, INC. RICHMOND BAKERY / D.C.



2ND FLOOR - SOUTH BAKE SHOP

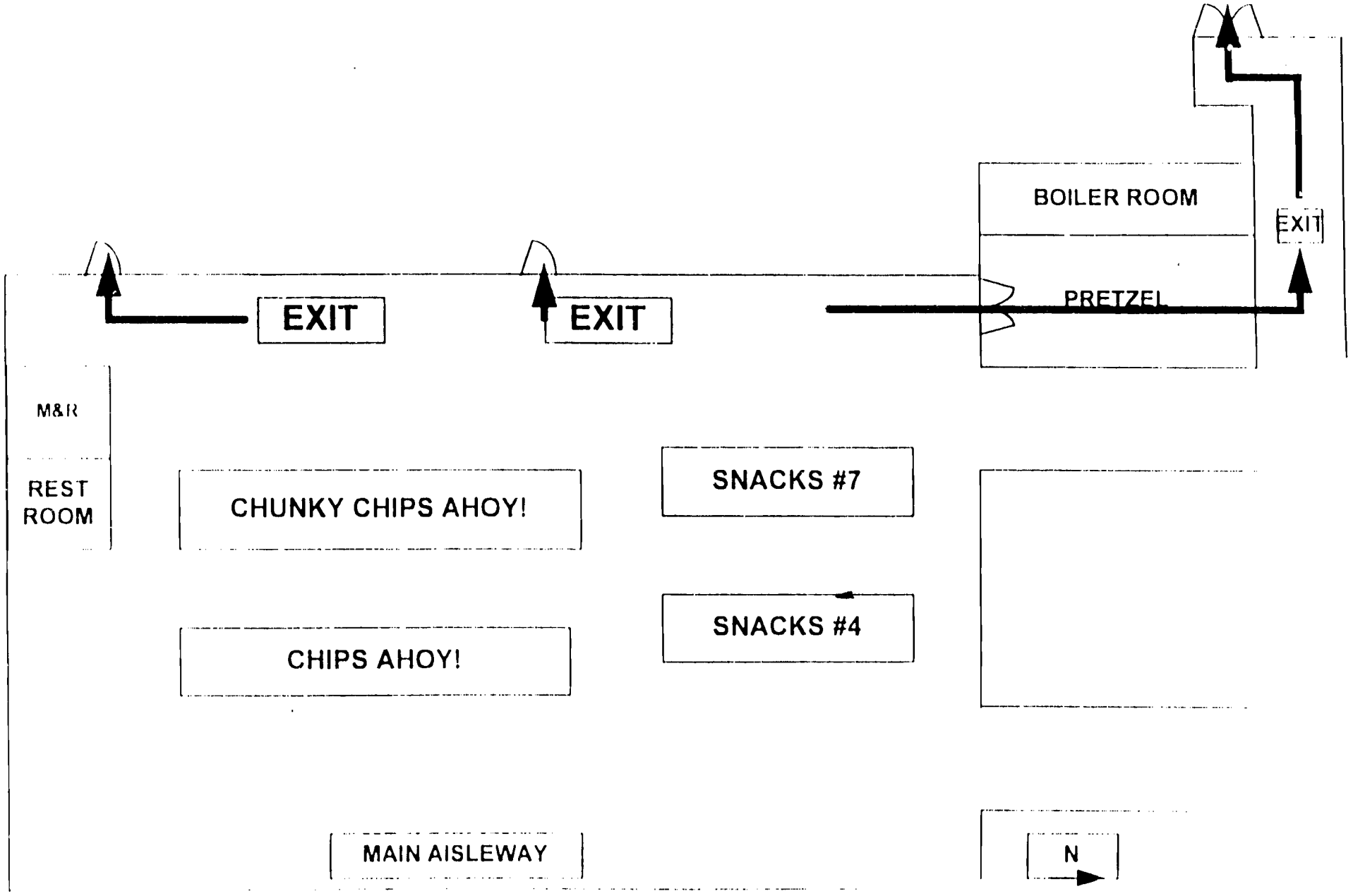
7/93

INC. RICHMOND BAKERY / D.C.



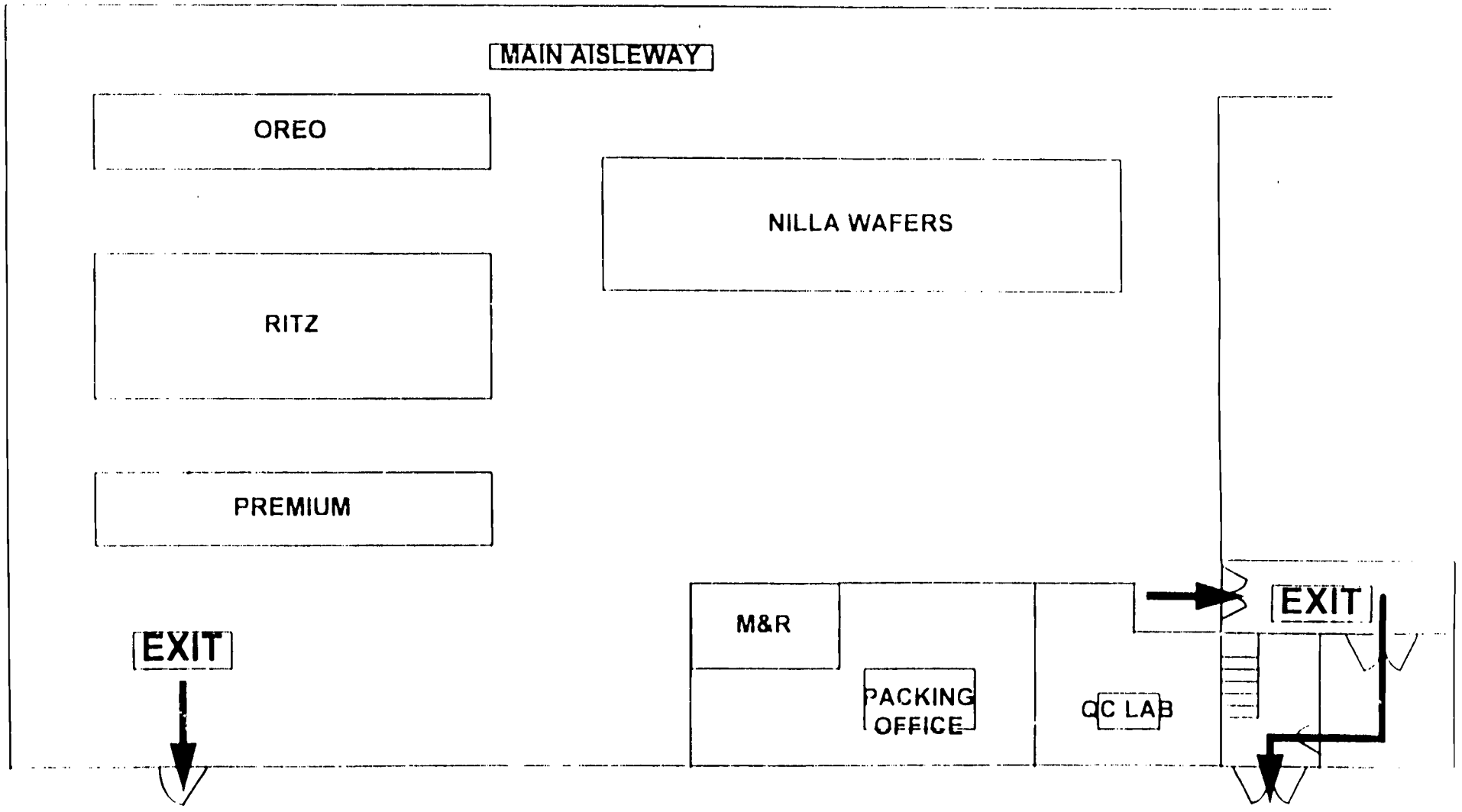
2ND FLOOR - NORTH BAKE SHOP

NABISCO, INC. RICHMOND BAKERY / D.C.



1ST FLOOR - WEST PACKING DEPT.

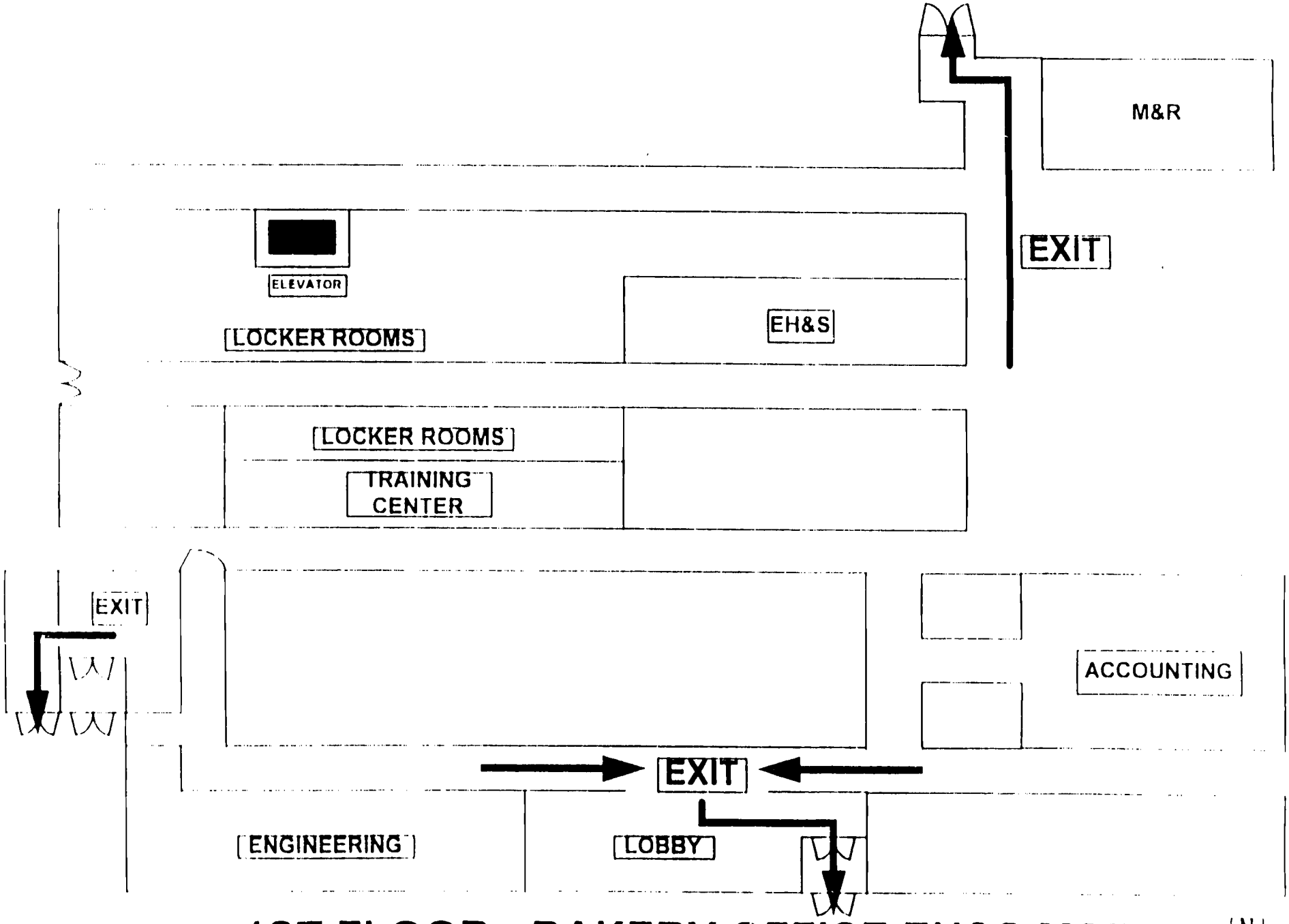
NABISCO, INC. - RICHMOND BAKERY (D.C.)



1ST FLOOR - EAST PACKING DEPT.

NABISCO, INC. RICHMOND BAKERY / D.C.

[7/93]



1ST FLOOR - BAKERY OFFICE,EH&S,M&R

NABISCO, INC. RICHMOND BAKERY / D.C.

(7/93)

Activity: 10 - Giving and Receiving Oral Directions

Objective(s): This activity will enable participants
1. To practice giving and following oral directions.
2. To reinforce all of the communication concepts learned to date.
3. To develop analytical skills.
4. To develop skill in sequencing instructions.

Materials Required:
1. Large folding map of Metropolitan Richmond area for each participant
2. Set of emergency evacuation diagrams of Nabisco® facility.

Directions:

1. You will be working with a partner. Choose one of the activities below.

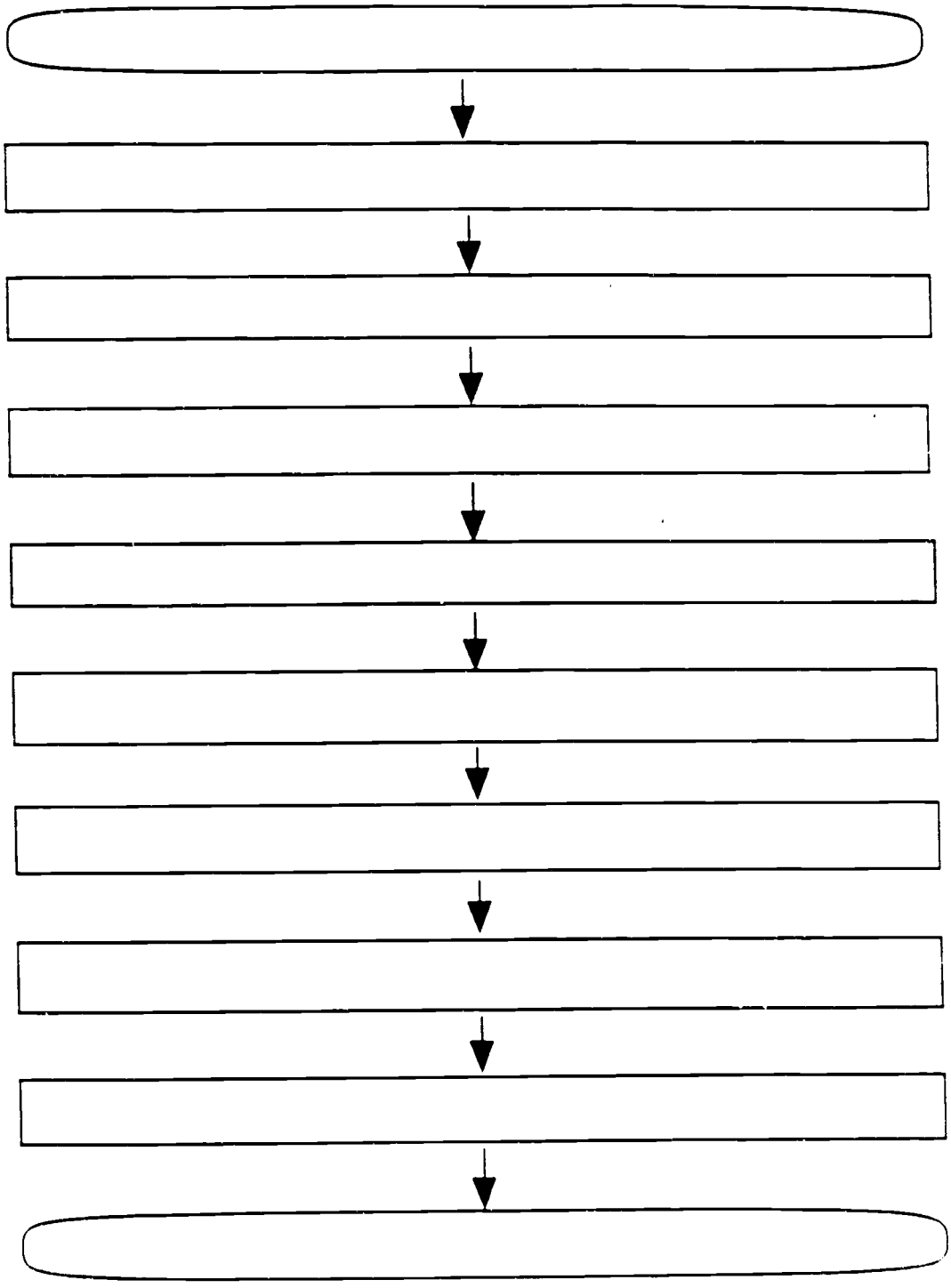
2. The object is for you to plan and give oral directions that are so clear and easy to follow that your partner, using effective and active listening techniques, will reach a predetermined point known only to you.

3. Remember the techniques you've learned for giving directions.

Activity A:
Study the map you've been given and plan (doing a flow chart) how to give oral directions for driving from the work site to your home. If you prefer, you could give directions for getting to a public place such as the baseball park, one of the regional shopping malls, etc. but do not tell your partner what the destination is.

Activity B:
Use the set of emergency evacuation diagrams again as a guide and draw a map showing how to get from the employee parking lot to your work station. Do a flow chart that shows the steps in sequence.

Activity: 10 - Giving and Receiving Oral Directions
Flow Chart



Activity: 11 - Getting Information Orally

Objective(s): This activity will enable participants
1. To practice asking and answering questions to get information they need.

Materials Required:
Information gap activity worksheets
Pen or pencil

You need to know:

About Asking Questions

1. Decide what information you need to have about a situation by asking the "five W's and how" questions to yourself first. Examples:
   a. Who (should page the mechanic when one is needed?)
   b. What (should I do if the ovenband stops?)
   c. When (should I do a cream-up?)
   d. Where (should I check to see which bins need to be fumigated?)
   e. Why (did the belts shut down and the red light start flashing?)
   f. How (many doughs are in the proof room?)

2. You need answers to the "five W's and how" questions in order to do your job effectively and when you don't have those answers, you have an information gap.

3. To close or fill in your information gap, determine who is the best or most likely person to have the answer(s) you need.
   a. Co-workers in the same department
   b. Co-workers in another department
   c. Your internal customer or the person who gets the product after you've done your job.
   d. Your supervisor

4. Generate your questions by
   a. Planning ahead exactly what information you need.
   b. Asking your questions as clearly as you can.
   c. Listening carefully to the answer(s) you get.
   d. Taking notes if necessary.
   e. Evaluating the answers in light of your job.
   f. Repeating the cycle if necessary.

Activity: 11 - Getting Information Orally (continued)

You need to know: (continued)

5. There are two basic kinds of questions:
   a. Open questions don't require a specific answer. People often include their opinions, thoughts and feelings. Example - How should I prepare to measure product breakage?

   b. Closed questions are narrow and usually require a specific answer. People tend to answer closed questions in a direct way, often in a single word or sentence. Example - Should I enter the empty bag weight into the computer?

Directions:

1. You and your partner will have different information for the same incom[illegible] graphics.

2. Each of you must correctly fill in your graphics by getting the missing information from your partner through the questions you ask.

3. You should not look at your partner's information.

4. Carefully analyze the information you do have first.

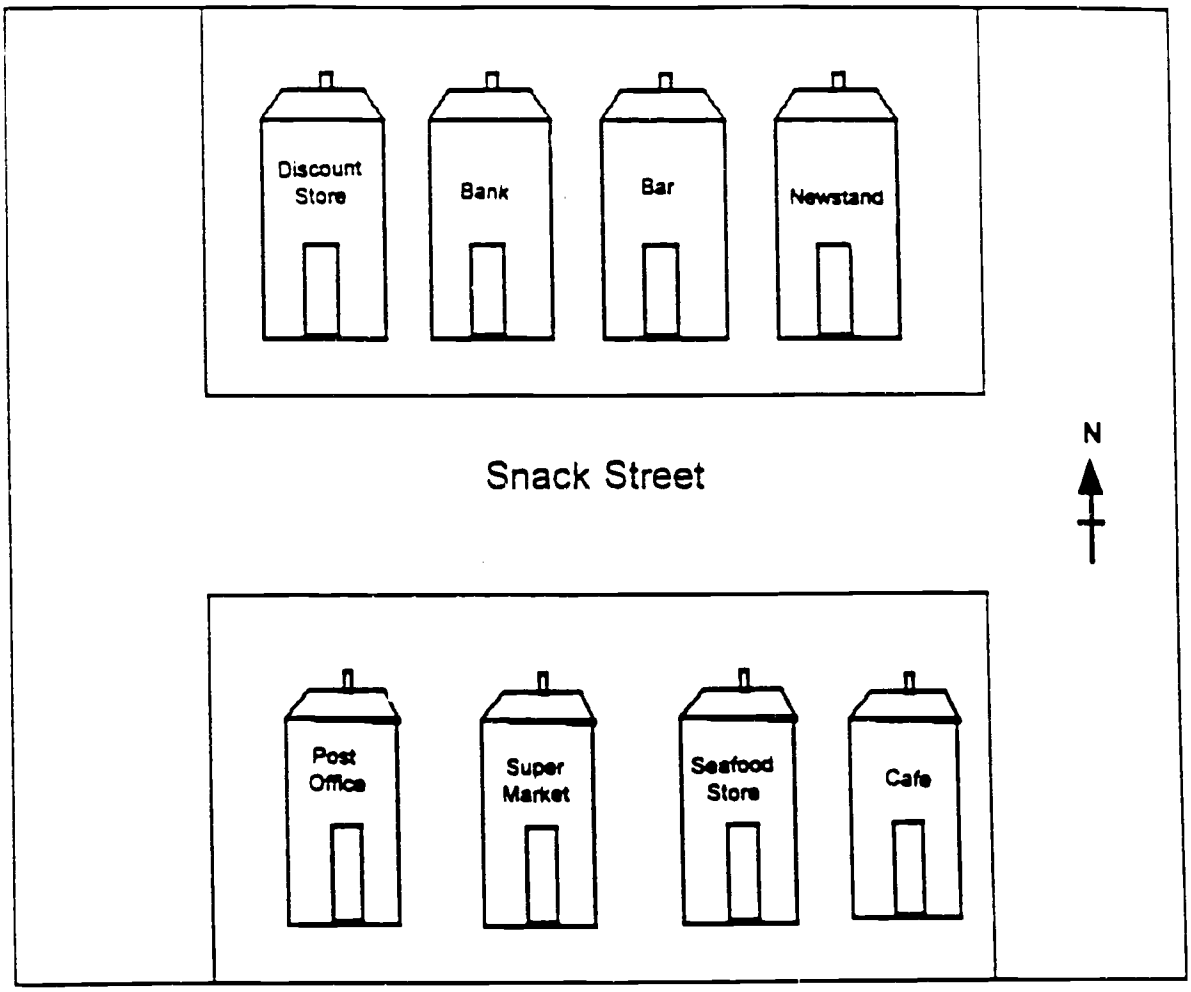
5. Then determine what information you need to get.

6. You and your partner should then ask and answer each other's questions until you both have all the information you need.

Activity: 11 - Getting Information Orally

Exercise 1 - Snack Street

1. Fill in the correct name for each of the buildings on Snack Street below.
2. Remember the techniques for asking questions.
3. Use your reasoning and common sense to name the buildings.



NABISCO FOODS GROUP

47080

EQUIP DESCRIPTION | EQUIP AVAILABLE | CRAFT

WORK REQUESTED:

DATE	REQUEST BY / APPROVED BY	COMPLETE SIGN OFF: DATE	CRAFT PERSON	SUPERVISOR

WORK ORDER TITLE

JOB NUMBER			PLANNER	SUPV ASSIGNED	SHIFT	ACTION CODE	COMPONENT JOB	

MOORE SPEEDISET MCP PATENTED 226

NABISCO FOODS GROUP

47079

EQUIP DESCRIPTION | EQUIP AVAILABLE | CRAFT

WORK REQUESTED:

DATE	REQUEST BY / APPROVED BY	COMPLETE SIGN OFF: DATE	CRAFT PERSON	SUPERVISOR

WORK ORDER TITLE

JOB NUMBER			PLANNER	SUPV ASSIGNED	SHIFT	ACTION CODE	COMPONENT JOB	

MOORE SPEEDISET MCP PATENTED 226

NABISCO FOODS GROUP

DEPARTMENT | COST CENTER | WORK ORDER NO: 47078 | EQUIPMENT

EQUIP DESCRIPTION | EQUIP AVAILABLE | CRAFT

WORK REQUESTED:

DATE	REQUEST BY / APPROVED BY	COMPLETE SIGN OFF: DATE	CRAFT PERSON	SUPERVISOR

WORK ORDER TITLE

JOB NUMBER			PLANNER	SUPV ASSIGNED	SHIFT	ACTION CODE	COMPONENT JOB	

Activity: 11 - Getting Information Orally

Exercise 2 - Work orders

1. On the opposite page are blank work orders.

2. You and your partner will be given different completed work orders.

3. Use the information that your partner has on his completed orders to fill in the heavily outlined areas on the blank work orders.

4. Ask and answer questions with your partner to get the information you nee

Activity: 12 - Giving and Getting Information Via Telephone

Objective(s): This activity will enable participants
1. To practice asking for and receiving information on the telephone.

Materials Required:
1. Telephone
2. Telephone books

You need to know:

About Listening and Speaking to Others

1. Your attitude and your ability to relate to other people (in person and over the telephone) are shown in the way you speak and in the attention you give when you listen.
2. Attitude and ability to relate to others make up about 85% of job success.
3. Prepare to use the telephone by deciding:
   a. How you will introduce yourself.
      When answering your work phone, say the name of your department and then give your name. When making a call, greet, give your name and department and ask for the person you need.
   b. Who you need to speak with.
   c. Why you are calling
   d. What background information you need to give.
   e. What questions you need to have answered.

Activity: 12 - Giving and Getting Information Via Telephone (continued)

Directions:

1. Fill in the charts with the information you gather as you make the following phone calls.

2. You may complete this activity at home as needed.

3. To gain practice, you must make each call yourself.

CALLS for Chart A

1. Call at least three suppliers of building materials to find the lowest prices for 2" x 4" studs in eight foot lengths.

2. Choose a city you would like to visit. You must be there by 9:00 p.m. on Friday. What will be the best way to get there - plane, train or bus?

CALLS for Chart B

3. You have to send a 20 pound package to Los Angeles, California, for delivery no later than 12 noon on next Tuesday. The Zip Code for the delivery is 90210. You need to send the package the cheapest way possible. Practice your telephone skills and get the information you need to make a decision.

Activity: 12 - Chart A

	Supplier 1	Supplier 2	Supplier 3	Airline	Amtrak	Bus
Step 1. Greeting- "Hello. This is _____."						
Step 2. "With whom am I speaking?"						
Step 3. "I'd like to get some information about _____." OR						
Step 4. "I'm working on a project for a class and I need _____."						
Step 5. Notes (Answers to your questions)						

	Post Office	UPS	Federal Express	Other	Other
Step 1. Greeting- "Hello. This is ."					
Step 2. "With whom am I speaking?"					
Step 3. "I'd like to get some information about ." OR					
Step 4. "I'm working on a new project for a class and I need ."					
Step 5. Notes (Answers to your questions)					

Activity: 13 - Communicating Within a WorkGroup

Objective(s): This activity will enable the participant
1. To develop an awareness of the concept of workplace culture.
2. To identify the workplace culture at an organization.

Materials Required:
None

You need to know:

About Workplace Cultures

Every workplace is different in that every workplace has its own way of doing things; it's own culture. Listening actively will help you understand the culture of your workplace and your co-workers.

To understand the culture of your workplace, you have to learn four things about it:

1. The goals of the particular workplace. What are you expected to do?
2. The values of your workplace. What are the most important priorities here? What are the standards to which work has to be done or behavior has to be focused?
3. The customs of your workplace. What are the rules or procedures that are followed here?
4. The networks in your workplace. How does information flow here? Who talks to whom?

Directions:

1. Use the chart on the opposite page to organize your thoughts and notes from our discussion.

Activity: 13 - Communicating Within A WorkGroup

	Workplace #1	Workplace #2	Workplace #3
Goals			
Values			
Customs			
Networks			

Activity: 14 - Communicating With Co-Workers

Objective(s): This activity will enable participants
1. To practice techniques for communicating effectively with co-workers.

Materials Required:
None

You need to know:

About Listening and Speaking to Co-Workers

Please DO	Please DON'T
1. Learn the workplace culture-the written (if any) and unwritten rules of co-worker communication.	Ignore the acceptable ways of communicating in your workplace.
2. Maintain an upbeat, "can do" attitude.	Be influenced by negative shop talk.
3. Learn the workplace jargon or special language.	Hesitate to ask questions when you need information.
4. Be mindful of your non-verbal language and behavior.	Infringe on other's personal space.
5. Remember that the tone of your voice sends more of a message than the actual words say.	Forget about all the non-verbal messages you send.
6. As much as possible, choose a good time to discuss a problem.	Try to discuss problems when others are rushed, distracted or upset.
7. Describe the problem carefully, avoiding personal criticism.	Let discussions of workplace problems become attacks on anyone's compentence.
8. In general, concentrate on the problems themselves; not on blaming.	Be distracted by the way problems are stated by your co-workers.

Activity: 14 - Communicating With Co-Workers (continued)

Please DO	Please DON'T
9. Limit the amount of personal information you share at the workplace.	Allow your personal life to interfere with your workplace responsibilities.
10. Use the active listening techniques with your co-workers giving supportive feedback when and where possible.	Let your emotions get out of control.

Directions:

1. Separate into occupational groups of no more than four people.

2. Each group member should share their perspective of a workplace communication with a co-worker (no names, please) that could have been improved if they or the co-worker had used more effective communication techniques.

3. Within your small groups, decide on several of the situations to discuss with the total group. Limit your discussions to situations about:
   a. telling co-workers about workplace needs or problems or
   b. telling co-workers on the next shift about the current status of an assignment station, piece of equipment, etc.

4. Add to your list of Please Do and Please Don't as the total group discussion unfolds.

Activity: 15 - Communicating With Supervisors

Objective(s): This activity will enable participants
1. To develop an understanding of an employee's roles and responsibilities in employee/supervisor communications.

Materials Required:
Pen or Pencil

You need to know:

About Your Responsibilities as an Employee

1. One of your most important responsibilities is to let your supervisor know about the work that you're doing.

2. Make every effort to learn what your supervisor expects you to tell him and how and when you should tell him. Learn what information is critical (requiring immediate notification of your supervisor) and what information is not as important. Generally, your supervisor wants to know about any work situation that has an impact on how he does his job.

3. Never feel that you shouldn't ask for information or any assistance that's needed to do your job. If you don't know how to do a job task, let your supervisor know.

Activity: 15 - Communicating With Supervisors (continued)

You need to know:

About Communicating With Your Supervisor

Remember To:	Try Not To:
Follow the standard operating procedure when communicating with your supervisor Understand as much about a situation as you can before talking to your supervisor Focus on the facts that you're giving to your supervisor Listen actively to your supervisor. Respond to him in accordance with what he asked; not what you think he said. Listen actively so as not to become confrontational or defensive or apologetic because of a misinterpretation of what was said.	Go against company policy or workplace culture in talking with your supervisor. Give inaccurate or insufficient information to your supervisor. Focus on your supervisor's personality or the negative influences of your co-workers. Don't blame other people for problems. Show negative behavior that will only work against you.

Directions:

1. Analyze communication situations you've had with your supervisor over the past few weeks Think about situations in which you were given information or directions by your supervisor. Also, think about situations where you had tc give your supervisor information or tell him about a problem.

2. Use the chart on the opposite page to organize your thougnts as we prepare to discuss some of these supervisory communication situations.

Activity: 15 - Communicating With Supervisors

	Equipment	Materials	Procedure or Production Process	Labor/Scheduling
What (is the situation) or What (happened)				
When				
Where				
Why				
How				

Activity: 16 - Group Behavior

Objective(s): This activity will enable participants
1. To practice identifying positive and negative group behavior.

Materials Required:
1. Teacher dictated group communication materials.

You need to know:

About Group Behavior

Just as each person has a special personality, each group of people develops a personality also. The group's personality is influenced by the roles each member takes on. Group members tend to take on roles that are an extension of their own personality - being a leader or a joker; being a quiet observer or an agitator and so forth.

The important thing to understand is that the behavior of each group member will affect the group's ability to achieve the goal that should be common to everyone.

Behavior that Helps a Group	Behavior that Hurts a Group
1. opening up discussions	1. dominating discussions
2. contributing ideas	2. discouraging ideas
3. explaining to new members	3. playing
4. asking questions	4. blocking development of ideas
5. answering questions	5. "lobbying" for a personal or special interest
6. asking for opinions	6. trying to get undue recognition or attention
7. offering opinions	7. _____
8. taking notes	8. _____
9. listening to others	
10. _____	

Activity: 16 - Group Behavior

Directions:

1. Listen carefully as comments people have made in group discussions are read

2. We will discuss which comments are positive behaviors and which are negative behaviors.

3. Refer to the lists above and add to them if you'd like.

Facilitator:

Read these statements one by one and allow the participants time to decide on the kind of group behavior demonstrated by each comment.

1. You have the wrong idea! Listen, let me straighten you out about a few things.

2. Hey, I was talking! I haven't made my point!

3. With all due respect to what you said, I see the problem from another perspective.

4. That idea sucks! It'll never work.

5. Let's give some other people a chance to speak before we reach a decision.

6. That's enough from you. Why don't you sit down, shut up, and give someone else a chance to talk.

7. We've always done it this way.

8. It'll never fly.

9. Yes, but....We've tried that before.....If it ain't broke, don't fix it

10. Don't rock the boat.

Activity: 17 - Group Dynamics

Objective(s): This activity will enable participants
1. To develop an awareness of the stages of group dynamics.

Materials Required:
None

You need to know:

About Group Dynamics
Group dynamics refers to the collective pattern of behavior that unfolds as any group of people begin working together towards a common goal. There are several predictable stages of group dynamics and they are universal.

1. At first, a group leader seems to emerge from within the group and most members seem content to follow the leader while they "sort out" other group members and the job the group has to accomplish.

2. Next, and without most group members even realizing it, the members arrange themselves according to their roles, their influence within the group and their expertise.

3 In the next phase,group members become more related and develop a sense of belonging to the group.

4. The last stage of group dynamics begins when members actually begin working and communicating freely with each other in accomplishing the common goal of the group.

Directions:

1. The remaining activities in this module will require communicating within a group.

2. In addition to practicing and improving your listening, speaking, and group participation skills, observe the dynamics of the various groups.

Total Group
Listening

PINK - MAXIMUM LEVEL

Activity: 18 - Group Decision Making

Objective(s): This activity will enable participants
1. To understand three of the ways a group reaches a decision.
2. To practice making decisions within a group.

Materials Required:
1. Paper
2. Pen or pencil

You need to know:

About Group Decision Making
Groups of people have three basic ways of reaching decisions.

1. Dictatorship. A single group member takes over and makes the decisions for the entire group.

2. Majority Rule. Each group member votes on the decision to be made and the majority wins.

3. Consensus. Each group member decides on the one decision or solution that is acceptable enough so that the entire group is able to support or live with the decision. This method takes time, communicaiton, open-mindedness, creative thinking and total participation. It is the most deisrable way to reach a group decision because everyone wins.

Activity: 18 - Group Decision Making (continued)

DINING ROOM STAFF - 3RD Shift

Before leaving each night, you must:

-vacuum carpeting and wet clean tile foyer

-discard flower centerpieces as necessary/refill containers

-change tablecloths

-refill salt and pepper shakers and return them to the tables

-return chairs to tables

-set tables with napkins, silverware, glasses, and coffee cups inverted

-change menus

-add daily special to menus

Activity: 18 - Group Decision Making (continued)

Directions:

1. Separate into groups of five members.

2. Pretend that four of the group members work the evening shift in the restaurant of the best resort hotel in the area.

3. The fifth group member will act as an observer of the group.

4. Go over the notice on the opposite page that was on the bulletin board at the restaurant.

5. Each of you should number the items listed on the notice in the order you think they should be done.

6. Then, work together as a group to reach a decision about the most efficient order for the duties.

7. Be ready to express and defend your opinions but practice good group participation skills.

Activity: 19 - Demonstration Production Line

Objective(s): This activity will enable participants
1. To demonstrate an understanding of group process.
2. To practice effective communication within a group.
3. To practice group decision making skills.

Materials Required:
1. Demonstration Production Line Situation Materials
2. Pen or pencil

You need to know:

Techniques for Being a Successful Group Participant

Understand the Group's Members

Upon joining a group, learn the names of the other group members.
Learn all you can about each person's abilities and attitudes.
Look at group members who are talking. Scan others in the group for non-verbal signs of interest or disinterest.
Decide who the group's leaders are.

Understand How the Group Makes Decisions

Identify what the groups standards are. What does the group consider to be acceptable ways to resolve conflict, etc.?
Determine what the groups goals are and what the plans are for reaching the goal.

Use Effective Communication Skills

Always use positive behaviors (verbal and non-verbal).
Avoid negative comments and excessive talking.
Use active listening techniques when appropriate.

Activity: 19 - Demonstration Production Line (continued)

Directions:

The Situation

Nabisco® has been invited to participate in an upcoming World's Fair. It has been decided that the company will have a demonstration production line that will actually be a mini bakery for only one product. The public will be able to view the production process from start to finish and they will then be able to purchase the cookies that they have just seen being made.

The facility for the demonstration line does not yet exist and can be built to meet the mini bakery's needs. A special rail line has been built to the site of the Fair and an excellent highway system is in place also.

The Challenge

The REACH participants have been asked to contribute (based on their job knowledge) to the planning of the demonstration production line from start to finish.

You need to consider:

1. The need to maintain and even build upon the excellent public relations the company enjoys.
2. The need to create a totally functioning yet scaled down production line with a minimum investment.
3. The need to produce a consistently high quality product, seven days a week from 10:00 a.m. to 10:00 p.m. (the hours of the Fair).
4. The need to produce and package the product for an estimated 25,000 fair goers daily.

Part A

1. Separate into job groups (mixers, utility, etc.)

2. As a job group, envision what your department would be like in the above situation. Make the following decisions:

   a. the single product you think should be produced. What factors influenced your decision?

   b. what the basic requirements would be for your department to "set up" its duties. Which machinery and/or equipment would be needed?

   c. what job positions would be needed and how many people should be scheduled over 12 hours to fill those positions?

   d. what policies and procedures should your department put in place to contain costs?

   e. what policies and procedures should be put in place to facilitate being on public display? (Uniforms, communication methods, sanitation procedures, etc.)

   f. what recommendations would you make to the designer of the facility to ensure that your department's needs for space, safety, noise control, etc., are met.

Part B

1. Now that each job group has reached a decision about each department's needs, as a total group (all occupations together) discuss the same factors and come to a total group decision on each.

2. This is only an exercise. There are no right or wrong answers. This is an opportunity to put into practice all the communication skills you've learned to date.

Problem Solving

To the Facilitator:

The curriculum is color coded to indicate levels of difficulty. Yellow represents Minimum Level, blue represents Moderate Level, and Pink represents Maximum Level.

These levels correlate to the benchmarks established by employees and the results of the assessment process validated for selected jobs at the Nabisco Richmond Facility.

Table of Contents
Problem Solving Skills

Content Outline

1. The Problem Solving Mindset

2. A Problem Solving Process
   a. Identify and clarify the problem
   b. Analyze the problem
   c. Develop possible solutions
   d. Decide on and implement a solution
   e. Evaluate the solution
   f. Implement alternative solutions as needed
   g. Recycle the entire process as needed

Minimum Level Problem Solving

3. Solving Problems of Relationships Between Two Things
   a. If....then....
   b. Cause to effect
   c. Reason to result
   d. Parts of a whole
   e. Class and members
   f. General to specific
   g. Occupational problems

Moderate Level Problem Solving

4. Solving Problems with a Limited Number of Options
   a. Deductive Reasoning
   b. Vertical Thinking
   c. Flow Charting
   d. Applying the problem solving process to occupational problems

Maximum Level Problem Solving

5. Solving Problems with an Unlimited Number of Options
   a. Understanding General Rules and Principles
   b. Flow Charting
   c. Applying the problem solving process to occupational problems

Cluster
Problem Solving
YELLOW

Activity 1 - Problem Solving Mindset

Objective(s):
1. To establish a foundation and mindset for the module on solving problems.

Materials Required:
1. Two desks or other large objects placed at a 90 degree angle to each other so as to create an obstacle at the entrance to the REACH building.
2. "Do not disturb" sign

Directions:

1. Placing an obstacle with a Do not disturb sign on it at the entrance to the REACH building will create a common problem for all participants.

Activity 2 - Mind Mapping

Objective(s):
1. To introduce participants to the concept of mind mapping.

Materials Required:
1. Mind map transparency and handout
2. Pen or pencil

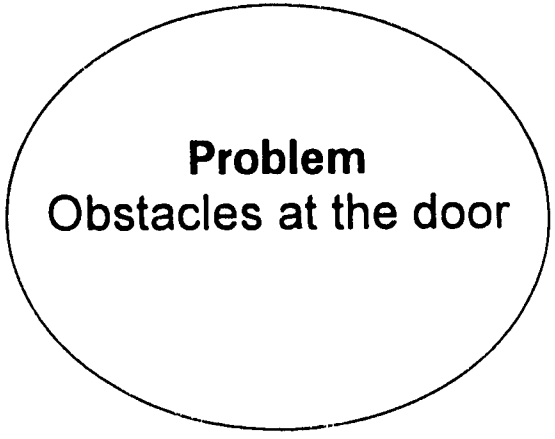
You need to know:

1. A mind map is a way of organizing thoughts.
2. Organizing thoughts with a mind map can help us to think through ideas and to begin to solve problems.
3. A mind map starts with a problem or central idea that is expressed in a few simple words.
4. These words become the center of the map and all other ideas will come from and relate to the center of the map.
5. Ideas about the problem or central idea are written down, enclosed in a "balloon" and connected to the core of the map.
6. When completed, a mind map will give you a picture of the problem and possible ways to think about, approach or begin to solve the problem.

Directions:

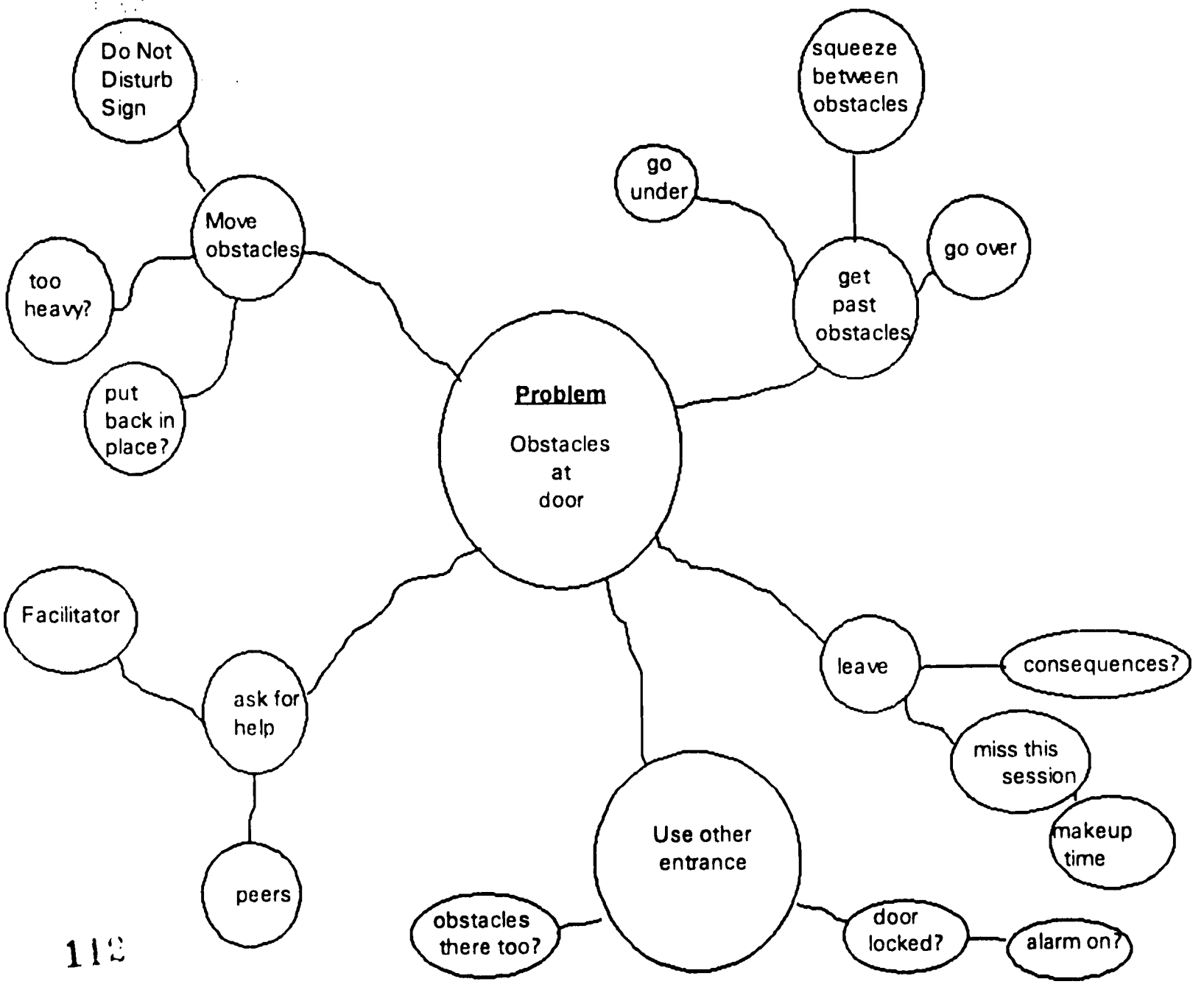
1. As a group we will develop a mind map based on the problem situation of having an obstacle in the door of the REACH building.
2. Use your handout to create your mind map.

MIND MAP



MIND MAP

MIND MAP


Problem
Obstacles at door
Move obstacles
Do Not Disturb Sign
too heavy?
put back in place?
get past obstacles
squeeze between obstacles
go under
go over
ask for help
Facilitator
peers
Use other entrance
obstacles there too?
door locked?
alarm on?
leave
consequences?
miss this session
makeup time

Activity 3 - What Path Does Your Mind Take?

Objective(s):
1. To have participants analyze their individual approach to solving problems.

2. To have participants begin to explore the different avenues other's minds take when confronted with a problem.

Materials Required:
1. Mind Map handout
2. Pen or pencil

Directions:

1. Use the handout to organize your thoughts about how you would solve one of the work related problems that will be read to you.

2. Choose a problem that you have some knowledge about or have had to solve before.

3. Think carefully about the possibilities involved in solving the problem.

4. Develop a mind map of the approach you would take in solving the problem.

Activity 3 - What Path Does Your Mind Take? (continued)

Workplace Problems

1. Assembly/Mixer
   - Temperature of chocolate chips is higher than 55 degrees.

2. Baker/Machine Captain
   - There is a problem with the way the dough is machining - bubbles or too much lap, etc.

3. Machine Operator/Packing Tech
   - Bag weights are outside of tolerance levels.

4. Sanitor/Utility
   - Phostoxin has to be transported to outside containers labeled for each day.

5. Mechanic/Electrician
   - Lockout procedures have to be used to replace mechanical or electrical equipment.

MIND MAP

Activity 4 - Common Elements or Problems

Objective(s):
1. To have participants understand that all problem solving processes have certain elements in common.

2. To have participants demonstrate their understanding of those elements by separating their responses to Activity 3 into those elements.

Materials Required:
1. Completed mind map handout from Activity 3.
2. Pen or pencil

You need to know:

1. All problem solving processes have certain elements in common.

2. All problem solving processes require:
   a. Identifying the problem
   b. Generating ideas about the problem
   c. Trying out ideas about the problem
   d. Evaluating the resolution of the problem

Directions:

1. Using the completed handout from Activity 3, indicate which of the steps you take in solving that problem belong to which of the elements listed above.

2. Write an a, b, c, or d by your problem solving steps to indicate the element.

Activity 5 - Steps In Problem Solving - Identifying The Problem

Objective(s):
1. To introduce participants to the first step in the problem solving process used in the module.

Materials Required:
1. Pen or pencil

You need to know:

1. Problem Solving skills help us get from where a situation or a process or a product is to where it should be or where we want it to be.

2. The first step in solving problems is the "Hold It! Something's wrong" step. That means that we have to recognize or identify when something is not as it should be. We have to realize that a product or situation is not at its optimal or best level.

3. Recognizing when something's wrong requires knowing what's right! For instance, we have to know what a properly sealed bag of cookies looks like before we can recognize improperly sealed bags and say "Hold it!" We have to know what a given product is supposed to be like (look, taste, feel, smell, etc.) at the point in the production process where we handle the product before we can recognize when that product is not as it should be and say "Something's wrong".

4. The optimal conditions or standards for the process, product, or machines used in your particular job have already been determined for the most part.

5. These optimal conditions or standards are taught to you in formal classes or through on the job training. Also, much of what you learn comes from experience.

6. Your primary problem-solving task is to identify when what's going on is something other than what's supposed to be going on.

H It ! Something's Wrong!	Door Obstacle			

Activity 5 - Steps In Problem Solving - Identifying The Problem (continued)

Directions:

1. Discuss at what point you recognized that something was wrong as you were trying to enter the REACH building today.

2. Review in your mind some of the problem solving situations you faced on the job over the past several weeks. Choose one situation for discussion.

3. Be prepared to share with the group your knowledge of the accepted standard for the situation and at what point you recognized that what was going on was not in keeping with that standard.

4. Use the chart on the opposite page to organize your notes from our discussion.

5. Take your time and think carefully about the problem, the accepted standard (what was supposed to be going on) and the point at which you said "Hold it".

Activity 6 - Clarifying An Identified Problem

Objective(s):
1. To have participants practice a method for clarifying the elements of an identified problem.

Materials Required:
1. Pen or pencil

You need to know:

1. An important part of the "Hold it" step is as being sure of what the problem is as you can be in any given situation.

2. Clarify an identified problem by asking yourself....

   How critical is this problem?
   How much time, energy and materials can I give to this problem?
   What is the best condition that I can achieve with this problem?

3. Try to ask the who, what, when, where, how and why kind of questions about the problem as you clarify it in your mind.

   Who (should page the mechanic when one is needed?)
   What (should I do if the ovenband stops?)
   When (should I do a cream-up?)
   Where (should I check to see which bins need to be fumigated?)
   Why (did the belts shut down and the red light start flashing?)
   How (many doughs are in the proof room?)

H It ! Something's Wrong!	Door obstacle			
Current condition?				
Limitations				
Optimal condition for this situation or product?				
Something's wrong with this product or situation				
because				
because				
because				
because				

Activity 6 - Clarifying An Identified Problem (continued)

You need to know:

4. There are situations where it may be helpful to ask the same question several times to clarify exactly what the problem really is. For example...

Problem as first perceived
-I don't have enough money to pay my bills this month.

because - The last check I wrote was not accepted by the merchant.

because - The bank said there was not enough money in my account to cover the check.

because - My balance is lower than I thought it was.

because - I forgot to deposit my last paycheck!

Immediate solution
-Deposit paycheck.

Long term solution
- Sign up for automatic deposit of paycheck.

Directions:

1. As a group we'll apply the clarification methods just discussed to the door obstacle problem.

2. Then you apply the clarification methods just discussed to your chosen problem. Is the problem any clearer?

3. Be prepared to discuss your chosen problem with the group.

4. Complete the handout on identifying and clarifying problems using the workplace problem you chose.

Activity 7 - Thinking Of Solutions To Problems

Objective(s):
1. To introduce participants to the second step in the problem solving process presented in the module.

Materials Required:
1. Pen or pencil

You need to know:

1. The second step in problem solving is the "Think" or "What can I do about it?" step. That means that we try to think of a way to solve the problem.

2. Some problems are limited in scope and may have only one solution. These are clear cut problems. As long as you know the rule or principle at the heart of the problem, you can solve the problem. For example,

   Problem - If the glue level in glue pot is low,
   Solution - transfer glue chips from barrel to glue pot.

3. Some problems are more complicated and may have more than one solution. Choosing between two options requires using your judgement and knowledge as you apply the rules.

   Problem - cookie stack height is beyond the control limits.
   Solution - make a decision to:
   a. accept the information
   b. notify the machine operator or baker by telephone
   c. other

V[illegible] can . do about it?	Door Obstacle			

Activity 7 - Thinking Of Solutions To Problems (continued)

You need to know:

4. Still other problems are even more complex and may require trying several possible solutions before the problem can be corrected. For example,

   Problem - The moisture percentage in the product is higher than the acceptable level.

   Solution -
   a. Check the product weight.
   b. If the weight is not within the acceptable range make approved adjustments.
   c. If the weight is okay, adjust the heat in the oven by following approved procedures.
   d. Periodically check the oven profile chart and adjust according to the master oven chart. Document all adjustments.

Directions:

1. As a group, we will complete the door obstacle column of the handout on thinking about solutions to problems.

2. Then, you will analyze the workplace problem you've been considering and try to determine if it's simple (only one option), a little more complicated (several options), or complex (many options).

3. Think about how many choices you had when you were faced with the problem.

4. Complete the correct column on the handout on thinking about solutions to problems.

5. Be prepared to share your analysis with the group.

Activity 8 - Trying Out Solutions To Problems

Objective(s):
1. To introduce participants to the third step in the problem solving process presented in this module.

Materials Required:
1. Pen or pencil

You need to know:

1. The next step in solving problems is the "Let's see if this works" step. This step means trying out possible solutions to see which one works.

2. Just as company policy determines the standard by which we measure problems, company policy also determines what possibilities there are for solving problems.

3. Within the limits of company policy, choose solutions that demonstrate
   a. you've gathered as much information (time, materials, etc.) as necessary to make an informed choice.
   b. you're aware of the underlying rules or principles governing the operation of machines, the production process and the product itself.

4. Try the most likely solution to the problem.

Directions:

1. As a group, we will complete the door obstacle column on the chart on trying out solutions to problems.

2. Then, you will complete the appropriate column for the workplace problem you've been analyzing during this module.

Let's see .. this will work....	Door Obstacle			

Activity 9 - Evaluating The Solution To The Problem

Objective(s):
1. To introduce participants to the last step in the problem solving process presented in the module.

Materials Required:
1. Pen or pencil

You need to know:

1. The next step in solving problems is the "Is it fixed yet?" step. This means evaluating whether or not the problem has been fixed or solved.

2. This step could be the last in solving your problem or it could be the first step in taking a closer look at identifying the problem once more if what you tried did not work.

3. If what you tried did not return the process, machine or product to optimal conditions, go back to step one and repeat the problem solving process again.

Directions:

1. Again, as a group we will complete the door obstacle column on the appropriate handout.

2. Then, you will complete the appropriate column for evaluating your workplace problem.

ixed , et?	Door Obstacle			

Cluster
Problem Solving
PINK

Activity 10 - Troubleshooting

Objective(s):
1. To have participants develop skills in troubleshooting problems.

Materials Required:
None

You need to know:

1. Troubleshooting is a special kind of problem solving. Troubleshooting methods are used when something goes wrong with mechanical or production equipment.

2. A basic process approach can be used to locate and correct mechanical types of problems.

3. When mechanical or production equipment fails to work properly and a production line doesn't move, the business is losing money. Its manufacturing expenses continue but the company is not producing items that can be sold.

4. Almost any machine or piece of equipment will fail at some time or another. This is when knowing how to troubleshoot (knowing which questions to ask and how to think about answers to those questions) will lead to solutions.

Activity 10 - Troubleshooting (continued)

A TROUBLESHOOTING PROCESS

a. State the problem clearly and simply just as you expressed the problem statement in your mind map.

b. Then, ask these questions about the machinery that is not working.
   (1) What happened, exactly?
   (2) Where, exactly, is the condition located?
   (3) How is this condition different from normal operation?
   (4) What does this condition represent or mean?

   Although this is the last question in the process, it can be used at each step in applying the troubleshooting process. This question will help you find the cause of an problem provided you have an understanding of the basic rules and principles on which a piece of machinery operates.

c. Think about these questions. Consider them in dealing with a troubleshooting situation of any kind.

Directions:

1. The facilitator is going to tell you about a problem that he/she needs to solve. You will be told only one or two facts about the problem at a time.

2. Use the troubleshooting questions you've just reviewed to help the facilitator solve the problem.

3. Later, you will develop a similar troubleshooting problem based on an experience you've had with a piece of equipment that you have some knowledge about.

Activity 12 - Problem Solving Review

Objective(s)
1. To have participants review and reinforce the problem solving process presented in this module.

Materials Required:
1. Mind map handout and list of problems

Directions:

1. Choose a problem from the list below and create a mind map of solutions to the problem.

2. Use the problem solving and troubleshooting process discussed in this module.

3. The facilitator will review the process with the group before you begin to work on your problem.

WORKPLACE PROBLEMS -

1. The moisture percentage in a product is higher than the acceptable level.

2. The flour is not flowing to the mixer

3. The dough temperature is too hot or too cold.

4. The spray oil machine is not putting enough oil on the Ritz® bottoms.

5. The Premium ®Mini-cartoner is stopping.

6. Cartons (Cartoner 4 and 7) are not opening.

7. Product color is too light.

8. Too much product drops into a bag. The bagger cuts off and the LCD panel reports a Cross Jaw Jam.

9. There is a high percentage of product breakage at the bundler.

Activity 13 - Practice Exercises

Objective(s): To have participants practice their analytical and problem solving skills.

Materials Required:
1. Pen or Pencil
2. Demonstration Production Line Situation Materials

Directions:

1. Apply the problem solving process you've learned to the following situation.

2. Think in terms of having a situation that needs to be organized rather than a problem that needs to be solved. That means, rather than analyzing a problem, analyze the situation and apply the same process for finding a solution.

The Situation

Nabisco® has been invited to participate in an upcoming World's Fair. It has been decided that the company will have a demonstration production line that will actually be a mini bakery for only one product. The public will be able to view the production process from start to finish and they will then be able to purchase cookies that they have just seen being made.

The mini bakery and the public areas of this facility will be open from 10:00 a.m. to 10:00 p.m., seven days a week for the 12 months that the Fair is expected to run.

Activity 13 - Practice Exercises (continued)

The Challenge

Staffing and scheduling employees for this new, although temporary, facility is a problem that REACH participants are being asked to help solve.

Your problem is to develop a work schedule for the World's Fair facility. Consider the following as you develop your schedule:

1. The hours of the facility are 10:00 a.m. to 10:00 p.m., seven days a week for 52 weeks.

2. Twenty-three employees in various jobs at the 9 Nabisco® bakeries are transferring temporarily to the city of the World's Fair to work on the demonstration production line. These employees have equal seniority status and have all been cross-trained especially to work in this facility.

3. Any additional workers need for the facility can be hired locally on a temporary basis just before the facility opens.

4. There will be only one production line in this facility.

Set up a schedule that will show:

- what the shifts will be for the World's Fair facility. Allow for a 40 hour week for Nabisco® employees.
- how many people in which jobs will work on those shifts.
- where part time and/or temporary workers may have to fill in.

YELLOW

REACH Program
Understanding How to Use Your Calculator Activities

Cluster:_____

Activity 1 - Understanding how to use a Calculator

Objective (s): This activity will enable participants

1. To become familiar with the keys of a calculator
2. To become familiar with the functions of a calculator
3. To practice entering numbers in a calculator

Materials Used: calculator

You Need to Know:

The second college edition of *The American Heritage Dictionary* defines a calculator as a keyboard machine for the automatic performance of mathematical operations. In today's work environment users simply refer to the calculator as their best friend because they are fast and accurate. However, workers understand that the answers a calculator provides are as accurate as the person using the calculator. That's why it is important to know how your calculator works.

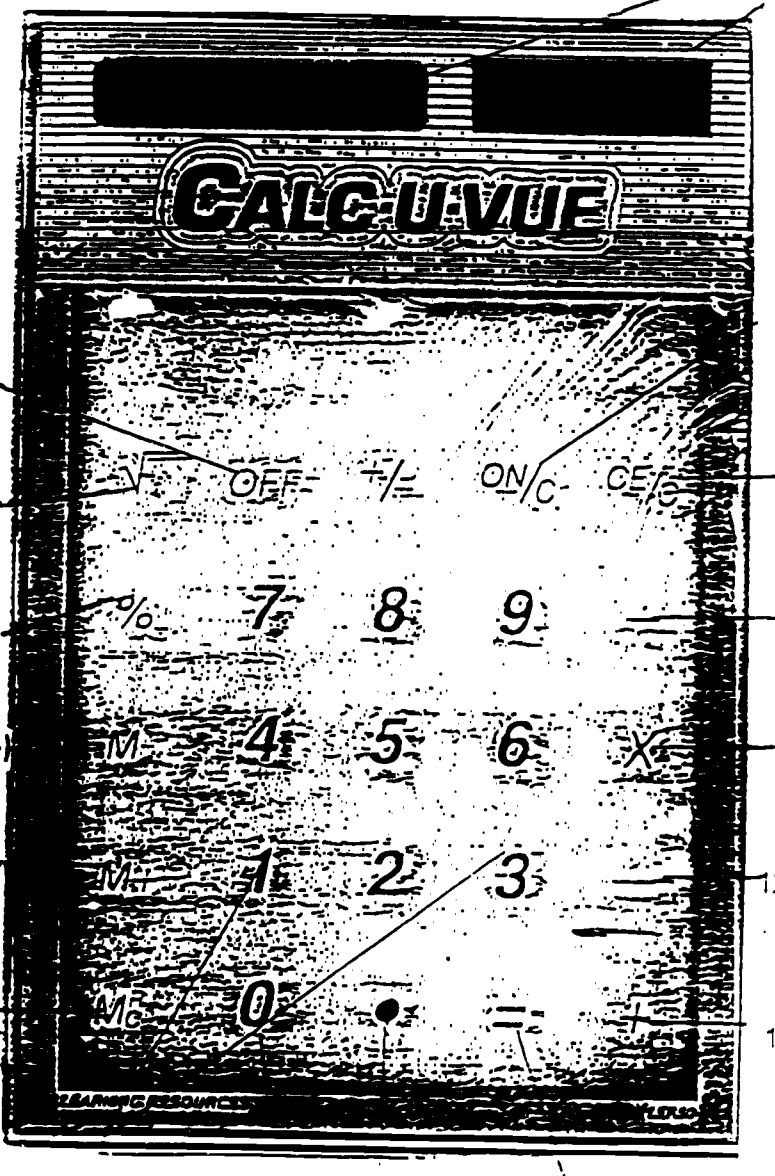
All calculators perform the four basic mathematical functions of addition, subtraction, multiplication, and division. There are other calculators that perform more advance math functions such as square roots, plotting, advanced calculus, and many other scientific calculations. Texas Instruments Inc. is one of many companies that manufacture scientific calculations. In this course, you will be using a basic calculator. It is a calculator that performs the basic four mathematical functions, percentages, and square roots.

Calculators operate by solar-power or battery. Solar-powered calculators have a row of solar cells that change light into electricity. Battery-powered calculators contain a battery, usually in the back of the calcuator. Now, let's get familiar with the calculator. Read through the calculator diagram on the following page.

CALCULATOR DIAGRAM

Directions

Study your calculator. Notice what each key does.



3. READOUT SCREEN
1. ON/CKEY
2. OFF KEY
4. CE/C (CLEAR)
16. SQUARE ROOT
15. PERCENTAGE
14. DIVISION
9. MEMORY KEY (M-)
13. MULTIPLICATION
10. MEMORY KEY (M+)
12. SUBTRACTION
8. RECALL/ CLEAR MEMORY
11. PLUS
5. NUMBER KEYS
6. DECIMAL POINT
7. EQUAL KEY

Keys

1. ON/C KEY - Use this key to turn your calculator on.

2. OFF KEY - Use this key to turn your calculator off.

3. READOUT SCREEN - Read the answers on this display screen.

4. CE/C (CLEAR) - Use this key to erase your entries.

5. NUMBER KEYS - Use these keys to enter the numbers.

6. DECIMAL POINT - Use this key to insert a decimal point.

7. EQUAL KEY - Use this key to get the answer.

8. RECALL/CLEAR MEMORY (RM/CM) KEY - Use this key to retain a number entry in the calculator's memory. Consider this sample problem: 100-10 = 90, press the RM/CM and the answer 90 is subtracted from the first entry 100. The answer is a negative 10. This key is helpful when you're working with a series of numbers.

9. MEMORY KEY (M-) - Use this key when working with a series of numbers and different functions. The calculator will hold an answer in memory. For example, 10-5=5, press M- key, the answer is 5, press (-) key, enter 2, press, M- key, the answer is 3. Notice the "M" appears on the readout screen to let you know the memory key is on.

10. MEMORY KEY (M+) - Use this key add a series of numbers. Consider this example, 10+5=5, press M+ key, the answer is 15, press (+) key, enter 5, press M+ key, the answer is 20.

Function Keys

11. PLUS - Use this key to add numbers.
12. SUBTRACTION - Use this key to subtract numbers.
13. MULTIPLICATION - Use this key to multiply numbers.
14. DIVISION - Use this key to divide numbers.
15. PERCENTAGE +/- - Use this key to calculate percentages.
16. SQUARE ROOT - Use this key to calculate the square root of numbers.

Practice

Follow these steps to practice entering whole numbers with your calculator.

Step 1: Turn on your calculator by pressing the key with **ON/C KEY**.
Step 2: Enter a number from the list below on your calculator.
Step 3: Erase the number using the CE/C key.
Step 4: Repeat steps 2-3 until you've entered and erased all the numbers for this exercise.
Step 5: Turn off your calculator.
Note: Most calculators do not display a comma. If the number displays as 1960, simply count three number places from the left. In this case 0, 6, 9, the comma would be inserted after the number 1 (1,960). Any number over 999 should be written with a comma.

A. Practice entering numbers.

1. 349
2. 974
3. 9,175
4. 8, 387
5. 27,285
6. 342,829
7. 88,642
8. 347,829
9. 755,691
10. 2,596,327
11. 9,442,611
12. 5,678

B. Entering numbers with decimal points.

Step 1: Turn on your calculator by pressing the key with **ON/C KEY**. Find the decimal key (.) on your calculator.
Step 2: Enter the number 12
Step 3: Press the decimal key (.)
Step 4: Then enter the number 2
Step 5: Press CE/C key to erase the number 12.2

Practice Exercise Continued...

Step 6: Repeat steps 2-4 until you've entered and erased all the numbers for this exercise.
Step 7: Turn off your calculator.

1. 56.78
2. 99.28
3. 110.8
4. 555.75
5. 100.78
6. 12.58
7. 600.78
8. 900.00
9. 88.8
10. 6.67

Activity 2 - Using and Understanding the Addition Function

Objectives (s): This activity will enable participants

1. To become familiar with the addition function of a calculator
2. To practice the addition function on a calculator

Materials Used: scrap paper, calculator

Directions

A calculator makes adding numbers easy. Follow these steps when adding numbers on your calculator.

Step 1: Turn on your calculator. Look for the plus (+) sign. Then look for the equal (=) sign. You will use both of these keys when you are adding numbers.
Step 2: Enter the numbers 1, 0, 0
Step 3: Press the plus sign (+)
Step 4: Enter 2, 0, 0
Step 5: Press the equal key (=)
Step 6: Read the answer in the readout screen area. The answer is 300.

Practice

Use your calculator to find the sum of the numbers. Write your answers in the space provided.

A. Find the sum.

1. 3,156, 7,125 _____
2. 7,206, 4,926, 3,331 _____
3. 8,501, 6,742 _____
4. 5,123, 9,600, 7,689 _____
5. 3,900, 6,174 _____
6. 378, 4,214 _____

B. Find the sum.

1. 16.2, 12.06_____
2. 123.0, 451.2 _____
3. 5.2, 6.8 _____
4. 234.2, 123.5 _____
5. 6.1, 6.4 _____
6. 12.1, 45.2 _____

Activity 3 - Using and Understanding the Subtraction Function

Objectives (s): This activity will enable participants

1. To become familiar with the addition function of a calculator
2. To practice the subtraction function on a calculator

Directions

A calculator makes subtracting large numbers easier. Follow the steps to subtract the numbers.

Step 1: Turn on your calculator. Find the minus (-) sign. The find the equal sign (=).
Step 2: Enter the numbers 6, 0, 0. When subtracting remember to enter the larger number first.
Step 3: Press the minus sign (-)
Step 4: Enter the numbers 3, 0, 0
Step 5: Press the equal (=) key. The answer is 300.

Practice

Use your calculator to find the difference between the numbers. Write your answers in the space provided.

A. Find the difference.

1. 7,500, 5,916 _____
2. 9,306, 8,200 _____
3. 3,472, 1,568 _____
4. 99, 48 _____
5. 5,280, 1,000 _____
6. 18,480, 15,840 _____
7. 5, 820, 1,760_____
8. 2,786, 1,308 _____
9. 2,815, 1,940 _____
10. 2,182, 855_____
11. 1,075, 758 _____
12. 2,631, 131 _____

B. Find the difference.

1. 31. 2, 12.6_____
2. 119.1, 67.0 _____
3. 303.1. 240.2 _____
4. 45.3, 23.2 _____
5. 20.1, 18.2 _____
6. 25.9, 12.8 _____

Activity 4 - Using and Understanding the Multiplication Function

Objectives (s): This activity will enable participants

1. To become familiar with the multiplication function of a calculator
2. To practice the multiplication function on a calculator

Directions

A calculator can also make multiplication easier. Read the example below. Follow the steps to understand how to use your calculator to multiply large numbers.

Step 1: Turn on your calculator. Find the multiplication sign (x). Find the equal sign (=).
Step 2: Enter the numbers 8, 5, 6, 4
Step 3: Press the x sign
Step 4: Enter the numbers 7, 2, 1, 3
Step 5: Press the equal sign (=). Read the answer on the readout screen. The answer is 61,772,132 (66 million, 772 thousand, 132).

Practice

Use the calculator to find the product of each group of numbers. The answer to a multiplication problem is called the product. Write the product in the space provided.

A. Multiply the numbers.

1. 6, 6 _____ 2. 27, 4 _____ 3. 12, 12 _____ 4. 50, 6 _____
5. 20, 20 _____ 6. 200, 7 _____ 7. 500, 8 _____ 8. 1000, 8 _____

B. Multiply the numbers.

1. 5,306, 8,317 _____ 2. 648, 4,269 _____ 3. 510, 888 _____

4. 92,000, 45 _____ 5. 80,000, 25 _____ 6. 357, 968 _____

Activity 5 - Using and Understanding the Division Function

Objectives (s): This activity will enable participants

1. To become familiar with the division function of a calculator
2. To practice the division function on a calculator

Directions

You can also solve division problems using your calculator. Follow the sample problem to understand the process. Find the division (÷) sign on your calculator.

Step 1: Turn on your calculator.
Step 2: Enter the numbers 2,0,0
Step 3: Press the division sign (÷).
Step 4: Enter the number 1, 0
Step 4: Press the equal sign (=).
Step 5: Read the answer on the display screen. The answer is 20.

Practice

A. Divide the numbers.

1. 500, 20 _____
2. 600, 30 _____
3. 20, 5 _____
4. 1000, 6 _____
5. 790, 5 _____
6. 180, 4 _____

B. Divide the numbers.

1. 10,000, 90_____
2. 124,780 ,20_____
3. 45,000, 60_____
4. 985, 3 _____
5. 50,650 ,10 _____
6. 540, 25 _____

Applied Math

To the Facilitator:

The curriculum is color coded to indicate levels of difficulty. Yellow represents Minimum Level, blue represents Moderate Level, and Pink represents Maximum Level.

These levels correlate to the benchmarks established by employees and the results of the assessment process validated for selected jobs at the Nabisco Richmond Facility.

80% mastery is recommended per activity before progressing to next activity.

Minimum Level Applied Math

1. Adding and Subtracting
   a. Calculating the Range Between Two Numbers
   b. Adding Ingredients
   c. Calculating Oil Usage
   d. Calculating Time on Time Cards
   e. Using a Calculator

Moderate Level Applied Math

2. Adding and Subtracting Decimals
   a. Dough Weights
   b. Product Weights

3. Multiplying and Dividing
   a. Sifter Tailings
   b. Calculating Breakage
   c. Determining Hourly Production Needs for Dough

4. Calculating Averages
   a. LayTimes - Time
   b. Bag Weights - Decimals

Maximum Level Applied Math

5. Calculating Oil Percentages

6. Calculating Average Dough Weight in Decimals

7. Calculating Cubic Footage
   a. Fogging
   b. Using Pesticides

Cluster
Applied Math

YELLOW

Activity 1 - Whole Numbers

Objective(s): This activity will enable participants to identify and write whole numbers.

Materials Required:
Pencil

You need to know:

1. Whole numbers are counting numbers and 0; they are numbers that are not fractions or decimals. They tell how many or how much.

2. A whole number represents a complete amount or group.
   EXAMPLES:

   Numbers: 0, 6, 13, 20, 50, 234

   Quantities: 142 machine screws, 12 spools, 47 outlets

   Measurements: 63 feet, 120 millimeters, $354

3. The Arabic number system is based on 10 digits:

   0 1 2 3 4 5 6 7 8 9

   Each of these symbols (0-9) is called a digit. These individual symbols (digits) may be combined to write any number.

Activity 1 - Whole Numbers (continued)

Directions: For each of the following numbers place a (✓) in the box if the number is a whole number.

1.	☐	6	21.	☐	4	41.	☐	8
2.	☐	14	22.	☐	15	42.	☐	18
3.	☐	37	23.	☐	82	43.	☐	56
4.	☐	365	24.	☐	359	44.	☐	321
5.	☐	901	25.	☐	763	45.	☐	288
6.	☐	2,225	26.	☐	2,227	46.	☐	2,221
7.	☐	6,592	27.	☐	6,552	47.	☐	6,512
8.	☐	8,831	28.	☐	8,231	48.	☐	8,631
9.	☐	4,895	29.	☐	3,998	49.	☐	7,246
10.	☐	33,485	30.	☐	50,001	50.	☐	29,092
11.	☐	.6	31.	☐	.1	51.	☐	.8
12.	☐	.005	32.	☐	.5	52.	☐	.05
13.	☐	.07	33.	☐	.7	53.	☐	7
14.	☐	2.5	34.	☐	.25	54.	☐	25
15.	☐	.82	35.	☐	.076	55.	☐	.08
16.	☐	.231	36.	☐	.226	56.	☐	.217
17.	☐	.7304	37.	☐	7.304	57.	☐	73.04
18.	☐	1491	38.	☐	14.91	58.	☐	.1491
19.	☐	20.04	39.	☐	2.004	59.	☐	200.4
20.	☐	7.83	40.	☐	.783	60.	☐	.0783

Activity 1 - Whole Numbers (continued)

Directions: For each of the following numbers place a (✓) in the space if the number is a whole number.

_____	1.	4,699	_____	16.	926.
_____	2.	96.677	_____	17.	6.790
_____	3.	620	_____	18.	58,416
_____	4.	2.053	_____	19.	6,815
_____	5.	.4001	_____	20.	649,873
_____	6.	28	_____	21.	.072
_____	7.	.1	_____	22.	.84
_____	8.	8,261.1	_____	23.	.7159
_____	9.	1.25	_____	24.	.638
_____	10.	27,611.9	_____	25.	.3901
_____	11.	.07	_____	26.	495.28
_____	12.	.0001	_____	27.	6215.9
_____	13.	.367	_____	28.	518.7302
_____	14.	3,842	_____	29.	429,631.058
_____	15.	493,200	_____	30.	85,210.3697

Activity 1 - Whole Numbers (continued)

Directions: Write examples of whole numbers in the following blanks.

_____	1.	_____	16.
_____	2.	_____	17.
_____	3.	_____	18.
_____	4.	_____	19.
_____	5.	_____	20.
_____	6.	_____	21.
_____	7.	_____	22.
_____	8.	_____	23.
_____	9.	_____	24.
_____	10.	_____	25.
_____	11.	_____	26.
_____	12.	_____	27.
_____	13	_____	28.
_____	14.	_____	29.
_____	15.	_____	30.

Activity 2 - Place Values and Whole Numbers

Objective(s): This activity will enable participants to identify the place values of whole numbers.

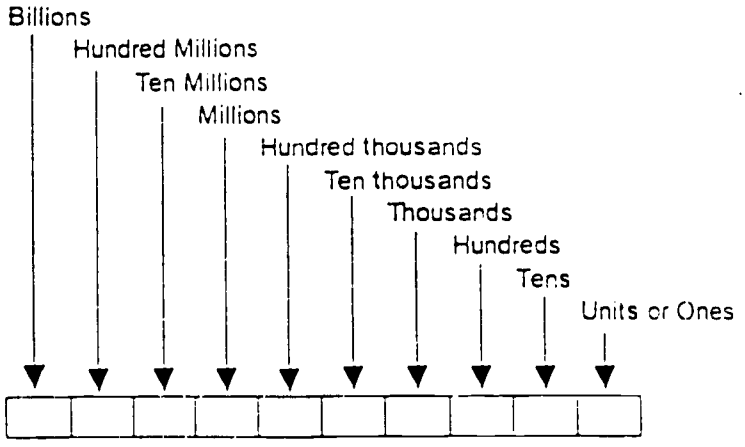
Materials Required:
Pencil

You need to know:

1. Each digit of a number from 0 through 9 has two values:
   A. Face value - what the numeral actually says
   B. Place value - the place (position) of the numeral tells it value

2. The first digit (column) in the extreme right position of a number is called the units digit or units column. The digit in the second position to the left is in the tens column; and the digit in the third location is in the hundreds column, etc. See the diagram below for additional examples of the place names of commonly used digits.

DIGIT PLACE NAMES (WHOLE NUMBERS)



Activity 2 - Place Values and Whole Numbers (continued)

You need to know:

3. Each digit can be assigned a different value depending on its place or position in the number. Example:

thousands	hundreds	tens	units *or* ones
8	7	6	5
5	6	7	8
7	8	5	6
6	5	8	7

Notice that the 8 in the first number is in the thousands place. That means it is worth 8 thousand. In the second number, the 8 is in the units or ones place. It is worth 8 ones or just plain 8. In the third number, the 8 is in the hundreds place, and it is worth 8 hundred. In the last number, the 8 is in the tens place. That means it is worth 8 tens or 80.

4. Whole numbers represent the sum of individual place values of numerals.

EXAMPLE: 217

200 → 2 hundreds
\+ 10 → 1 ten
\+ 7 → 7 ones
217

The whole number 217 is a simple and shortened form of 200 + 10 + 7.

Directions:

On the following page, write the value of the underlined number in the blank.

Activity 2 - Place Values and Whole Numbers (continued)

1. In the number 283, how much is the 8 worth? _____
2. In the number 1,296, how much is the 1 worth? _____
3. In the number 926, how much is the 6 worth? _____
4. In the number 637, how much is the 6 worth? _____
5. In the number 240, how much is the 4 worth? _____
6. In the number 318, how much is the 8 worth? _____
7. In the number 1,873, how much is the 7 worth? _____
8. In the number 8,176, how much is the 8 worth? _____
9. In the number 561, how much is the 5 worth? _____
10. In the number 746,721, how much is the 4 worth? _____
11. In the number 678, how much is the 7 worth? _____
12. In the number 3,016, how much is the 3 worth? _____
13. In the number 235,619, how much is the 2 worth? _____
14. In the number 145,768, how much is the 5 worth? _____

15. The value of 9 in the number 3,739,681 is: _____
16. The value of 7 in the number 873,000 is: _____
17. The value of 6 in the number 6,284,925 is: _____
18. The value of 4 in the number 46,867 is: _____
19. The value of 8 in the number 1,863,745 is: _____
20. The value of 3 in the number 5,632 is: _____
21. The value of 7 in the number 3,754 is: _____
22. The value of 5 in the number 2,385 is: _____
23. The value of 3 in the number 329 is: _____
24. The value of 6 in the number 76 is: _____
25. The value of 4 in the number 64 is: _____

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Fill in the blanks with the correct numbers.

(1) In the number 6,973.....
the value of 3 is _____ ones or _____.
the value of 7 is _____ tens or _____.
the value of 9 is _____ hundreds or _____.
the value of 6 is _____ thouands or _____.

(2) In the number 1,478.....
the value of 8 is _____ ones or _____.
the value of 7 is _____ tens or _____.
the value of 4 is _____ hundreds or _____.
the value of 1 is _____ thousand(s) or _____.

(3) In the number 11,243.....
the value of 3 is _____ ones or _____.
the value of 4 is _____ tens or _____.
the value of 2 is _____ hundreds or _____.
the value of 11 is _____ thousands or _____.

(4) In the number 48,505.....
the value of 5 is _____ ones or _____.
the value of 0 is _____ tens or _____.
the value of 5 is _____ hundreds or _____.
the value of 48 is _____ thousands or _____.

(5) In the number 6,054.....
the value of 4 is _____ ones or _____.
the value of 5 is _____ tens or _____.
the value of 0 is _____ hundreds or _____.
the value of 6 is _____ thousands or _____.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Fill in the blanks with the correct numbers.

(6) In the number 742.....
the value of 2 is _____ ones or _____.
the value of 4 is _____ tens or _____.
the value of 7 is _____ hundreds or _____.

(7) In the number 8,137.....
the value of 7 is _____ ones or _____.
the value of 3 is _____ tens or _____.
the value of 1 is _____ hundred(s) or _____.
the value of 8 is _____ thousands or _____.

(8) In the number 689.....
the value of 9 is _____ ones or _____.
the value of 8 is _____ tens or _____.
the value of 6 is _____ hundreds or _____.

(9) In the number 38,496.....
the value of 6 is _____ ones or _____.
the value of 9 is _____ tens or _____.
the value of 4 is _____ hundreds or _____.
the value of 38 is ___ ___ thousands or _____.

(10) In the number 379....
the value of 9 is _____ ones or _____.
the value of 7 is _____ tens or _____
the value of 3 is _____ hundreds or _____

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Answer the following by placing the correct digit in the space.

1.	561	Which digit is in the tens place?	_____
2.	780	Which digit is in the hundreds place?	_____
3.	42,625	Which digit is in the ten thousands place?	_____
4.	3,439	Which digit is in the hundreds place?	_____
5.	657,524	Which digit is in the thousands place?	_____
6.	4,075	Which digit is in the units place?	_____
7.	7,302	Wich digit is in the hundreds place?	_____
8.	428,713	Which digit is in the hundred thousands place?	_____
9.	9,371,246	Which digit is in the millions place?	_____
10.	32,584	Which digit is in the units place?	_____
11.	529,682	Which digit is in the thousands place?	_____
12.	115,035	Which digit is in the hundred thousands place?	_____
13.	8,851	Which digit is in the tens place?	_____
14.	738,495	Which digit is in the ten thousands place?	_____
15.	2,700,920	Which digit is in the millions place?	_____

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Show the place value of the following numbers by writing the digits correctly on the chart. An example has been completed for you.
EXAMPLE: 7,654

	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
				7	6	5	4
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							

Activity 2 - Place Values and Whole Numbers (continued)

EXAMPLE	7,654
1.	6,700
2.	53,426
3.	74,803,000
4.	175
5.	32,072
6.	8,115,035
7.	3,582
8.	493
9.	358,281
10.	1,661
11.	105,302
12.	29,547
13.	284
14.	135,011
15.	22,314
16.	321
17.	387,611
18.	88,027
19.	2,700,920
20.	4,228

Activity 3 - Reading and Writing Whole Numbers

Objective(s): This activity will enable participants to read and write whole numbers.

Materials Required:
Pencil

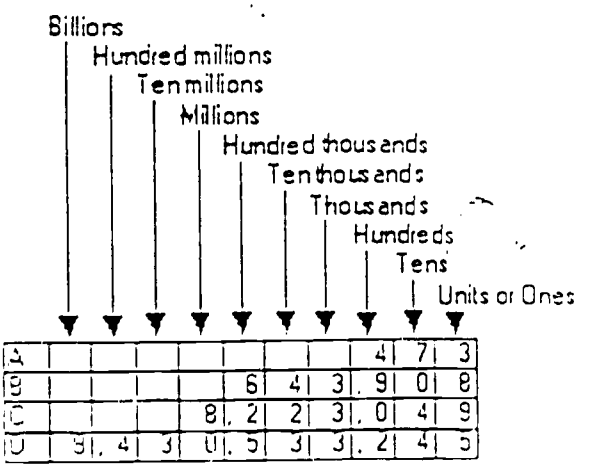
You need to know:

1. Usually the numbers with four digits or more are written with commas after every three digits, counting from right to left.
   EXAMPLE: 71230645
   71,230,645

2. Four-digit numbers are an exception to the rule. Commas are not required in four-digit numbers.
   EXAMPLE: 3743 AND 3,743

   Both are acceptable ways of writing the same number.

3. The numbers in the chart are read as follows:



A. Four hundred seventy three. Note that the 4 is in the "hundreds" column, 7 is in the "tens" column, and 3 is in the "ones" column.

B. Six hundred forty-three thousand, nine hundred eight.

C. Eight million, two hundred twenty three thousand, forty nine.

D. Nine billion, four hundred thirty million, five hundred thirty-three thousand, two hundred forty-five.

Activity 3 - Reading and Writing Whole Numbers (continued)

You need to know:

4. Numbers can be written in words, in an expanded form, or as a numeral.

EXAMPLE: 1,689
One thousand, six hundred eighty nine
1000+600+80+9
1,689

Activity 3 - Reading and Writing Whole Numbers (continued)

Directions:
1. At the instructor's request, read the foll wing numbers aloud.

2. On the following page, write out each number in words, in the blanks provided.

1.	8,497	21.	4,321
2.	742,351	22.	28
3.	932,617	23.	5,504
4.	7,639,792	24.	457
5.	25,816	25.	39
6.	173,855	26.	847
7.	6,382,523	27.	386
8.	782,386	28.	2,131
9.	1,175,140	29.	159
10.	97,268	30.	14
11.	6,973	31.	249,382
12.	382	32.	360
13.	4,880	33.	829
14.	14,228,786	34.	247,427,820
15.	865	35.	37
16.	97,268	36.	89,827
17.	243	37.	22,809
18.	27,268	38.	88
19.	1,478	39.	738,264,699
20.	257	40.	758

Activity 3 - Reading and Writing Whole Numbers (continued)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Activity 3 - Reading and Writing Whole Numbers (continued)

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

35. _____

36. _____

37. _____

38. _____

39. _____

40. _____

Activity 3 - Reading and Writing Whole Numbers (continued)

Directions:
Write the following numbers, using figures, in the chart below. Make sure you put each digit in the correct column. Insert commas, where applicable.

	Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Units or Ones
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

1. thirty-four thousand eighty six
2. eight hundred two
3. sixty-three thousand five hundred twenty-two
4. three hundred thirty nine
5. seven thousand seven hundred forty
6. nine million eight hundred twenty-three thousand five hundred twenty-seven
7. five hundred seventy eight
8. one hundred thirty five thousand eight hundred fifty one
9. forty-nine thousand seven hundred thirty-six
10. thirteen million four hundred thirty-six thousand nine hundred thirty-two
11. two thousand five hundred fifteen
12. two hundred four thousand nine hundred seventy-two
13. nine hundred ninety-eight thousand five hundred sixty
14. four thousand eighty-two
15. five thousand one hundred twelve

Activity 4 - Adding Whole Numbers

Objective(s): This activity will enable participants
(1) to add whole numbers in order to find the total amount.
(2) to check addition answers.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. Addition problems are done daily. For example, you might add the "tare" weight and the full weight together, add the proper amount of ingredient when recipes change, or add weights of two ingredients when both are combined in the same bucket.

2. Addition is combining two or more quantities (amounts) to find a total quantity (amount). The answer is called the sum.

3. When adding, the order of the numbers does not matter. For example, 2 + 6 = 6 + 2.

4. To add numbers greater than 10, arrange them in columns and regroup (borrow and carry).

5. To check addition answers, add the columns in the opposite direction. So if you started at the top and added downward, start at the bottom and add upward.

EXAMPLE:		CHECK:	
45	(1) 5 + 3 = 8	45	(1) 3 + 5 = 8
+33	(2) 4 + 3 = 7	+33	(2) 3 + 4 = 7
---		---	
78		78	

Activity 4 - Adding Whole Numbers (continued)

You need to know:

6. To add whole numbers:

A. Write the numbers under one another with each digit in the problem column.

4	6	2	5
	4	2	3
	5	7	4
3	2	5	1

B. Add the ones column:
5+3+4+1=13
Write down the 3 and carry the 1 to the tens column.

		(1)	
4	6	2	5
	4	2	5
	5	7	4
3	2	5	1
			3

C. Add the tens column:
1 (from the ones column) +2+2+7+5=17
Write down the 7 and carry the 1 to the hundreds columr..

	(1)	(1)	
4	6	2	5
	4	2	3
	5	7	4
3	2	5	1
		7	3

D. Add the hundreds column:
1 (from the tens column) +6+4+5+2=18
Write down the 8 and carry the 1 to the thousands column.

(1)	(1)	(1)	
4	6	2	5
	4	2	3
	5	7	4
3	2	5	1
	8	7	3

E. Add the thousands column:
1 (from the hundreds column) +4+3=8
Write down the 8. The sum is 8873.

(1)	(1)	(1)	
4	6	2	5
	4	2	3
	5	7	4
3	2	5	1
8	8	7	3

F. Continue the same process with the remaining columns, if applicable.

Activity 4 - Adding Whole Numbers

(1) Directions: Add.

1.	3 + 5	5 + 0	2 + 6	1 + 5	0 + 2
2.	1 + 8	4 + 5	3 + 5	2 + 6	0 + 8
3.	2 + 2	5 + 3	3 + 6	6 + 1	3 + 3
4.	1 + 2	4 + 3	1 + 1	5 + 2	4 + 1
5.	7 + 1	6 + 3	9 + 0	2 + 7	3 + 4

Activity 4 - Adding Whole Numbers

(2) Directions: Add.

1.	3 + 9	5 + 7	9 + 9	8 + 4	3 + 8
2.	8 + 7	6 + 6	7 + 3	5 + 9	5 + 5
3.	4 + 6	9 + 2	7 + 6	5 + 6	4 + 9
4.	3 + 2	5 + 4	6 + 0	6 + 3	4 + 5
5.	8 + 8	6 + 8	9 + 7	8 + 5	7 + 7

Activity 4 - Adding Whole Numbers

(3) Directions: Add.

1.

6	9	2	1	6
4	6	3	9	2
+ 5	+ 6	+ 8	+ 4	+ 3
___	___	___	___	___

2.

8	7	9	5	8
6	0	1	2	5
+ 7	+ 6	+ 8	+ 2	+ 9
___	___	___	___	___

3.

4	5	3	4	9
9	6	4	3	7
8	7	8	8	3
+ 1	+ 6	+ 9	+ 8	+ 7
___	___	___	___	___

4.

8	3	5	9	6
6	2	5	6	7
8	7	1	5	2
+ 4	+ 6	+ 0	+ 7	+ 3
___	___	___	___	___

Activity 4 - Adding Whole Numbers

(4) Directions: Add.

1.	2 + 95	18 + 9	3 + 35	14 + 3	5 + 37	61 + 5	3 + 13	62 + 9	5 + 36	9 + 47
2.	11 + 2	15 + 9	18 + 7	12 + 5	17 + 8	14 + 6	19 + 4	16 + 1	13 + 5	18 + 9
3.	2 + 4	86 + 9	93 + 3	2 + 75	5 + 88	7 + 99	84 + 1	96 + 6	57 + 9	3 + 37
4.	23 + 4	2 + 26	21 + 3	1 + 25	28 + 8	7 + 24	29 + 5	6 + 22	26 + 8	9 + 27
5.	4 + 73	5 + 89	97 + 8	3 + 56	2 + 66	76 + 1	6 + 82	7 + 94	49 + 5	8 + 39
6.	48 + 6	54 + 2	7 + 67	78 + 9	83 + 4	3 + 91	41 + 1	52 + 8	4 + 37	28 + 6
7	1 + 37	8 + 34	7 + 32	6 + 29	4 + 31	2 + 35	9 + 38	5 + 33	3 + 36	7 + 38

Activity 4 - Adding Whole Numbers

(5) Directions: Add.

1.	1	6	42	59	9	2	87	98	3	5
	+ 23	+ 34	+ 7	+ 4	+ 69	+ 74	+ 3	+ 8	+ 98	+ 59
2.	41	1	42	2	44	7	46	6	48	9
	+ 5	+ 48	+ 8	+ 47	+ 9	+ 49	+ 4	+ 43	+ 5	+ 46
3.	29	33	1	8	22	36	2	6	64	5
	+ 5	+ 9	+ 45	+ 19	+ 7	+ 4	+ 16	+ 27	+ 8	+ 37
4.	5	52	1	59	7	4	58	51	9	53
	+ 56	+ 9	+ 54	+ 8	+ 53	+ 55	+ 2	+ 6	+ 58	+ 9
5.	3	27	36	45	3	8	2	95	38	7
	+ 13	+ 9	+ 3	+ 3	+ 57	+ 63	+ 89	+ 8	+ 3	+ 26
6.	5	51	2	17	9	38	4	57	9	47
	+ 46	+ 1	+ 65	+ 8	+ 24	+ 7	+ 43	+ 6	+ 75	+ 6
7.	62	66	7	4	69	64	3	5	64	68
	+ 1	+ 6	+ 61	+ [illegible]	+ 9	+ 2	+ 68	+ 65	+ 6	+ 6

Activity 4 - Adding Whole Numbers

(6) Directions: Add.

1.	25	8	49	6	63	2	12	5	39	7
	+ 1	+ 31	+ 7	+ 58	+ 4	+ 77	+ 9	+ 28	+ 6	+ 38
2.	6	72	76	9	4	77	88	8	9	6
	+ 75	+ 2	+ 7	+ 73	+ 78	+ 5	+ 5	+ 86	+ 84	+ 45
3.	11	26	32	47	53	64	79	85	96	37
	+ 9	+ 7	+ 5	+ 8	+ 6	+ 4	+ 3	+ 1	+ 2	+ 5
4.	87	7	4	9	99	93	97	6	5	7
	+ 6	+ 85	+ 92	+ 96	+ 3	+ 2	+ 7	+ 98	+ 98	+ 96
5.	4	2	3	1	8	7	5	6	9	8
	+ 15	+ 21	+ 39	+ 44	+ 55	+ 68	+ 71	+ 81	+ 89	+ 46
6.	23	9	42	7	69	8	97	9	9	97
	+ 6	+ 34	+ 7	+ 59	+ 4	+ 77	+ 5	+ 95	+ 88	+ 9
7.	1	5	2	3	6	5	2	9	8	6
	30	47	81	25	52	83	56	37	36	84
	+ 9	+ 8	+ 5	+ 6	+ 9	+ 4	+ 5	+ 8	+ 7	+ 5

Activity 4 - Adding Whole Numbers

(7) **Rows 1 - 5** Directions: Add and check

1.	38 + 21	57 + 32	45 + 3	32 + 25
2.	28 + 49	83 + 46	37 + 86	29 + 45
3.	68 + 49	56 + 71	64 + 28	39 + 42
4.	37 + 22	59 + 76	83 + 24	55 + 99
5.	93 + 14	26 + 53	29 + 84	53 + 28

Activity 4 - Adding Whole Numbers

(7) **Rows 6- 10** Directions: Add and check

6.	42 + 54	34 + 28	37 + 61	24 + 13
7.	28 + 73	53 + 68	67 + 31	13 + 78
8.	31 + 28	93 + 15	59 + 83	82 + 71
9.	47 + 26	93 + 28	66 + 32	28 + 48
10.	65 + 27	47 + 68	74 + 16	55 + 29

Activity 4 - Adding Whole Numbers

(7) **Rows 11 - 15** Directions: Add and check

11.	84 + 29	55 + 89	83 + 15	25 + 39
12.	19 + 47	82 + 36	31 + 45	74 + 26
13.	64 + 28	23 + 88	65 + 87	56 + 49
14.	75 + 78	43 + 88	39 + 29	74 + 23
15.	98 + 43	39 + 26	93 + 28	96 + 16

Activity 4 - Adding Whole Numbers

(7) **Rows 16 - 20** Directions: Add and check

16.	66 + 45	24 + 63	57 + 14	92 + 79
17.	61 + 26	65 + 27	48 + 56	14 + 2
18.	32 + 19	39 + 87	29 + 50	47 + 24
19.	13 + 41	59 + 26	25 + 3	17 + 79
20.	72 + 24	44 + 36	46 + 2	38 + 25

Activity 4 - Adding Whole Numbers

(8) **Rows 1 - 5** Directions: Add and check.

1.	78 + 25	37 + 69	82 + 14
2.	59 + 67	32 + 49	55 + 63
3.	23 + 89	74 + 25	93 + 25
4.	61 + 28	24 + 57	28 + 16
5.	54 + 78	69 + 23	51 + 28

Activity 4 - Adding Whole Numbers

(8) **Rows 6 - 10** Directions: Add and check.

6.	73 + 69	84 + 28	62 + 48
7.	87 + 91	48 + 26	53 + 97
8.	68 + 54	83 + 17	75 + 29
9.	74 + 28	68 + 93	95 + 82
10.	46 + 83	72 + 96	47 + 84

Activity 4 - Adding Whole Numbers

(8) **Rows 11 - 15** Directions: Add and check

11.	92 + 15	73 + 16	29 + 33	34 + 69
12.	45 + 57	63 + 98	37 + 69	84 + 57
13.	36 + 83	24 + 47	71 + 98	64 + 36
14.	49 + 87	63 + 29	62 + 79	65 + 97
15.	26 + 75	38 + 44	83 + 29	58 + 46

Activity 4 - Adding Whole Numbers

(9) Directions: Add and check.

1.

68	72	93	87
+ 580	+ 469	+ 708	+ 506

2.

748	825	346	293
+ 87	+ 59	+ 64	+ 53

3.

41	57	53	64
+ 289	+ 418	+ 469	+ 377

4.

302	729	655
+ 83	+ 50	+ 43

Activity 4 - Adding Whole Numbers

(10) Directions: Add and check.

1.

56	34	80	482
+ 811	+ 205	+ 709	+ 16

2.

314	283	607	966
+ 98	+ 56	+ 95	+ 35

3.

53	13	62	47
+ 436	+ 206	+ 914	+ 532

4.

946	415	723
+ 32	+ 61	+ 75

Activity 4 - Adding Whole Numbers

(11) Directions: Add and check.

1.

66	21	89	92
81	49	67	10
+ 56	+ 43	+ 50	+ 39

2.

87	60	31	79
19	54	28	96
+ 72	+ 38	+ 44	+ 83

3.

70	51	42	78
57	91	93	12
+ 202	+ 329	+ 516	+ 490

4.

63	84	20	95
85	43	74	80
+ 854	+ 977	+ 627	+ 417

Activity 4 - Adding Whole Numbers

(12) Directions: Add and check.

1.

91	15	23
31	75	22
78	76	87
+ 66	+ 31	+ 99

2.

646	930	347
60	15	38
52	37	67
+ 944	+ 376	+ 421

3.

94	40	27
21	83	40
39	26	67
45	29	28
+ 80	+ 33	+ 86

4.

57	43	86
35	51	65
12	74	84
83	32	46
+ 58	+ 36	+ 97

Activity 4 - Adding Whole Numbers

(13) **Rows 1- 5** Directions: Add and check.

1.	603 + 285	577 + 321	458 + 201	413 + 564
2.	805 + 163	761 + 135	432 + 245	854 + 133
3.	345 + 698	254 + 736	829 + 847	378 + 692
4.	748 + 642	293 + 718	786 + 692	267 + 541
5.	843 + 927	298 + 354	674 + 732	235 + 872

Activity 4 - Adding Whole Numbers

(13) **Rows 6 - 10** Directions: Add and check.

6.	762 + 125	210 + 648	307 + 652	386 + 402	138 + 844
7.	328 + 560	415 + 383	574 + 692	925 + 381	558 + 649
8.	493 + 386	254 + 255	368 + 645	758 + 452	423 + 468
9.	475 + 321	347 + 433	425 + 716	129 + 632	
10.	328 + 972	523 + 476	215 + 256	548 + 627	

Activity 4 - Adding Whole Numbers

(14) **Rows 1 - 5** Directions: Add and check.

1.	786 + 394	928 + 782	475 + 698	378 + 257
2.	378 + 269	543 + 786	834 + 729	541 + 269
3.	287 + 465	387 + 298	546 + 589	728 + 569
4.	384 + 429	968 + 518	652 + 478	409 + 583
5.	740 + 893	584 + 427	637 + 905	842 + 369

Activity 4 - Adding Whole Numbers

(14) **Rows 6 - 11** Directions: Add and check.

6.	683 + 417	257 + 683	594 + 417	267 + 936
7.	405 + 561	216 + 423	537 + 252	640 + 118
8.	689 + 836	546 + 921	786 + 293	548 + 687
9.	834 + 785	692 + 847	716 + 263	408 + 241
10.	715 + 486	709 + 983	607 + 406	219 + 389
11.	885 + 102	235 + 452		

Activity 4 - Adding Whole Numbers

(16) Directions: Add and check.

1.

146	243	880
73	10	77
+ 718	+ 256	+ 523

2.

367	236	413	223
520	153	648	209
+ 124	+ 875	+ 381	+ 574

3.

175	357	526	162	845
263	113	683	842	464
+ 421	+ 318	+ 347	+ 682	+ 573

4.

316	214	817	552	621
470	275	646	673	897
+ 211	+ 463	+ 373	+ 631	+ 973

Activity 4 - Adding Whole Numbers

(17) Directions: Use scratch paper to add these numbers. Use your calculator to check your answers.

1.

685	597	263	760	461	298
691	283	161	218	919	709
274	406	247	322	653	395
+ 394	+ 938	+ 459	+ 938	+ 597	+ 471

2.

518	114	806	638	441
782	726	992	793	348
764	953	528	136	635
207	199	666	483	914
+ 843	+ 727	+ 894	+ 397	+ 679

3.

272	944	357
107	775	106
814	753	197
760	107	371
591	779	810
467	107	849
157	811	693
+ 724	+ 661	+ 556

4.

494	165	618
847	559	622
511	428	159
577	135	285
905	650	341
699	417	375
359	505	662
+ 424	+ 876	+ 996

Activity 4 - Adding Whole Numbers

(18) Directions: Add and check.

1.	8,027 + 1,932	3,329 + 4,060	6,203 + 2,351
2.	6,001 + 2,573	2,347 + 2,412	7,580 + 1,316
3.	4,825 + 3,054	1,756 + 6,213	6,073 + 2,515
4.	4,815 + 2,114	8,047 + 1,832	1,966 + 4,032
5.	4,116 + 4,572	7,038 + 2,521	2,413 + 4,334
6.	4,261 + 3,428	2,352 + 6,043	7,084 + 2,713

Activity 4 - Adding Whole Numbers

(19) Directions: Add and check.

1.	7,244 + 2,351	8,563 + 1,234	5,042 + 2,635
2.	4,162 + 5,736	2,438 + 4,235	7,654 + 3,476
3.	4,651 + 3,238	3,527 + 1,417	6,355 + 3,846
4.	7,136 + 1,042	3,574 + 3,103	5,546 + 2,342
5.	2,746 + 8,337	8,437 + 5,895	4,825 + 2,164
6.	9,223 + 4,439	7,558 + 6,796	3,251 + 4,748

Activity 4 - Adding Whole Numbers

(20) Directions: Add and check.

1.

	2,562		4,658		5,673
	3,114		3,226		2,225
+	3,201	+	1,814	+	3,070

2.

	4,124		2,543		7,338
	3,251		6,671		3,229
+	1,524	+	1,187	+	6,360

3.

	8,779		4,855		7,630
	2,286		2,849		4,108
+	5,269	+	1,754	+	7,068

4.

	8,493		4,181		4,596
	7,601		7,670		8,892
+	2,519	+	2,892	+	4,625

5.

	9,478		3,997		5,504
	6,791		9,254		2,741
+	5,912	+	4,529	+	3,116

Activity 4 - Adding Whole Numbers

(21) Directions: Use scratch paper to add these numbers. Use your calculator to check your answer.

1.

3,948	6,787
7,758	3,316
6,799	4,213
+ 2,437	+ 5,449

2.

8,123	2,774
7,510	7,887
1,085	3,551
6,534	4,560
9,469	5,494
3,638	1,745
+ 1,086	+ 8,361

3.

8,649	7,099
7,856	9,592
4,822	3,683
4,776	9,971
6,252	1,617
2,791	2,193
+ 8,679	+ 8,062

4.

4,108	9,081
7,915	8,752
3,736	2,978
+ 2,615	+ 7,093

Activity 4 - Adding Whole Numbers

(22) Directions: Add and check.

1.	24,207 + 15,072	54,156 + 30,422	32,854 + 43,104
2.	14,871 + 65,118	75,854 + 24,357	40,955 + 46,365
3.	36,745 + 42,031	56,092 + 23,805	72,033 + 21,563
4.	51,084 + 27,505	69,043 + 20,516	23,864 + 51,133
5.	25,401 + 22,367	86,996 + 97,668	27,514 + 22,384

Activity 4 - Adding Whole Numbers

(23) Directions: Add and check.

1.	21,513 + 62,375	63,285 + 24,926	32,643 + 20,898
2.	18,946 + 51,032	70,128 + 16,641	54,223 + 32,564
3.	51,937 + 35,042	69,821 + 20,104	30,649 + 54,320
4.	58,971 + 28,099	72,064 + 27,248	38,684 + 20,314
5.	76,521 + 13,054		

Activity 4 - Adding Whole Numbers

(24) Directions: Add and check.

1.

52,364	35,086	20,316
+ 2,305	+ 1,213	+ 8,271

2.

86,954	29,847	59,146
21,326	31,866	28,759
+ 40,579	+ 49,230	+ 61,238

3.

76,493	44,538	27,881
66,590	64,908	92,855
+ 27,286	+ 70,435	+ 33,064

4.

43,972	69,836	75,634
61,258	71,234	32,408
+ 30,417	+ 33,927	+ 21,046

5.

27,290	54,763
+ 2,607	+ 4,134

Activity 4 - Adding Whole Numbers

(25) Directions: Add and check.

1. $\begin{array}{r} 392{,}844 \\ +\ 547{,}276 \\ \hline \end{array}$ $\begin{array}{r} 693{,}295 \\ +\ 248{,}708 \\ \hline \end{array}$ $\begin{array}{r} 476{,}698 \\ +\ 781{,}786 \\ \hline \end{array}$

2. $\begin{array}{r} 646{,}245 \\ +\ 695{,}048 \\ \hline \end{array}$ $\begin{array}{r} 665{,}014 \\ +\ 959{,}084 \\ \hline \end{array}$ $\begin{array}{r} 236{,}980 \\ +\ 346{,}706 \\ \hline \end{array}$

3. $\begin{array}{r} 683{,}945 \\ +\ 821{,}596 \\ \hline \end{array}$ $\begin{array}{r} 382{,}769 \\ +\ 737{,}892 \\ \hline \end{array}$ $\begin{array}{r} 473{,}586 \\ +\ 469{,}218 \\ \hline \end{array}$

4. $\begin{array}{r} 596{,}868 \\ +\ 243{,}117 \\ \hline \end{array}$ $\begin{array}{r} 998{,}273 \\ +\ 289{,}713 \\ \hline \end{array}$ $\begin{array}{r} 610{,}199 \\ +\ 583{,}045 \\ \hline \end{array}$

5. $\begin{array}{r} 592{,}768 \\ +\ 409{,}826 \\ \hline \end{array}$

Activity 4 - Adding Whole Numbers

(26) Directions: Add and check.

1.	642,865 + 921,565	784,228 + 843,627	372,486 + 687,769
2.	662,184 + 234,013	729,832 + 240,144	229,056 + 500,832
3.	367,455 + 422,301	294,391 + 748,692	249,382 + 389,827
4.	831,476 + 978,937	210,976 + 384,012	861,042 + 121,446
5.	478,695 341,217		

Activity 4 - Adding Whole Numbers

(27) Directions: Use scratch paper to add these numbers. Use your calculator to check your answers.

1.
$$\begin{array}{r} 423,876,982 \\ +\ 839,213,469 \\ \hline \end{array} \qquad \begin{array}{r} 476,827,698 \\ +\ 928,022,809 \\ \hline \end{array} \qquad \begin{array}{r} 247,692,385 \\ +\ 786,427,820 \\ \hline \end{array}$$

2.
$$\begin{array}{r} 738,925,467 \\ +\ 426,178,698 \\ \hline \end{array} \qquad \begin{array}{r} 293,847,693 \\ +\ 542,769,827 \\ \hline \end{array} \qquad \begin{array}{r} 786,925,478 \\ +\ 354,769,842 \\ \hline \end{array}$$

3.
$$\begin{array}{r} 742,618,726 \\ +\ 427,864,415 \\ \hline \end{array} \qquad \begin{array}{r} 427,893,876 \\ +\ 738,264,699 \\ \hline \end{array} \qquad \begin{array}{r} 924,647,822 \\ +\ 376,256,878 \\ \hline \end{array}$$

4.
$$\begin{array}{r} 725,678,296 \\ +\ 854,927,707 \\ \hline \end{array} \qquad \begin{array}{r} 537,698,276 \\ +\ 654,276,987 \\ \hline \end{array} \qquad \begin{array}{r} 547,692,859 \\ +\ 382,769,842 \\ \hline \end{array}$$

Activity 5 - Solving Word Problems (Addition)

Objective(s): This activity will enable participants to solve word problems by applying addition skills.

Materials Required:
Pencil

You need to know:

To solve any word problem....

1. Determine what you must find out.

2. Decide what information is necessary in order to solve the problem.

3. Decide what arithmetic operation to use. Since clue words give you the key to solving the problem, pay particular attention to them.

EXAMPLES:

in all	sum	
together	more	
altogether	plus	→ TO ADD
total	and	
both	added	
combined	increase	

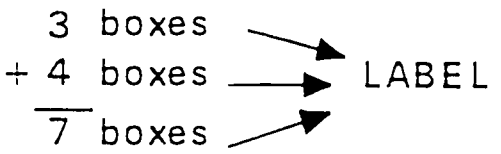
4. Work out the problem and find the solution.

5. Check your arithmetic. Reread the question to make sure that your answer makes sense.

Activity 5 - Solving Word Problems (continued)

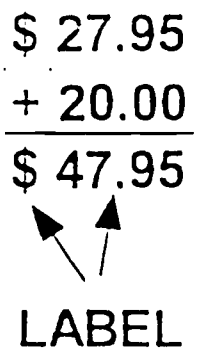
You need to know:

6. Label final answers in order to make the numbers concrete.
   EXAMPLES:
   Ralph ate 3 boxes of Better Cheddars® last week and 4 boxes this week. How many boxes did he eat altogether?



Not just 7, but 7 boxes (final answer).

A uniform costs $27.95 and an identification badge costs $20.00. How much did Henry pay for work attire?



Not just 47.95, but $47.95 (final answer).

Cluster
Applied Math

Activity 5 - Solving Word Problems (continued)

Directions: Read the word problems below and perform the necessary addition computations to answer the questions that follow.

1. An urban supermarket bought four shipments of Chips Ahoy!® cookies. The first shipment contained 87 cartons, the second 135, the third 111, and the fourth 215. In all, how many cartons were bought? _____

2. Annie, a packing technician, drives to Nabisco from various places and back home each evening. Her records show the following mileage for one week: 58 miles, 45 miles, 62 miles, 31 miles, and 79 miles. What was her total mileage for the week? _____

3. In the Bakery cafeteria, Rob bought a hamburger which costs $1.95, a bag of chips for $.65, and a large grape soda for $.93. How much did his lunch cost? _____

4. Bill and Carol Brown keep a record of the amount of gasoline they use to drive back and forth to Nabisco®. Last month they purchased the following number of gallons: 9, 13, 14, 10, 12, and 14. How many gallons did they purchase during the month?

_____

Activity 5 - Solving Word Problems (continued)

5. To reward employees for their outstanding record, Nabisco® management sponsored a luncheon. The following amounts of food were purchased: 110 pounds of hotdogs, 215 pounds of hamburger, 95 pounds of potato salad, 60 pounds of baked beans, and 48 pounds of coleslaw. Altogether, how many pounds of food were purchased? _____

6. During the luncheon, 283 employees were served the first hour, 170 the second hour, 82 the third hour, and 306 the fourth hour. What was the total number of employees served? _____

7. At the Richmond Bakery, the first shift produced 2,000,000 Premium® crackers, the second shift produced 1,743,562, and the third shift produced 1,928,637. How many crackers were produced on this day? _____

8. If 5,000,000 Ritz® crackers can be produced per shift, 2,000,000 Premium® crackers. and 2,400,000 Oreos®, combined how many cookies and crackers can be produced per shift? _____

Activity 5 - Solving Word Problems (continued)

9. Following are the pounds of B&R produced by each production line. What was the total amount of B&R produced for the day? _____

Line 1:	212	Line 5:	310
Line 2:	178	Line 6:	253
Line 3:	427	Line 7:	404
Line 4:	192		

10. One Thursday, line 1 produced 698 bundles of product, line 2 produced 737 bundles, line 3 produced 834 bundles, and line 4 produced 555 bundles. What was the total number of bundles produced for the day? _____

11. Following are the number of Nilla Wafer® units rejected by each fill machine on line 5, shift two. How many units were rejected during the shift? _____

Fill Machine 1:	12	Fill Machine 3:	16
Fill Machine 2:	23	Fill Machine 4:	67

Activity 5 - Solving Word Problems (continued)

12. One Tuesday, three lines produced Wheat Thins®. Line 2 produced 8,983 units, line 5 produced 9,876 units, and line 7 produced 9,495 units. How many units were produced altogether? _____

13. It is 6:17 p.m. and you have to relieve one of the Assemblers in 38 minutes. What time will you arrive to relieve him?

_____

14. Ray travels through a tunnel which costs $1.35 each way in order to get to and from work at Nabisco®. How much money does he spend to get through the tunnel daily? _____

15. During a one-hour period, fill machine 1 filled 786 boxes, fill machine 2 filled 993 boxes, and fill machine 3 filled 884 boxes. How many boxes were filled by all three machines? _____

Activity 5 - Solving Word Problems (continued)

16. Over a one-month period, a bakery produced the following number of pounds of B&R: 29,387, 32,740, 26,513 and 30,200. How many pounds of B&R were produced in all during the month? _____.

17. Following are the slug weights for five Chips Ahoy!® slugs (in grams). What is the total weight of the slugs? _____

253.1 246.7 266.5 258.3 260.9

18. On Wednesday, line 1 produced 374 pounds of B&R, line 2 produced 226 pounds, line 3 produced 427 pounds, and line 4 produced 452 pounds. What was the total amount of B&R produced for the day? _____

19. One Monday, shift 1 produced 634 doughs, shift 2 produced 606 doughs, and shift 3 produced 578 doughs. How many doughs were produced for the day? _____

Activity 5 - Solving Word Problems (continued)

20. Calculate the cumulative totals.

Pounds of B&R produced

Shift 1: 643

Shift 2: 376 Cumulative total = _____

Shift 3: 485 Cumulative total = _____

21. Calculate the cumulative totals.

Number of Wheat Thin® units produced by line 1:

Shift 1: 5,432

Shift 2: 4,987 Cumulative total = _____

Shift 3: 5,321 Cumulative total = _____

22. Following are the net weights of five packages of Chips Ahoy!®. What is the total net weight? _____

16.33 16.54 16.70 16.06 16.35

Activity 6 - Subtraction of Whole Numbers

Objective(s): This activity will enable participants to (1) apply the rules for subtracting whole numbers and (2) check the answers to subtraction problems.

Materials Required:
Pencil

You need to know:

1. Subtraction is used everyday in many ways. Whenever you buy an item at the store, your change can be calculated by subtraction. On the job, you may subtract an oil reading from total usage, subtract the lowest bag weight from the highest bag weight to calculate bag weight range, or subtract minor ingredients to put the proper amount of ingredients into the mixer.

2. Subtraction is the opposite of addition. Addition is combining two or more quantities while subtraction is the process of taking one number away from another. It is the process of determining the difference between two numbers or quantities.

3. Use subtraction to figure out how much is left when you remove one number from another or when you want to compare two numbers.

   EXAMPLE: (A) Betty had $7.00. She gave $3.50 to Ted for his lunch. How much money did Betty have left?

(A)	$ 7.00
	- 3.50
Answer	$ 3.50

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know: (continued)

EXAMPLE: (B) If a large bag of cookies weighs 18 ounces and a small bag weighs 10 ounces, how much more does the large bag weigh?

18 ounces
- 10 ounces
Answer 8 ounces

4. The number from which another number is to be subtracted is called the minuend. The number to be subtracted is the subtrahend. The result (answer) is called the difference or remainder.

EXAMPLE:

246 minuend
- 134 subtrahend
Answer 112 difference (remainder)

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know: (continued)

5. To subtract whole numbers:

EXAMPLE: Subtract 231 from 744.

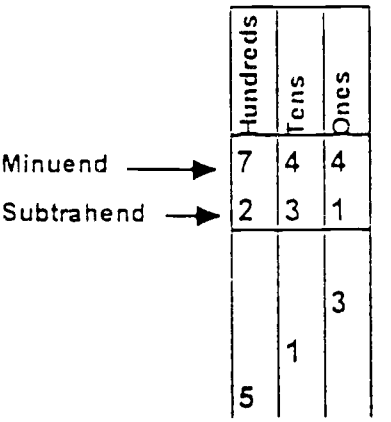
(A) Write the larger number as the minuend.

(B) Place the digits in the subtrahend in proper columns.

(C) Begin with the units (ones) column and take 1 away from 4. Record the difference (3) in the units column.

(D) Continue in the same manner with the tens and hundreds columns (subtract other columns to the left, where applicable).

(E) The answer (513) is the difference between the two numbers.



Activity 6 - Subtraction of Whole Numbers (continued)

You need to know:

6. If a digit in the subtrahend is too large to take from the digit above it in the minuend, borrow from the next column in the minuend in order to subtract.

   (A) Since you can't subtract 6 from 2, borrow 1 ten from the tens column. (10 + 2 = 12). Place a small 1 next to the 2 in the minuend to show that it is now 12.

   EXAMPLE:

   $$\begin{array}{rr} \overset{6}{\cancel{7}} & {}^{1}2 \\ - \; 2 & 6 \\ \hline 4 & 6 \end{array}$$

   (B) Cross out the 7 in the tens column and make it a six to show that your borrowed 1 ten.

   (C) Subtract: 12 - 6 = 6

   (D) Subtract: 6 - 2 = 4

   (E) The answer (46) is the difference between the two numbers.

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know:

7. If you have to borrow more than once in the same problem, continue the same process with remaining columns. Proceed to subtract by borrowing until you have subtracted each digit

   EXAMPLE:

$$\begin{array}{r} {}^{7}\not{8}\ {}^{15}\not{6}\ {}^{1}4 \\ -\quad 8\ 7 \\ \hline 7\ 7\ 7 \end{array}$$

8. To check a subtraction problem, add the difference (answer) to the subtrahend of the original problem. The sum should be the minuend of the original problem.

   EXAMPLE:

$$\begin{array}{r} 39 \\ -\ 14 \\ \hline 25 \end{array}$$

(1) $9 - 4 = 5$
(2) $3 - 1 = 2$

CHECK

$$\begin{array}{r} 39\checkmark \\ -\ 14 \\ \hline 25 \\ \hline 39\checkmark \end{array}$$

(1) $4 + 5 = 9$
(2) $1 + 2 = 3$

9. For every subtraction problem, there is an equivalent addition problem.

   EXAMPLE: $16 - 7 = 9$ because $9 + 7 = 16$

Activity 6 - Subtraction of Whole Numbers (continued)

Directions: Practice subtracting in your head a one digit number from a larger number. Have a classmate time you for exactly 5 minutes as you work to accurately complete the chart. Subtract the numbers in the left column from each of the numbers across the top of the chart. GO AS FAST AS YOU CAN!

—	16	23	30	18	90	12	47	10	25
9									
7									
5									
3									
8									
6									
4									

Activity 6 - Subtracting Whole Numbers

(1) Directions: Subtract.

1.	8	7	4	9	8	3	1	8	5	6
	- 4	- 0	- 2	- 0	- 7	- 2	- 1	- 5	- 2	- 6
2.	6	5	7	4	9	8	2	6	7	9
	- 3	- 4	- 7	- 3	- 2	- 5	- 0	- 2	- 6	- 6
3.	4	8	13	9	6	12	3	15	11	4
	- 0	- 2	- 8	- 1	- 6	- 3	- 1	- 7	- 5	- 1

Activity 6 - Subtracting Whole Numbers

(2) Directions: Subtract.

1.	10	5	18	8	6	15	9	16	5	12
	- 5	- 1	- 9	- 2	- 6	- 7	- 7	- 9	- 5	- 4
2.	5	7	8	13	11	7	8	11	10	9
	- 3	- 6	- 3	- 5	- 3	- 2	- 0	- 9	- 7	- 9
3.	13	12	11	2	7	13	6	6	9	13
	- 8	- 3	- 5	- 2	- 0	- 9	- 5	- 1	- 0	- 6

Activity 6 - Subtracting Whole Numbers

(3) Directions: Subtract.

1.	16	8	10	5	6	5	7	14	18	11
	- 7	- 6	- 5	- 4	- 2	- 1	- 3	- 8	- 9	- 4
2.	12	10	12	14	7	10	16	5	7	11
	- 5	- 3	- 8	- 9	- 5	- 4	- 7	- 4	- 3	- 4
3.	7	5	13	14	3	4	15	10	9	2
	- 1	- 2	- 7	- 6	- 2	- 3	- 6	- 9	- 3	- 1

Activity 6 - Subtracting Whole Numbers

(4) Directions: Subtract.

1.	13	4	9	5	8	3	1	8	11	12
	- 7	- 3	- 3	- 0	- 5	- 3	- 1	- 7	- 6	- 7
2.	9	12	10	7	11	11	7	14	15	2
	- 8	- 9	- 8	- 6	- 3	- 9	- 1	- 6	- 6	- 1
3.	10	14	12	6	7	11	9	10	1	8
	- 1	- 9	- 6	- 0	- 5	- 7	- 5	- 4	- 0	- 1

Activity 6 - Subtracting Whole Numbers

(5) Directions: Subtract.

1.	14	11	2	17	16	4	5	13	8	9
	- 7	- 2	- 0	- 9	- 8	- 2	- 3	- 5	- 0	- 9
2.	6	5	10	13	8	17	7	3	15	11
	- 4	- 0	- 2	- 4	- 5	- 8	- 4	- 3	- 9	- 8
3.	6	15	4	3	9	7	10	6	9	8
	- 3	- 8	- 4	- 0	- 4	- 7	- 1	- 0	- 5	- 1

Activity 6 - Subtracting Whole Numbers

(6) Directions: Subtract.

1.	1	14	6	8	9	15	11	10	4	12
	- 1	- 5	- 3	- 7	- 6	- 8	- 6	- 6	- 4	- 7
2.	12	11	1	8	6	14	4	9	3	4
	- 6	- 7	- 0	- 6	- 2	- 8	- 0	- 1	- 1	- 1
3.	8	7	10	5	3	10	6	13	7	11
	- 3	- 2	- 7	- 2	- 2	- 9	- 4	- 4	- 4	- 8

Activity 6 - Subtracting Whole Numbers

(7) Directions: Subtract.

1.	6	17	9	6	16	12	9	4	10	13
	- 5	- 9	- 8	- 1	- 8	- 9	- 0	- 2	- 8	- 6
2.	10	17	15	14	9	10	9	8	13	8
	- 2	- 8	- 9	- 5	- 6	- 6	- 2	- 8	- 6	- 4
3.	9	2	14	16	7	11	5	13	2	12
	- 7	- 2	- 7	- 9	- 0	- 2	- 5	- 9	- 0	- 4

Activity 6 - Subtracting Whole Numbers

(8) Directions: Subtract and check.

1.	60 - 40	35 - 21	77 - 73	74 - 40	58 - 32
2.	63 - 22	72 - 70	85 - 34	96 - 62	43 - 43
3.	91 - 6	62 - 9	33 - 4	52 - 27	45 - 16

Activity 6 - Subtracting Whole Numbers

(9) Directions: Subtract and check.

1.	57 - 18	43 - 25	65 - 8	82 - 75	60 - 42
2.	36 - 18	48 - 29	51 - 36	25 - 18	74 - 27
3.	34 - 22	69 - 35	38 - 31	52 - 32	75 - 51

Activity 6 - Subtracting Whole Numbers

(10) Directions: Subtract and check.

1.	82 - 9	27 - 8	21 - 7	95 - 8	63 - 5
2.	54 - 33	28 - 14	94 - 51	77 - 36	58 - 48
3.	83 - 25	95 - 39	50 - 28	68 - 49	97 58

Activity 6 - Subtracting Whole Numbers

(11) Directions: Subtract and check.

1.	78 - 15	28 - 10	56 - 12	67 - 25	79 - 54
2.	67 - 8	95 - 9	48 - 9	68 - 9	84 - 7
3.	76 - 7	47 - 8	94 - 8	81 - 40	62 - 11

Activity 6 - Subtracting Whole Numbers

(12) Directions: Subtract and check.

1.	85 - 16	44 - 27	68 - 59	70 - 32	42 - 18
2.	76 - 71	21 - 11	65 - 53	87 - 62	48 - 17
3.	53 - 36	28 - 19	97 - 28	79 - 58	64 - 26

Activity 6 - Subtracting Whole Numbers

(13) Directions: Subtract and check.

1.	75 - 17	71 - 26	38 - 19	24 - 11	92 - 39
2.	57 - 29	61 - 34	92 - 83	41 - 21	37 - 15
3.	62 - 21	46 - 25	58 - 26	61 - 47	92 - 29

Activity 6 - Subtracting Whole Numbers

(14) Directions: Subtract and check.

1.	300 - 37	400 - 45	600 - 63	200 - 34	900 - 51
2.	553 - 69	417 - 58	864 - 87	241 - 48	752 - 57
3.	251 - 38	742 - 27	927 - 18	381 - 53	793 - 86

Activity 6 - Subtracting Whole Numbers

(15) Directions: Subtract and check.

1.	896	692	546	695	588
	- 88	- 85	- 37	- 88	- 79
2.	205	306	402	508	206
	- 86	- 38	- 46	- 59	- 49
3.	795	932	866	357	614
	- 29	- 38	- 47	- 28	- 17

Activity 6 - Subtracting Whole Numbers

(16) Directions: Subtract and check.

1.	602	501	803	902	401
	- 58	- 29	- 37	- 44	- 53
2.	968	141	572	543	519
	- 74	- 80	- 91	- 62	- 53
3.	640	365	482	981	288
	- 27	- 48	- 75	- 63	- 59

Activity 6 - Subtracting Whole Numbers

(17) Directions: Subtract and check.

1.	334 - 299	634 - 467	310 - 123
2.	246 - 134	983 - 672	643 - 482
3.	401 - 389	893 - 748	472 - 472

Activity 6 - Subtracting Whole Numbers

(18) Directions: Subtract and check.

1.	641 - 500	812 - 602	559 - 247
2.	885 - 452	740 - 520	482 - 331
3.	562 - 491	496 - 263	842 - 761

Activity 6 - Subtracting Whole Numbers

(19) Directions: Subtract and check.

1. $\begin{array}{r} 525 \\ -\ 247 \\ \hline \end{array}$ $\begin{array}{r} 287 \\ -\ 198 \\ \hline \end{array}$ $\begin{array}{r} 216 \\ -\ 158 \\ \hline \end{array}$

2. $\begin{array}{r} 305 \\ -\ 278 \\ \hline \end{array}$ $\begin{array}{r} 207 \\ -\ 199 \\ \hline \end{array}$ $\begin{array}{r} 401 \\ -\ 285 \\ \hline \end{array}$

3. $\begin{array}{r} 466 \\ -\ 388 \\ \hline \end{array}$ $\begin{array}{r} 373 \\ -\ 199 \\ \hline \end{array}$ $\begin{array}{r} 983 \\ -\ 585 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(20) Directions: Subtract and check.

1.	502 - 263	308 - 149	604 - 326
2.	418 - 279	957 - 821	627 - 468
3.	650 - 440	848 - 232	567 - 356

Activity 6 - Subtracting Whole Numbers

(21) Directions: Subtract and check.

1.	467 - 349	355 - 237	653 - 409
2.	983 - 147	578 - 429	356 - 180
3.	942 - 611	889 - 278	468 - 432

Activity 6 - Subtracting Whole Numbers

(22) Directions: Subtract and check.

1. $\begin{array}{r} 893 \\ -\ 655 \\ \hline \end{array}$ $\begin{array}{r} 972 \\ -\ 408 \\ \hline \end{array}$ $\begin{array}{r} 331 \\ -\ 125 \\ \hline \end{array}$

2. $\begin{array}{r} 362 \\ -\ 188 \\ \hline \end{array}$ $\begin{array}{r} 721 \\ -\ 356 \\ \hline \end{array}$ $\begin{array}{r} 982 \\ -\ 581 \\ \hline \end{array}$

3. $\begin{array}{r} 371 \\ -\ 269 \\ \hline \end{array}$ $\begin{array}{r} 684 \\ -\ 547 \\ \hline \end{array}$ $\begin{array}{r} 143 \\ -\ 128 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(23) Directions: Subtract and check.

1.	974 - 923	567 - 524	534 - 311
2.	337 - 155	812 - 90	764 - 581
3.	952 - 940	540 - 230	686 - 251

Activity 6 - Subtracting Whole Numbers

(24) Directions: Subtract and check.

1.	794 - 478	652 - 239	498 - 379
2.	563 - 185	777 - 298	835 - 348
3.	364 - 263	751 - 401	523 - 321

Activity 6 - Subtracting Whole Numbers

(25) Directions: Subtract and check.

1. $\begin{array}{r} 458 \\ -\ 349 \\ \hline \end{array}$ $\begin{array}{r} 691 \\ -\ 227 \\ \hline \end{array}$ $\begin{array}{r} 854 \\ -\ 536 \\ \hline \end{array}$

2. $\begin{array}{r} 278 \\ -\ 119 \\ \hline \end{array}$ $\begin{array}{r} 445 \\ -\ 108 \\ \hline \end{array}$ $\begin{array}{r} 764 \\ -\ 545 \\ \hline \end{array}$

3. $\begin{array}{r} 249 \\ -\ 134 \\ \hline \end{array}$ $\begin{array}{r} 553 \\ -\ 243 \\ \hline \end{array}$ $\begin{array}{r} 916 \\ -\ 503 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(26) Directions: Subtract and check.

1.

683	944	871
- 421	- 703	- 260

2.

772	908	197
- 341	- 305	- 122

3.

887	543	781
- 352	- 243	- 300

Activity 6 - Subtracting Whole Numbers

(27) Directions: Subtract and check.

1. $\begin{array}{r} 692 \\ -\ 491 \\ \hline \end{array}$ $\begin{array}{r} 485 \\ -\ 324 \\ \hline \end{array}$ $\begin{array}{r} 727 \\ -\ 512 \\ \hline \end{array}$

2. $\begin{array}{r} 739 \\ -\ 628 \\ \hline \end{array}$ $\begin{array}{r} 609 \\ -\ 203 \\ \hline \end{array}$ $\begin{array}{r} 957 \\ -\ 342 \\ \hline \end{array}$

3. $\begin{array}{r} 266 \\ -\ 118 \\ \hline \end{array}$ $\begin{array}{r} 385 \\ -\ 166 \\ \hline \end{array}$ $\begin{array}{r} 597 \\ -\ 408 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(28) Directions: Subtract and check.

1. 800 - 263 | 300 - 127 | 500 - 233

2. 400 - 291 | 600 - 382 | 200 - 194

3. 700 - 266 | 900 - 724 | 300 - 123

Activity 6 - Subtracting Whole Numbers

(29) Directions: Subtract and check.

1.	5,037	1,201	5,834
	- 329	- 642	- 855
2.	3,633	4,125	2,951
	- 794	- 636	- 972
3.	1,896	1,896	1,896
	- 484	- 494	- 498

Activity 6 - Subtracting Whole Numbers

(30) Directions: Subtract and check.

1. $\begin{array}{r} 1,876 \\ -\ 689 \\ \hline \end{array}$ $\begin{array}{r} 3,243 \\ -\ 892 \\ \hline \end{array}$ $\begin{array}{r} 3,243 \\ -\ 856 \\ \hline \end{array}$

2. $\begin{array}{r} 5,648 \\ -\ 649 \\ \hline \end{array}$ $\begin{array}{r} 6,345 \\ -\ 258 \\ \hline \end{array}$ $\begin{array}{r} 1,827 \\ -\ 918 \\ \hline \end{array}$

3. $\begin{array}{r} 8,002 \\ -\ 628 \\ \hline \end{array}$ $\begin{array}{r} 9,003 \\ -\ 324 \\ \hline \end{array}$ $\begin{array}{r} 4,005 \\ -\ 556 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(31) Directions: Subtract and check.

1. 4,080 − 387 | 3,070 − 991 | 5,020 − 438

2. 1,896 − 499 | 1,004 − 687 | 4,468 − 579

3. 3,006 − 439 | 8,007 − 299 | 1,006 − 307

Activity 6 - Subtracting Whole Numbers

(32) Directions: Subtract and check.

1.	2,040 - 462	3,060 - 392	1,050 - 465
2.	4,003 - 621	9,002 - 972	6,001 - 430
3.	7,263 - 185	4,775 - 683	5,175 - 438

Activity 6 - Subtracting Whole Numbers

(33) Directions: Subtract and check.

1.

	8,240	2,334	1,615
-	327	516	807

2.

	3,004	5,006	2,007
-	973	425	347

Activity 7 - Calculating the Range of Whole Numbers

Objective(s): This activity will enable participants to find the range between two numbers.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. Subtraction is used to calculate the range between two numbers.

2. The <u>range</u> is the difference between the lowest number and the highest number calculated when taking measurements such as temperatures, weights, etc.

   <u>EXAMPLE</u>:
   Find the range of these dough weights:
   105 g 101 g 110 g 103 g

   A. Arrange the measurements (temperatures, weights, etc.) in sequence:

      110 g
      105 g
      103 g
      101 g

   B. Determine the largest measurement. → 110 g

   C. Determine the smallest measurement. → 101 g

Activity 7 - Calculating the Range of Whole Numbers (continued)

You need to know:

D. Subtract the smallest measurement from the largest measurement.

$$\begin{array}{r} 110\ g \\ -\ 101\ g \\ \hline 9\ g \end{array} \quad \text{(range)}$$

E. The difference is the range.

3. The simplest way to report variations is to give the range between the highest and lowest measurement. You can interpret the variation in a process by examining the patterns on control charts. Such patterns let you know if the process is operating according to guidelines or if it is not in control.

4. For example, you can check wet weights, dough weights, or oven temperatures by calculating the range between measurements.

Activity 7 - Calculating the Range of Whole Numbers (continued)

Directions: Underline the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	18	12	14	16	_____
B)	21	27	23	25	_____
C)	6	2	8	4	_____
D)	9	7	5	3	_____
E)	44	48	42	40	_____
F)	33	35	32	36	_____
G)	51	50	53	57	_____
H)	17	11	6	3	_____
I)	33	13	22	11	_____
J)	213	266	245	202	_____

Activity 7 - Calculating the Range of Whole Numbers (continued)

Directions: Calculate the range.

1. Find the range of the following oil readings:

   4 % 11 % 10 % 8 % 13 %

   Range: %

2. Find the range of the following bag weights:

   18 oz. 17 oz. 14 oz. 12 oz. 10 oz.

   Range: oz.

3. Calculate the range of the following wet weights:

   A) 74 69 67 Range:

   B) 76 72 67 Range:

   C) 69 72 68 Range:

   D) 70 74 66 Range:

   E) 76 75 65 Range:

4. Find the range of these oven temperatures:

   A) 410° 580° 550° 520° 415° 330° 420° 450°

   Range: °

   B) 350° 500° 510° 400° 340° 350° 300° 320°

   Range: °

Activity 8 - Calculating Tare Weights

Objective(s): This activity will enable participants to determine product weights.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. To figure out precisely how much product or ingredient is on a scale, you must first subtract the weight of the packaging material or container holding the product or ingredient. This packaging material or container is known as the tare.

2. If a bag of Oreos® is labeled 20 ounces, this means 20 ounces of edible product, not including the bag (tare weight). To determine how much edible product is in the bag, first weigh the empty bag and then subtract this weight from the weight of the full bag. The remainder (difference) is the actual amount of edible product inside the bag. When you press the Tare Key on the scale, the scale makes this calculation for you.

   EXAMPLE: Find the following product weight:

   16 oz. of cookies including the bag
   - 2 oz. of packaging material (tare)
   14 oz. exact weight of cookies inside the bag

Activity 9 - Subtracting Whole Numbers (Word Problems)

Directions: Use subtraction to solve the following problems:

1. Suppose lines 8 and 9 in a bakery produce Snackwells®. The total number of units produced daily is 32,988. Line 9 produces 18,752 units per day. How many units are produced by Line 8?

   _____

2. The total package weight of a box of Cheese Nips® is 383 grams. The tare weight is 73 grams. What is the net weight?

   _____

3. The total package weight of a package of Chips Ahoy!® is 18 ounces. The packaging tare is 2 ounces. What is the net weight?

   _____

4. The total package weight of a box of Premium® crackers is 17 ounces. The tare weight is 1 ounce. What is the actual product weight?

   _____

5. One Thursday, shift 2 produced 634 doughs and shift 3 produced 527 doughs. How many more doughs did shift 2 produce than shift 3?

   _____

6. On Wednesday, shift 1 produced 694 pounds of B&R and shift 2 produced 447 pounds of B&R. How much more B&R was produced by shift 1 than by shift 2?

   _____

Activity 9 - Subtracting Whole Numbers (Word Problems) (continued)

7. On Friday, three shifts produced Oreos®. Shift 3 produced 9,298 units, shift 1 produced 9,986 units, and shift 2 produced 8,897 units.

   A) How many more units did shift 1 produce than shift 3?

   _____

   B) How many more units did shift 1 produce than shift 2?

   _____

   C) How many more units did shift 3 produce than shift 2?

   _____

8. Find the following product weights:

   A) 178g of product; 10g of packaging material

   product weight: _____

   B) 249g of product; 13g of packaging material

   product weight: _____

   C) 254g of product; 12g of packaging material

   product weight: _____

   D) 12 oz. of product; 2 oz. of packaging material

   product weight: _____

   E) 22 oz. of product; 4 oz. of packaging material

   product weight: _____

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Activity 10 - Decimal Place Values/Reading and Writing Decimals

Objective(s): This activity will enable participants to identify decimal place values and to read and write decimals.

Materials Required:
Pencil

You need to know:

1. A decimal is a number which stands for a part of a whole. It is written with a decimal point (.) followed by digits to the right. Each digit to the right of the decimal point stands for less than a whole number.

2. Like whole numbers, the placement of each digit in a decimal number, or its place value, determines the value of the decimal.

3. The decimal point (.) separates the whole number places from the decimal places. Moving to the left of the decimal point, place values increase. Moving to the right of the decimal point, place values decrease.

4. Decimals may be read in two different ways:
   (a) Place Value - Read the value of the entire number and read the decimal point as "and." Use the place value of the last digit in reading the decimal. For example, .4 is read "four tenths"; .04 is read "four hundredths"; .004 is read "four thousandths"; .0004 is read "four ten-thousandths"; and 1.45 is read "one and forty five hundredths".

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

You need to know:

Hundreds	Tens	Ones	Decimal Point	Tenths	Hundredths	Thousandths	Ten Thousandths	Hundred Thousandths	Millionths
			.	4					
			.	0	4				
			.	0	0	4			
			.	0	0	0	4		
		1	.	4	5				

(b) Point Value - Read each digit, reading the decimal point as "point." For example, 1.45 is read "one point four five."

EXAMPLES:

.9	=	nine tenths, or point nine
.015	=	fifteen thousandths, or point zero one five
12.43	=	twelve and forty-three hundredths, or twelve point four three
118.257	=	one hundred eighteen and two hundred fifty-seven thousandths, or one hundred eighteen point two five seven

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

Directions: Before starting this exercise, read aloud to the instructor the decimals listed below. Write the place name of the last digit in each decimal in the blank provided. Underline all the digits that represent less than a whole.

(1)	29.3	_____
(2)	679.23	_____
(3)	51.084	_____
(4)	392.19	_____
(5)	500.453	_____
(6)	14.7	_____
(7)	38.22	_____
(8)	142.002	_____
(9)	25.6341	_____
(10)	12.36	_____

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

Directions: Rewrite the numbers below as decimals. When you've completed the exercise, read the decimals aloud to the instructor.

(1) twenty-seven and eight tenths _____

(2) forty-five and sixty-three hundredths _____

(3) nineteen and two hundred forty-two thousandths _____

(4) twenty-five and thirty-four ten thousandths _____

(5) fifty and thirty-three thousandths _____

(6) eighty-one hundredths _____

(7) three and five tenths _____

(8) one hundred thirty-seven thousandths _____

(9) twelve and fifteen thousand six hundred twenty-five hundred-thousandths _____

(10) eight hundred seventy-five ten-thousandths _____

Activity 10 - Decimal Place Values/Reading and Writing Decimals

Directions: Write the following decimals in words.

(1) .8 _____

(2) .09 _____

(3) .378 _____

(4) 10.475 _____

(5) .0028 _____

(6) 8.000326 _____

(7) 19.55 _____

(8) .0041 _____

(9) .000208 _____

(10) 16.013 _____

Activity 11 - Adding Decimals

Objective(s): This activity will enable participants to add decimals.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. A decimal is a number which stands for a part of a whole. It is written with a decimal point (.) followed by digits to the right. Each digit to the right of the decimal point stands for less than a whole number. The decimal point is also used to separate whole numbers from decimals.

2. Decimals are special types of fractions which are used daily. They are often referred to as decimal fractions.
   A) Any fraction with a denominator of 10 or a multiple of 10 can be written as a decimal.

   EXAMPLES:

$$\frac{3}{10} = .3, \quad \frac{175}{1000} = .175, \quad \frac{15}{100} = .15$$

   B) Decimal fractions are used every day.

   EXAMPLES:

money system (dollars and cents)	$ 5.95
gallons of gasoline	12.8 gallons
timing of sports events	9.5 seconds
car mileage	7.2 miles

Activity 11 - Adding Decimals (continued)

You need to know:

3. Decimal measurements are used in recording net weights, product moisture, slug weights, product pH, etc. Suppose you were asked to find the total slug weight of six Premium® slugs. Since cracker slugs may be measured in decimal form, you would need to know how to add decimals.

4. Adding decimals is very similar to adding whole numbers. In fact, the only difference between adding whole numbers and adding decimals is the placement of the decimal point.

   EXAMPLE: Add .2 + 6.07 + 1.943 + .005

   A) Write the numbers under each other so that all the decimal points are aligned vertically.

```
  .2
6.07
1.943
 .005
```

   Zeros may be added to the numbers so that they all have an equal number of places after the decimal point. Adding zeros will not change the value of the numbers. Besides, you may follow this practice to avoid errors in addition.

```
 .2000
6.0700
1.9430
 .0050
```

Activity 11 - Adding Decimals (continued)

You need to know:

B) Add each column with the same place value, starting with the column farthest to the right.

If a sum is greater than 9, carry to the column immediately to the left.

```
  .2000
 6.0700
 1.9430
  .0050
 -------
 82180
```

C) Write the decimal point in the answer so that it lines up with the decimal points in the problem.

```
  .2000
 6.0700
 1.9430
  .0050
 -------
 8.2180   Answer
```

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	.6 .5 .1	.3 .2 .4	.9 .7 .8	.1 .4 .7
2.	.2 .4 .6	.3 .5 .7	.4 .6 .8	.5 .7 .9
3.	.10 .15 .20	.12 .14 .16	.19 .17 .14	.13 .16 .18
4.	.11 .32 .54	.15 .28 .45	.22 .73 .47	.19 .37 .51

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.

.4	.9	.1	.8
.7	.5	.6	.4
8.7	4.3	3.2	6.5

2.

9.3	2.3	4.8	7.6
17.7	18.6	16.4	15.2
74.2	62.7	88.5	53.9

3.

76.8	32.5	67.9	35.7
119.42	321.26	392.28	231.09
24.4	29.3	21.8	10.6

4

3.8	5.7	4.5	3.2
2.1	3.2	1.3	2.5

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	9.3 1.4	2.6 5.3	2.9 8.4	8.3 9.9
2.	3.02 8.3	7.29 5.0	6.35 4.3	4.69 6.4
3.	.41 2.89	.57 4.18	.23 7.08	.64 3.77
4.	.32 9.46	.13 2.06	.47 5.32	.16 4.82

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	6.6 .81 .056	2.1 .49 .043	8.9 .67 .039	9.2 .10 .500
2.	60.3 2.85 5.77	.870 1.54 725.073	194.7 84.02 9.006	6.57 29.35 1.7
3.	14.6 .73 7.18	24.3 .10 25.67	8.80 7.7 52.3	.223 20.9 57.46
4	.817 6.465 3.73	62.1 8.97 .973	.526 6.83 3.4	62.1 8.97 .9730

Activity 11 - Adding Decimals (continued)

Directions: Calculate the following sums.

1. 5,342.1 + 367.22 = _____

2. 29 + 32.43 + 236.211 + 10.32 = _____

3. lowing are net weights for 18-ounce packages of Chips Ahoy!® What is the total net weight for these six packages?

   Answer: _____ounces

   17.9 18.2 18.4 18.7 18.5 18.8

4. Following are the net weights for 13.5-ounce boxes of Cheese Nips®. What is the total net weight for these 4 boxes?

   Answer: _____ounces

   13.383 13.501 13.496 13.023

5. Following are the slug weights for six Chips Ahoy!® slugs. What is the total weight of the slugs?

   Answer: _____ ___grams

   255.3 249.1 254.6 264.4 257.8 261.7

Activity 12 - Rounding Decimals

Objective(s): This activity will enable participants to round decimals to the nearest tenth, hundredth, and thousandth place.

Materials Required:
Pencil

You need to know:

1. Decimals are often rounded off, especially when working with measurements. In fact, the steps for rounding off decimals are the same as those used for rounding off whole numbers.

2. HOW TO ROUND DECIMALS
   A) Identify the digit just to the right of the place to which you are rounding.

   B) If this digit is less than 5, drop it (and all the digits to its right, if applicable).

   C) If the digit is 5 or more, add 1 to the digit in the place to which you are rounding.

3. EXAMPLE:

   Suppose you were asked to round the net weight of a carton of Premiums® to the nearest tenth (16.65 ounces).

   The digit just to the right of the place to which you are rounding is 5 (16.65 ounces).

   If this digit is less than 5 (16.64 ounces), drop it (and all the digits to its right, if applicable).
   16.64 = 16.6 ounces (answer)

   Since this digit is at least 5 (or more), add 1 to the digit in the place to which you are rounding.
   16.65 ounces = 16.7 ounces (answer)

Activity 12 - Rounding Decimals

Directions: Round the numbers as indicated below.

1. Round the net weight of this product to he nearest tenth.

   16.37 ounces _____ounces

2. Round the product moisture to the nearest tenth and the nearest hundredth.

   4.172% _____%

   _____%

3. Round the slug weight to the nearest tenth and the nearest one.

   254.65 grams _____grams

   _____grams

4. Round the following number to the nearest ten thousandth, thousandth, and hundredth.

   .01525 _____

   _____

   _____

Activity 12 - Rounding Decimals

Directions: Round the following decimals to the nearest tenth:

1)	4.57	_____
2)	2.52	_____
3)	1.85	_____
4)	12.04	_____
5)	.68	_____

Directions: Round the following decimals to the nearest hundredth:

6)	9.048	_____
7)	7.563	_____
8)	2.497	_____
9)	3.299	_____
10)	.485	_____

Directions: Round the following decimals to the nearest thousandth.

11)	5.1836	_____
12)	7.4889	_____
13)	1.6378	_____
14)	.2546	_____
15)	.1168	_____

Activity 13 - Subtracting Decimals

Objective(s): This activity will enable participants to subtract decimals.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. Write the larger number on top and line up the decimal points one under the other.

   EXAMPLE

   19.7 - .169

   ```
    19.7
   .169
   ```

2. Add zeros to the right of the decimal point so that each decimal has the same number of places. The top number should have the same number of decimal places as the bottom.

   ```
   19.700 (minuend)
 - .169   (subtrahend)
   ```

3. Subtract as you would for the whole numbers and bring down the decimal point in the difference. This decimal point should be aligned under the other decimal points.

   ```
   19.700
 - .169
   19.531 (difference or answer)
   ```

Activity 13 - Subtracting Decimals

Directions: Find the differences in the problems below.

(1) 6.2 - 3.76 = _____

(2) 45.92 - 23.07 = _____

(3) 5 - 2.493 = _____

(4) 382 - 46.20 = _____

(5) 12 - .936 = _____

(6) 835.091 - 482.320 = _____

(7) 3.2 - .1986 = _____

(8) 78 - 35.83 = _____

(9) 29.34 - 16.52 = _____

(10) .07 - .002 = _____

(11) 1 - .047 = _____

(12) .47 - .3992 = _____

(13) 89.3 - .764 = _____

(14) 963.857 - 241.534 = _____

Activity 13 - Subtracting Decimals

Directions: Find the difference in the following problems.

1. 93.7 - 39.48 = _____

2. 3,724.266 - 859.001 = _____

3. Calculate the net weight of a box of Better Cheddars®:
   Total package weight (ounces): 9.86; Tare weight (ounces): 1.3

   Net weight: _____

4. Calculate the net weight of a box of Honey Maid Graham Crackers®:
   Total package weight (ounces): 17.6; Tare weight (ounces): 1.28

   Net weight: _____

5. Suppose the wet weight of a Premium® cracker sample is 89.8 grams. The dry weight is 86.45 grams. What is the difference between the wet and dry weights?

   _____

6. On Thursday, shift 1 produced 646.99 pounds of B&R and shift 2 produced 972.5 pounds. How much more B&R was produced by shift 2 than by shift 1?

   _____

7. The average number of Oreo® units produced per day on shift 1 is 4,000.58. The average number of Oreo® units produced per day on shift 2 is 3,895.6. On average, how many more units does shift 1 produce than shift 2?

   _____

Cluster
Applied Math

Activity 14 - Comparing Decimals

Objective(s): This activity will enable participants to compare decimals.

Materials Required:
Pencil

You need to know: To compare decimals.....

1. Compare the digits to the left of the decimal point as whole numbers. If one whole number is larger, then that decimal is larger.

   EXAMPLE Compare: 427.36 with 425.263

   427 is larger than 425; therefore 427.36 is larger than 425.263.

2. When the whole numbers in decimals are equal, compare the first digit to the right of the decimal point. If one digit is larger, then that decimal is larger.

   You may give each decimal compared the same number of places by writing in zeros, if necessary. By using zeros as placeholders, you are giving each decimal a common denominator.

   EXAMPLE Compare: 18.331 with 18.47
   (18.331 with 18.470)

   The whole numbers are identical (18 and 18). Four (4) is larger than 3; therefore, 18.47 is larger than 18.331.

3. If the digits in the first place to the right of the decimal point (tenths) are the same, then compare the next place to the right (hundredths). If one digit is larger, then that decimal is larger.

   EXAMPLE Compare: 1.486 with 1.49
   (1.486 with 1.490)

   The whole numbers are identical (1 and 1). The digits in the first place to the right of the decimal point are the same (4 and 4). Nine (9) is larger than 8; therefore, 1.49 is larger than 1.486.

Activity 14 - Comparing Decimals

Directions: Write the larger decimal of each pair in the blank below.

(1)	.502	.52	_____
(2)	.17	.21	_____
(3)	.6	.06	_____
(4)	.400	.500	_____
(5)	.30	.90	_____
(6)	.4	.45	_____
(7)	.57	.06	_____
(8)	.7	.2	_____
(9)	.14	.41	_____
(10)	.83	.8	_____

Activity 15 - Calculating Range Using Decimals

Directions: Circle the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	17.8	17.08	17.1	17.11	_____
B)	43	43.1	40	43.01	_____
C)	234.9	234.19	233	234	_____
D)	16.91	17.1	16.98	17.09	_____
E)	23.16	22.93	23.61	23.094	_____
F)	18.33	18.32	18.28	18.23	_____
G)	51.98	51.	51.9	51.89	_____
H)	46.7	46.71	46.75	46.78	_____
I)	19.75	19.80	20.00	19.85	_____
J)	34.99	34.9	35	35.72	_____

Activity 15 - Calculating Range Using Decimals

Directions: Circle the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	16.8	16.08	15 1	15.11	_____
B)	16.3	16.1	15.8	15.9	_____
C)	19.85	20.00	19.75	20.71	_____
D)	243.7	243.17	242.00	243.00	_____
E)	41.0	41.3	40.0	41.6	_____
F)	6.8	7.2	6.9	7.6	_____
G)	1.6	1.2	.8	1.0	_____
H)	3.07	3.04	3.09	3.03	_____
I)	15.85	15.90	16.05	16.25	_____
J)	19.2	19.8	20.4	20.8	_____

Activity 16 - Multiplying Decimals

Objective(s): This activity will enable participants to multiply decimals.

Materials Required:
Pencil
Scratch Paper

You need to know: To multiply decimals, follow the steps below...

1. Line up the numbers one under the other for ease in multiplying. You may ignore the decimal places until you have found the product (number obtained by multiplying).

2. Multiply the decimals just as you would multiply whole numbers.

3. Count the number of decimal places in the numbers you have multiplied. Remember that whole numbers have 0 decimal places.

4. Starting from right to left, count off the same number of decimal places in the product. Place a decimal point in the product.

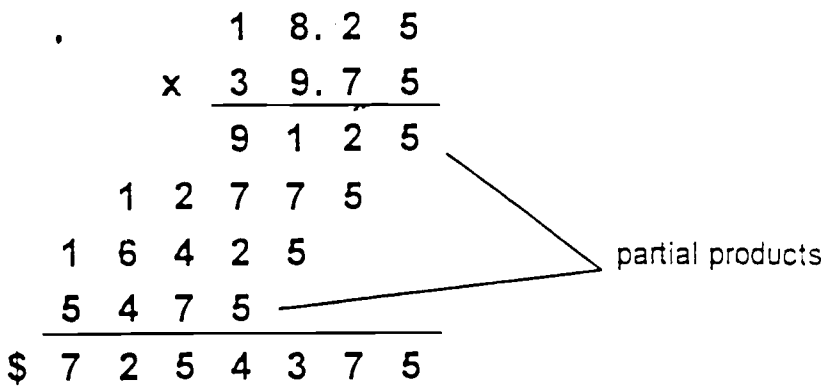
EXAMPLE

Suppose you are a packing technician employed by Nabisco and you want to compute your wages for a particular week. You earn $ 18.25 per hour and worked 39.75 hours. By multiplying the hourly rate by the number of hours worked, you can compute your pay for the week.

$ 18.25 **hourly rate**
x 39.75 **hours worked**

Activity 16 - Multiplying Decimals (continued)

You need to know:



	$ 18.25	2 decimal places
	x 39.75	+ 2 decimal places
product	$ 725.4375	4 decimal places
	($ 725.44)	

5. To multiply decimals by 10, 100, or 1,000...
   a. count the number of zeros in 10, 100, or 1,000.
   b. move the decimal point to the right as many places as there are zeros in 10, 100, or 1,000.
   c. write in additional ending zeros, if necessary.
   d. remember that a whole number is understood to have a decimal point at its right.

Activity 16 - Multiplying Decimals (continued)

You need to know:

EXAMPLES

45. 8 x 10	=	45.8	=	458.
45.8 x 100	=	45.80	=	4,580.
45.8 x 1,000	=	45.800	=	45,800
.136 x 10	=	.1 36	=	1.36
.136 x 100	=	.13 6	=	13.6
.136 x 1,000	=	.136	=	136.

Activity 16 - Multiplying Decimals

(2) Directions: Multiply.

1.	34.7 x 8	2.89 x 7	.551 x 6	60.3 x 9	7.18 x 4
2.	3.8 x 4	.92 x 9	6.7 x 6	5.3 x 8	.84 x 7
3.	41 x .03	78 x .5	59 x .09	86 x .4	19 x .06

Activity 16 - Multiplying Decimals

(3) Directions: Find the products in the problems below.

1.	.09 x .6	.05 x .7	.004 x .3	.08 x .04	.002 x .8
2.	2.8 x 4.3	5.6 x .82	.72 x 5.7	.81 x .69	.94 x 1.8
3.	41.8 x .7	3.90 x .08	.516 x .5	73.8 x .06	3.47 x .4

Activity 16 - Multiplying Decimals

(4) Directions: Multiply.

1.	5.6 x .2	.73 x .08	9.2 x .7	.087 x .4	3.3 x .06
2.	30.5 x .27	7.40 x 6.6	61.8 x 4.8	.514 x .91	9.06 x 7.3
3.	906 x .07	504 x.002	783 x .8	652 x .06	.467 x.003

Activity 16 - Multiplying Decimals

(5) Directions: Multiply.

1.	.02 x .8	.25 x .04	1.2 x .008	.073 x .05
2.	14.21 x 35	.216 x .24	17.7 x 2.5	3.2 x 87
3.	547.1 x .73	3.07 x 731	17.39 x 12.4	1.754 x .23
4.	4.08 x .0017	.0125 x .315	.468 x .1302	.12121 x .03

Activity 16 - Multiplying Decimals

(6) Directions: Multiply.

1.	17.32 x .16	.0648 x 2.3	913.2 x .049	40.21 x 20.8
2.	45.21 x 5.6	3.748 x 73	206.9 x .28	.7488 x 4.9
3.	.2789 x .17	3.845 x 29.2	5183.6 x .0016	303.003 x 56.8

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(7) Directions: Use the shortcut to multiply each of the following problems.

1. 10 x 7.6 = _____
2. 100 x .013 = _____
3. 10 x 7.64 = _____
4. 10 x .013 = _____
5. 10 x .7839 = _____
6. 100 x .002 = _____
7. 1,000 x .7839 = _____
8. 10 x .9084 = _____
9. 1,000 x .7839 = _____
10. 1,000 x 908.4 = _____
11. 10 x 7.9 = _____
12. 100 x 90.84 = _____

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(8) Directions: Multiply each of the following problems using the shortcut.

1. .2 x 10 = _____
2. 45.06 x 100 = _____
3. 72.4 x 100 = _____
4. .35 x 10 = _____
5. .539 x 100 = _____
6. .457 x 1,000 = _____
7. .05 x 100 = _____
8. 42.4 x 100 = _____
9. 86.73 x 1,000 = _____
10. 2.97 x 100 = _____
11. 22.8 x 1,000 = _____
12. .9 x 1,000 = _____

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(9) Directions: Multiply each of the following problems using the shortcut.

1)	.34 x 10 =	1.24 x 100 =	3.85 x 1,000 =
2)	.03 x 100 =	.275 x 100 =	8.9 x 100 =
3)	.8 x 10 =	.09 x 10 =	3.64 x 10 =
4)	.9 x 1,000 =	2.36 x 1,000 =	.475 x 1,000 =
5)	.06 x 1,000 =	.863 x 100 =	.721 x 10 =
6)	1.6 x 1,000 =		

Activity 16 - Multiplying Decimals

(1) Directions: Find the following products.

1. 1.14 x .8 = .912

2. .23 x .47 = .1081

3. 6.59 x .701 = 4.61959

4. Suppose you make $16.75 per hour. Last week you worked 39.5 hours. What will be your gross wages for the week?

   $ 661.625 ($ 661.63)

5. The net weight of a box of crackers is 13.5 ounces. Assuming that all boxes have the same net weights, how much will 12 boxes weigh?

   162 ounces

If you have less than 4 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(2) Directions: Multiply.

1.	34.7	2.89	.551	60.3	7.18
	x 8	x 7	x 6	x 9	x 4
	277.6	20.23	3.306	542.7	28.72
2.	3.8	.92	6.7	5.3	.84
	x 4	x 9	x 6	x 8	x 7
	15.2	8.28	40.2	42.4	5.88
3.	41	78	59	86	19
	x .03	x .5	x .09	x .4	x .06
	1.23	39	5.31	34.4	1.14

If you have less than 12 correct, see your instructor for additional help.

Activity 17 - Dividing Decimals By Whole Numbers

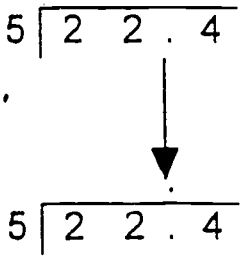
Objective(s): This activity will enable participants to divide decimals by whole numbers.

Materials Required:
Pencil
Scratch Paper

You need to know: To divide decimals by whole numbers...

1. Place the decimal point up in the quotient (answer) directly above its position in the dividend (problem).

   EXAMPLE



2. Divide as you would whole numbers until all digits of the dividend have been used.

$$\begin{array}{r} 4.4 \\ 5\overline{)\,22.4} \\ 20 \\ \hline 24 \\ 20 \\ \hline 4 \end{array}$$

Activity 17 - Dividing Decimals By Whole Numbers (continued)

4. Suppose you were asked to calculate the average machine downtime for each of the 7 production lines in the Richmond bakery on a given day. You would divide the total downtime hours by the number of lines. Round the answer to the nearest hundredth.

EXAMPLE $7\overline{)28.6}$

Total Machine Downtime Hours	28.6
Number Of Lines	7

$$\begin{array}{r} 4.085 \\ 7\overline{)28.60} \\ 28 \\ \hline 60 \\ 56 \\ \hline 40 \\ 35 \\ \hline 5 \end{array} = 4.09 \text{ Answer}$$

5. To divide decimals by 10, 100, or 1,000...
   a. count the number of zeros in 10, 100, or 1,000.
   b. move the decimal point to the left as many places as there are zeros in 10, 100, or 1,000.
   c. write in additional ending zeros, if necessary.

4.63 ÷ 10 = .4 63 = .463

29.5 ÷ 100 = 2 9 5 = .295

.075 ÷ 1,000 = 0 0 0 075 = .000075

Activity 17 - Dividing Decimals By Whole Numbers (continued)

You need to know:

3. Write the remainder over the divisor as a fraction.

$$
\begin{array}{r}
4.4\,\frac{4}{5} \\
5\overline{)\,22.4} \\
\underline{-\,20} \\
2\,4 \\
\underline{-\,2\,0} \\
4
\end{array}
$$

OR

Divide further by adding ending zeros.

$$
\begin{array}{r}
4.48 \\
5\overline{)\,22.40} \\
\underline{-\,20} \\
2\,4 \\
\underline{-\,2\,0} \\
4\,0 \\
\underline{-\,4\,0} \\
0
\end{array}
$$

Activity 17 - Dividing Decimals By Whole Numbers

(1) Directions: Find the quotients in the problems below.

1. $3\overline{).27}$ $2\overline{).492}$ $27\overline{)85.32}$ $12\overline{).150}$

2. $5\overline{).45}$ $6\overline{)36.12}$ $34\overline{)356.32}$ $8\overline{).526}$

3. $8\overline{).56}$ $12\overline{)74.76}$ $64\overline{)58.56}$ $76\overline{)12.54}$

Activity 17 - Dividing Decimals By Whole Numbers

(2) Directions: Find the quotients in the problems below.

1.	$8\overline{).192}$	$3\overline{)148.8}$	$5\overline{)19.45}$	$4\overline{)2.524}$
2.	$6\overline{)13.8}$	$9\overline{)70.2}$	$4\overline{).384}$	$7\overline{)57.75}$
3.	$16\overline{)76.8}$	$21\overline{)7.56}$	$19\overline{)1.52}$	$38\overline{)216.6}$
4.	$52\overline{)9.516}$	$43\overline{)1565.2}$	$77\overline{)464.31}$	$65\overline{)33.605}$

Activity 17 - Dividing Decimals By 10, 100, or 1,000

(3) Directions: Find the quotients using the shortcut.

1. .62 ÷ 10 = _____ 5.74 ÷ 100 = _____

2. .3 ÷ 10 = _____ 12.09 ÷ 100 = _____

3. .08 ÷ 100 = _____ .834 ÷ 100 = _____

4. 21.6 ÷ 100 = _____ 38.6 ÷ 1,000 = _____

5. 84.7 ÷ 100 = _____

Activity 17 - Dividing Decimals By 10, 100, or 1,000

(4) Directions: Find the quotients using the shortcut.

1. $7.7 \div 10 =$ _____ $.14 \div 10 =$ _____

2. $52.9 \div 100 =$ _____ $64.7 \div 1{,}000 =$ _____

3. $.239 \div 1{,}000 =$ _____ $58.09 \div 1{,}000 =$ _____

4. $8.306 \div 100 =$ _____ $50.73 \div 1{,}000 =$ _____

5. $.4 \div 1{,}000 =$ _____

Activity 18 - Dividing Decimals By Decimals

Objective(s): This activity will enable participants to divide decimals by decimals.

Materials Required:
Pencil
Scratch Paper

You need to know: To divide decimals by decimals...

1. Make the divisor a whole number by moving the decimal point to the right as far as it will go.

   EXAMPLE

   $7.5\overline{)2.25}$ $\qquad$ $7.5\overline{)2.25}$

2. Move the decimal point in the divident the same number of places to the right that you moved the point in the divisor.

   $7.5\overline{)2.25}$

3. Place a decimal point in the quotient directly above its new position in the dividend.

   $7.5\overline{)2.25}$

Activity 18 - Dividing Decimals By Decimals (continued)

You need to know:

4. Divide as you would divide a decimal by a whole number.

$$\begin{array}{r} .3 \\ 75\overline{)22.5} \\ 225 \end{array}$$

5. Sometimes it is necessary to add ending zeros to the dividend in order to have enough places to move the decimal point. Create the same number of places in the dividend as are in the divisor. Continue dividing until quotient has as many places as are required for the answer.

EXAMPLE

$$.008\overline{)44.8}$$

$$\begin{array}{r} 5600. \\ .008\overline{)44.800} \\ 40 \\ \hline 48 \\ 48 \\ \hline 0 \\ 0 \\ \hline 0 \\ \hline 0 \end{array}$$

Activity 18 - Dividing Decimals By Decimals (continued)

6. To check your answers, multiply the quotient by the original divisor (the decimal). You should get the dividend.

CHECK

5600	quotient
x .008	original divisor
44.800	dividend

Activity 18 - Dividing Decimals By Decimals

(3) Directions: Find the quotients in the problems below.

1. $.8\overline{)7.68}$ $.7\overline{)26.6}$

2. $4.1\overline{)1.148}$ $9.2\overline{)128.8}$

3. $.06\overline{)0.882}$ $.28\overline{).5404}$

4. $8.7\overline{).522}$ $.19\overline{).3933}$

Activity 18 - Dividing Decimals By Decimals

(4) Directions: Find the quotients in the problems below. Check your answers.

1. $.007\overline{)5.32}$ $.009\overline{)4.32}$

2. $.016\overline{)212.8}$ $.025\overline{).1}$

3. $.003\overline{)8.1}$ $.008\overline{)77.12}$

4. $.091\overline{)65.52}$ $.68\overline{)57.8}$

Activity 18 - Dividing Decimals By Decimals

(5) Directions: Divide and check.

1. $.0018\overline{)1.683}$ $.0073\overline{)15.184}$

2. $.0024\overline{).78}$ $.0006\overline{)42.84}$

3. $.008\overline{)4.48}$ $.06\overline{)558.6}$

4. $.32\overline{)156.8}$ $.45\overline{)1381.5}$

Activity 18 - Dividing Decimals By Decimals

(2) Directions: Find the quotients in the problems below.

1. $.6\overline{)0.42}$ $.4\overline{)2.76}$

2. $5.3\overline{)4.399}$ $3.2\overline{)0.288}$

3. $.75\overline{)453.75}$ $.52\overline{)6.656}$

4. $3.6\overline{)145.44}$ $.64\overline{).11648}$

Activity 18 - Dividing Decimals By Decimals

(1) Directions: Find the quotients in the problems below.

1. $.4\overline{).8}$ $.07\overline{)4.921}$ $.25\overline{)16.5}$ $4.4\overline{)82.28}$

2. $.15\overline{).45}$ $.6\overline{)72.18}$ $.06\overline{)5.6}$ $.08\overline{)170.4}$

3. $.12\overline{)1.56}$ $1.04\overline{)93.8}$ $6.8\overline{)44.2}$ $3.8\overline{)62.7}$

Applied Math
PINK

Activity 19 - Calculating Percent of Oil

All ingredients in a product must be added in the amount specified by the master recipe. By doing so, consistency is maintained in the product and the product complies with labeling information provided for the consumer.

For instance the correct amount of spray oil on a product must be monitored. To perform this calculation you need to take weights, read the scale, subtract, divide, and multiply.

Step 1:
Record the dry weight of the product

Step 2:
Record the wet weight of the product (after the oil spray machine)

Step 3:
Subtract the dry weight from the wet weight

Step 4:
Divide the wet weight into the answer for step 3

Step 5:
Multiply your answer by 100. The answer is the percent of oil in that sample.

Now try the following:

	Wet Wt.	Dry Wt.	% Oil
1.	50	45	_____
2.	69	63	_____
3.	100	90	_____
4.	112	110	_____

Activity 20 - Calculating Cubic Footage

When working in Environmental Services, an employee must sometimes spray designated areas to prevent infestation. The chemicals must be used according to the label directions for the amount of space to be sprayed. Therefore, the cubic footage of the area to be sprayed must be determined.

To calculate cubic footage you must be able to measure width, length, height and then multiply.

If a room measures 70 feet by 80 feet and is 20 feet high, you multiply.
70 X 80 X 20 = 112,000 cubic feet.

Find the cubic footage of the following rooms.

Room A measures
100 ft. long, 45 ft. wide, 25 feet tall _____cu. ft.

Room B measures
12 ft. wide, 15 ft. long, 8 ft. tall _____cu. ft.

Room C measures
35.5 ft. long, 22.25 ft. wide, 12 ft. tall _____cu. ft.

Activity 21 - Calculating Sprays

An Environmental Services employee must sometimes use a spraying device for tasks such as administering pesticides. How much liquid you put in the spraying device is determined by the label directions and the amount of area or space to be sprayed.

First, you must calculate the space as you did in the previous activity. Next, you follow label directions, using division to calculate the amount of liquid to pour into the tank.

For instance, if the area to be sprayed is 10,000 cubic feet, and one gallon sprays 5,000 cubic feet, you will need 2 gallons, because

10,000 ÷ 5,000 = 2

Use the room measurements in the previous activity to calculate how many gallons of liquid will be needed if one gallon is necessary for 1000 cubic feet.

Room A _____gallons

Room B _____ gallons

Room C _____ gallons

ANSWER KEYS

Activity 1 - Whole Numbers (continued)

Directions: For each of the following numbers place a (✓) in the space if the number is a whole number.

✓	1.	4,699	✓	16.	926.
	2.	96.677		17.	6.790
✓	3.	620	✓	18.	58,416
	4.	2.053	✓	19.	6,815
	5.	.4001	✓	20.	649,873
✓	6.	28		21.	.072
	7.	.1		22.	.84
	8.	8,261.1		23.	.7159
	9.	1.25		24.	.638
	10.	27,611.9		25.	.3901
	11.	.07		26.	495.28
	12.	.0001		27.	6215.9
	13.	.367		28.	518.7302
✓	14.	3,842		29.	429,631.058
✓	15.	493,200		30.	85,210.3697

If you have less than 24 correct, see your instructor for additional help

Activity 1 - Whole Numbers (continued)

Directions: Write examples of whole numbers in the following blanks.

_____	1.	_____	16.
_____	2.	_____	17.
_____	3.	_____	18.
_____	4.	_____	19.
_____	5.	_____	20.
_____	6.	_____	21.
_____	7.	_____	22.
_____	8.	_____	23.
_____	9.	_____	24.
_____	10.	_____	25.
_____	11.	_____	26.
_____	12.	_____	27.
_____	13.	_____	28.
_____	14.	_____	29.
_____	15.	_____	30.

If you have less than 24 correct, see your instructor for additional help.

Activity 2 - Place Values and Whole Numbers (continued)

1.	In the number 283, how much is the **8** worth?	80
2.	In the number 1,296, how much is the **1** worth?	1,000
3.	In the number 926, how much is the **6** worth?	6
4.	In the number 637, how much is the **6** worth?	600
5.	In the number 240, how much is the **4** worth?	40
6.	In the number 318, how much is the **8** worth?	8
7.	In the number 1,873, how much is the **7** worth?	70
8.	In the number 8,176, how much is the **8** worth?	8,000
9.	In the number 561, how much is the **5** worth?	500
10.	In the number 746,721, how much is the **4** worth?	40,000
11.	In the number 678, how much is the **7** worth?	70
12.	In the number 3,016, how much is the **3** worth?	3,000
13.	In the number 235,619, how much is the **2** worth?	200,000
14.	In the number 145,768, how much is the **5** worth?	5,000
15.	The value of 9 in the number 3,73**9**,681 is:	9,000
16.	The value of 7 in the number 8**7**3,000 is:	70,000
17.	The value of 6 in the number **6**,284,925 is:	6,000,000
18.	The value of 4 in the number **4**6,867 is:	40,000
19.	The value of 8 in the number 1,**8**63,745 is:	800,000
20.	The value of 3 in the number 5,6**3**2 is:	30
21.	The value of 7 in the number 3,**7**54 is:	700
22.	The value of 5 in the number 2,38**5** is:	5
23.	The value of 3 in the number **3**29 is:	300
24.	The value of 6 in the number 7**6** is:	6
25.	The value of 4 in the number 6**4** is:	4

If you have less than 20 correct, see your instructor for additional help.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Fill in the blanks with the correct numbers.

(1) In the number **6,973**.....
the value of 3 is **3** ones or **3**.
the value of 7 is **7** tens or **70**.
the value of 9 is **9** hundreds or **900**.
the value of 6 is **6** thousands or **6,000**.

(2) In the number **1,478**.....
the value of 8 is **8** ones or **8**.
the value of 7 is **7** tens or **70**.
the value of 4 is **4** hundreds or **400**.
the value of 1 is **1** thousand(s) or **1,000**.

(3) In the number **11,243**.....
the value of 3 is **3** ones or **3**.
the value of 4 is **4** tens or **40**.
the value of 2 is **2** hundreds or **200**.
the value of 11 is **11** thousands or **11,000**.

(4) In the number **48,505**.....
the value of 5 is **5** ones or **5**.
the value of 0 is **0** tens or **0**.
the value of 5 is **5** hundreds or **500**.
the value of 48 is **48** thousands or **48,000**.

(5) In the number **6,054**.....
the value of 4 is **4** ones or **4**.
the value of 5 is **5** tens or **50**.
the value of 0 is **0** hundreds or **0**.
the value of 6 is **6** thousands or **6,000**.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Fill in the blanks with the correct numbers.

(6) In the number **742**.....
the value of 2 is **2** ones or **2**.
the value of 4 is **4** tens or **40**.
the value of 7 is **7** hundreds or **700**.

(7) In the number **8,137**.....
the value of 7 is **7** ones or **7**.
the value of 3 is **3** tens or **30**.
the value of 1 is **1** hundred(s) or **100**.
the value of 8 is **8** thousands or **8,000**.

(8) In the number **689**.....
the value of 9 is **9** ones or **9**.
the value of 8 is **8** tens or **80**.
the value of 6 is **6** hundreds or **600**.

(9) In the number **38,496**.....
the value of 6 is **6** ones or **6**.
the value of 9 is **9** tens or **90**.
the value of 4 is **4** hundreds or **400**.
the value of 38 is **38** thousands or **38,000**.

(10) In the number **379**.....
the value of 9 is **9** ones or **9**.
the value of 7 is **7** tens or **70**.
the value of 3 is **3** hundreds or **300**.

If you have less than 8 correct, see your instructor for additional help.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Answer the following by placing the correct digit in the space.

1.	561	Which digit is in the tens place?	6
2.	780	Which digit is in the hundreds place?	7
3.	42,625	Which digit is in the ten thousands place?	4
4.	3,439	Which digit is in the hundreds place?	4
5.	657,524	Which digit is in the thousands place?	7
6.	4,075	Which digit is in the units place?	5
7.	7,302	Wich digit is in the hundreds place?	3
8.	428,713	Which digit is in the hundred thousands place?	4
9.	9,371,246	Which digit is in the millions place?	9
10.	32,584	Which digit is in the units place?	4
11.	529,682	Which digit is in the thousands place?	9
12.	115,035	Which digit is in the hundred thousands place?	1
13.	8,851	Which digit is in the tens place?	5
14.	738,495	Which digit is in the ten thousands place?	3
15.	2,700,920	Which digit is in the millions place?	2

If you have less than 12 correct, see your instructor for additional help.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Show the place value of the following numbers by writing the digits correctly on the chart. An example has been completed for you.
EXAMPLE: 7,654

	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
				7,	6	5	4
1.				6,	7	0	0
2.			5	3,	4	2	6
3.	74,	8	0	3,	0	0	0
4.					1	7	5
5.			3	2,	0	7	2
6.	8,	1	1	5,	0	3	5
7.				3,	5	8	2
8.					4	9	3
9.		3	5	8,	2	8	1
10.				1,	6	6	1
11.		1	0	5,	3	0	2
12.			2	9,	5	4	7
13.					2	8	4
14.		1	3	5,	0	1	1
15.			2	2,	3	1	4
16.					3	2	1
17.		3	8	7,	6	1	1
18.			8	8,	0	2	7
19.	2,	7	0	0,	9	2	0
20.				4,	2	2	8

If you have less than 16 correct, see your instructor for additional help.

Activity 2 - Place Values and Whole Numbers (continued)

EXAMPLE	7,654
1.	6,700
2.	53,426
3.	74,803,000
4.	175
5.	32,072
6.	8,115,035
7.	3,582
8.	493
9.	358,281
10.	1,661
11.	105,302
12.	29,547
13.	284
14.	135,011
15.	22,314
16.	321
17.	387,611
18.	88,027
19.	2,700,920
20.	4,228

Activity 3 - Reading and Writing Whole Numbers (continued)

1. eight thousand four hundred ninety-seven
2. seven thousand forty-two thousand, three hundred fifty-one
3. nine hundred thirty-two thousand, six hundred seventeen
4. seven million, six hundred thirty-nine thousand, seven hundred ninety two
5. twenty five thousand, eight hundred sixteen
6. one hundred seventy-three thousand, eight hundred fifty-five
7. six million, three hundred eighty-two thousand, five hundred twenty-three
8. seven hundred eighty two thousand, three hundred eighty-six
9. one million, one hundred seventy-five thousand, one hundred forty
10. ninety-seven thousand, two hundred sixty eight
11. six thousand, nine hundred seventy three
12. three hundred eighty two
13. four thousand, eight hundred eighty
14. fourteen million, two hundred twenty-eight thousand, seven hundred eighty six
15. eight hundred sixty-five
16. ninety-seven thousand, two hundred sixty-eight
17. two hundred forty-three
18. twenty seven thousand, two hundred sixty-eight
19. one thousand four hundred seventy-eight
20. two hundred fifty seven

Activity 3 - Reading and Writing Whole Numbers (continued)

21. four thousand three hundred twenty-one
22. twenty eight
23. five thousand, five hundred four
24. four hundred fifty seven
25. thirty nine
26. eight hundred forty seven
27. three hundred eighty six
28. two thousand, one hundred thirty one
29. one hundred fifty-nine
30. fourteen
31. two hundred forty nine thousand, three hundred eighty-two
32. three hundred sixty
33. eight hundred twenty nine
34. two hundred forty seven million, four hundred twenty seven thousand, eight hundred twenty
35. thirty-seven
36. eighty nine thousand, eight hundred twenty seven
37. twenty two thousand, eight hundred nine
38. eighty-eight
39. seven hundred thirty-eight million, two hundred sixty four thousand, six hundred ninety-nine
40. seven hundred fifty-eight

If you have less than 32 correct, see your instructor for additional help.

Activity 3 - Reading and Writing Whole Numbers (continued)

1. thirty-four thousand eighty six
2. eight hundred two
3. sixty-three thousand five hundred twenty-two
4. three hundred thirty nine
5. seven thousand seven hundred forty
6. nine million eight hundred twenty-three thousand five hundred twenty-seven
7. five hundred seventy eight
8. one hundred thirty five thousand eight hundred fifty one
9. forty-nine thousand seven hundred thirty-six
10. thirteen million four hundred thirty-six thousand nine hundred thirty-two
11. two thousand five hundred fifteen
12. two hundred four thousand nine hundred seventy-two
13. nine hundred ninety-eight thousand five hundred sixty
14. four thousand eighty-two
15. five thousand one hundred twelve

If you have less than 12 correct, see your instructor for additional help.

Activity 3 - Reading and Writing Whole Numbers (continued)

Directions: Write the following numbers, using figures, in the chart below. Make sure you put each digit in the correct column. Insert commas, where applicable.

	Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Units or Ones
1.						3	4,	0	8	6
2.								8	0	2
3.						6	3,	5	2	2
4.								3	3	9
5.							7,	7	4	0
6.				9,	8	2	3,	5	2	7
7.								5	7	8
8.					1	3	5,	8	5	1
9.						4	9,	7	3	6
10.			1	3,	4	3	6,	9	3	2
11.							2,	5	1	5
12.					2	0	4,	9	7	2
13.					9	9	8,	5	6	0
14.							4,	0	8	2
15.							5,	1	1	2

Activity 4 - Adding Whole Numbers

(1) Directions: Add.

1.	3 + 5 = 8	5 + 0 = 5	2 + 6 = 8	1 + 5 = 6	0 + 2 = 2
2.	1 + 8 = 9	4 + 5 = 9	3 + 5 = 8	2 + 6 = 8	0 + 8 = 8
3.	2 + 2 = 4	5 + 3 = 8	3 + 6 = 9	6 + 1 = 7	3 + 3 = 6
4.	1 + 2 = 3	4 + 3 = 7	1 + 1 = 2	5 + 2 = 7	4 + 1 = 5
5.	7 + 1 = 8	6 + 3 = 9	9 + 0 = 9	2 + 7 = 9	3 + 4 = 7

If you have less than 20 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(1) Directions: Add.

1.	3 + 5 = 8	5 + 0 = 5	2 + 6 = 8	1 + 5 = 6	0 + 2 = 2
2.	1 + 8 = 9	4 + 5 = 9	3 + 5 = 8	2 + 6 = 8	0 + 8 = 8
3.	2 + 2 = 4	5 + 3 = 8	3 + 6 = 9	6 + 1 = 7	3 + 3 = 6
4.	1 + 2 = 3	4 + 3 = 7	1 + 1 = 2	5 + 2 = 7	4 + 1 = 5
5.	7 + 1 = 8	6 + 3 = 9	9 + 0 = 9	2 + 7 = 9	3 + 4 = 7

If you have less than 20 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(2) Directions: Add.

1.	3 + 9 = 12	5 + 7 = 12	9 + 9 = 18	8 + 4 = 12	3 + 8 = 11
2.	8 + 7 = 15	6 + 6 = 12	7 + 3 = 10	5 + 9 = 14	5 + 5 = 10
3.	4 + 6 = 10	9 + 2 = 11	7 + 6 = 13	5 + 6 = 11	4 + 9 = 13
4.	3 + 2 = 5	5 + 4 = 9	6 + 0 = 6	6 + 3 = 9	4 + 5 = 9
5.	8 + 8 = 16	6 + 8 = 14	9 + 7 = 16	8 + 5 = 13	7 + 7 = 14

If you have less than 20 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(3) Directions: Add.

1.	6 4 + 5 15	9 6 + 6 21	2 3 + 8 13	1 9 + 4 14	6 2 + 3 11
2.	8 6 + 7 21	7 0 + 6 13	9 1 + 8 18	5 2 + 2 9	8 5 + 9 22
3.	4 9 8 + 1 22	5 6 7 + 6 24	3 4 8 + 9 24	4 3 8 + 8 23	9 7 2 + 3 26
4.	8 6 8 + 4 26	3 2 7 + 6 18	5 5 1 + 0 11	9 6 5 + 7 27	6 7 3 + 7 18

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(4) Directions: Add.

1.	2	18	3	14	5	61	3	62	5	9
	+ 95	+ 9	+ 35	+ 3	+ 37	+ 5	+ 13	+ 9	+ 36	+ 47
	97	27	38	17	42	66	16	71	41	56
2.	11	15	18	12	17	14	19	16	13	18
	+ 2	+ 9	+ 7	+ 5	+ 8	+ 6	+ 4	+ 1	+ 5	+ 9
	13	24	25	17	25	20	23	17	18	27
3.	72	86	93	2	5	7	84	96	57	3
	+ 4	+ 9	+ 3	+ 75	+ 88	+ 99	+ 1	+ 6	+ 9	+ 37
	76	95	96	77	93	106	85	102	66	40
4.	23	2	21	1	28	7	29	6	26	29
	+ 4	+ 26	+ 3	+ 25	+ 8	+ 24	+ 5	+ 22	+ 8	+ 7
	27	28	24	26	36	31	34	28	34	36
5.	4	5	97	3	2	76	6	7	49	8
	+ 73	+ 89	+ 8	+ 56	+ 66	+ 1	+ 82	+ 94	+ 5	+ 39
	77	94	105	59	68	77	88	101	54	47
6.	48	54	7	78	83	3	41	52	4	28
	+ 6	+ 2	+ 67	+ 9	+ 4	+ 91	+ 1	+ 8	+ 37	+ 6
	54	56	74	87	87	94	42	60	41	34
7.	1	8	7	6	4	2	9	5	3	7
	+ 37	+ 34	+ 32	+ 39	+ 31	+ 35	+ 38	+ 33	+ 36	+ 38
	38	42	39	45	35	37	47	38	39	45

If you have less than 56 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(5) Directions: Add.

1.	1	6	42	59	9	2	87	98	3	5
	+ 23	+ 34	+ 7	+ 4	+ 69	+ 74	+ 3	+ 8	+ 98	+ 59
	24	40	49	63	78	76	90	106	101	64
2.	41	1	42	2	44	7	46	6	48	9
	+ 5	+ 48	+ 8	+ 47	+ 9	+ 49	+ 4	+ 43	+ 5	+ 46
	46	49	50	49	53	56	50	49	53	55
3.	29	33	1	8	22	36	2	6	64	5
	+ 5	+ 9	+ 45	+ 19	+ 7	+ 4	+ 16	+ 27	+ 8	+ 37
	34	42	46	27	29	40	18	33	72	42
4.	5	52	1	59	7	4	58	51	9	53
	+ 56	+ 9	+ 54	+ 8	+ 53	+ 55	+ 2	+ 6	+ 58	+ 9
	61	61	55	67	60	59	60	57	67	62
5.	3	27	36	45	3	8	2	95	38	7
	+ 13	+ 9	+ 3	+ 3	+ 57	+ 63	+ 89	+ 8	+ 3	+ 26
	16	36	39	48	60	71	91	103	41	33
6.	5	51	2	17	9	38	4	57	9	47
	+ 46	+ 1	+ 65	+ 8	+ 24	+ 7	+ 43	+ 6	+ 75	+ 6
	51	52	67	25	33	45	47	63	84	53
7.	62	66	7	4	69	64	3	5	64	68
	+ 1	+ 6	+ 61	+ 67	+ 9	+ 2	+ 68	+ 65	+ 6	+ 6
	63	72	68	71	78	66	71	70	70	74

If you have less than 56 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(6) Directions: Add.

1.

25	8	49	6	63	2	12	5	39	7
+ 1	+ 31	+ 7	+ 58	+ 4	+ 77	+ 9	+ 28	+ 6	+ 38
26	39	56	64	67	79	21	33	45	45

2.

6	72	76	9	4	77	88	8	9	6
+ 75	+ 2	+ 7	+ 73	+ 78	+ 5	+ 5	+ 86	+ 84	+ 45
81	74	83	82	82	82	93	94	93	51

3.

11	26	32	47	53	64	79	85	96	37
+ 9	+ 7	+ 5	+ 8	+ 6	+ 4	+ 3	+ 1	+ 2	+ 5
20	33	37	55	59	68	82	86	98	42

4.

87	7	4	9	99	93	97	6	5	7
+ 6	+ 85	+ 92	+ 96	+ 3	+ 2	+ 7	+ 98	+ 98	+ 96
93	92	96	105	102	95	104	104	103	103

5.

4	2	3	1	8	7	5	6	9	8
+ 15	+ 21	+ 39	+ 44	+ 55	+ 68	+ 71	+ 81	+ 89	+ 46
19	23	42	45	63	75	76	87	98	54

6.

23	9	42	7	69	8	97	9	9	97
+ 6	+ 34	+ 7	+ 59	+ 4	+ 77	+ 5	+ 95	+ 88	+ 9
29	43	49	66	73	85	102	104	97	106

7.

1	5	2	3	6	5	2	9	8	6
30	47	81	25	52	83	56	37	36	84
+ 9	+ 8	+ 5	+ 6	+ 9	+ 4	+ 5	+ 8	+ 7	+ 5
40	60	88	34	67	92	63	54	51	95

If you have less than 56 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(7) Rows 1 - 5 Directions: Add and check.

1.	38 + 21 = 113	57 + 32 = 144	45 + 3 = 98	32 + 25 = 64
2.	28 + 49 = 66	83 + 46 = 118	37 + 86 = 76	29 + 45 = 100
3.	68 + 49 = 92	56 + 71 = 111	64 + 28 = 152	39 + 42 = 105
4.	37 + 22 = 153	59 + 76 = 131	83 + 24 = 68	55 + 99 = 97
5.	93 + 14 = 141	26 + 53 = 65	29 + 84 = 121	53 + 28 = 112

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(7) Rows 6 - 10 Directions: Add and check.

6.	42 + 54 = 113	34 + 28 = 144	37 + 61 = 98	24 + 13 = 64
7.	28 + 73 = 66	53 + 68 = 118	67 + 31 = 76	13 + 78 = 100
8.	31 + 28 = 92	93 + 15 = 111	59 + 83 = 152	82 + 71 = 105
9.	47 + 26 = 153	93 + 28 = 131	66 + 32 = 68	28 + 48 = 97
10.	65 + 27 = 141	47 + 68 = 65	74 + 16 = 121	55 + 29 = 112

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(7) Rows 11 - 15 Directions: Add and check.

11.	84 + 29 = 113	55 + 89 = 144	83 + 15 = 98	25 + 39 = 64
12.	19 + 47 = 66	82 + 36 = 118	31 + 45 = 76	74 + 26 = 100
13.	64 + 28 = 92	23 + 88 = 111	65 + 87 = 152	56 + 49 = 105
14.	75 + 78 = 153	43 + 88 = 131	39 + 29 = 68	74 + 23 = 97
15.	98 + 43 = 141	39 + 26 = 65	93 + 28 = 121	96 + 16 = 112

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(7) Rows 16 - 20 Directions: Add and check.

16.	66 + 45 = 111	24 + 63 = 87	57 + 14 = 71	92 + 79 = 171
17.	61 + 26 = 87	65 + 27 = 92	48 + 56 = 104	14 + 2 = 16
18.	32 + 19 = 51	39 + 87 = 126	29 + 50 = 79	47 + 24 = 71
19.	13 + 41 = 54	59 + 26 = 85	25 + 3 = 28	17 + 79 = 96
20.	72 + 24 = 96	44 + 36 = 80	46 + 2 = 48	38 + 25 = 63

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(8) **Rows 1- 5** Directions: Add and check.

1.	78 + 25 = 103	37 + 69 = 106	82 + 14 = 96
2.	59 + 67 = 126	32 + 49 = 81	55 + 63 = 118
3.	23 + 89 = 112	74 + 25 = 99	93 + 25 = 118
4.	61 + 28 = 89	24 + 57 = 81	28 + 16 = 44
5.	54 + 78 = 132	69 + 23 = 92	51 + 28 = 79

If you have less than 12 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(8) **Rows 6 - 10** Directions: Add and check.

6.	73 + 69 = 142	84 + 28 = 112	62 + 48 = 110
7.	87 + 91 = 178	48 + 26 = 74	53 + 97 = 150
8.	68 + 54 = 122	83 + 17 = 100	75 + 29 = 104
9.	74 + 28 = 102	68 + 93 = 161	95 + 82 = 177
10.	46 + 83 = 129	72 + 96 = 168	47 + 84 = 131

If you have less than 12 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(8) Rows 11 - 15 Directions: Add and check.

11.	92 + 15 = 107	73 + 16 = 89	29 + 33 = 62	34 + 69 = 103
12.	45 + 57 = 102	63 + 98 = 161	37 + 69 = 106	84 + 57 = 141
13.	36 + 83 = 119	24 + 47 = 71	71 + 98 = 169	64 + 36 = 100
14.	49 + 87 = 136	63 + 29 = 92	62 + 79 = 141	65 + 97 = 162
15.	26 + 75 = 101	38 + 44 = 82	83 + 29 = 112	58 + 46 = 104

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(9) Directions: Add and check.

1.

68	72	93	87
+ 580	+ 469	+ 708	+ 506
648	541	801	593

2.

748	825	346	293
+ 87	+ 59	+ 64	+ 53
835	884	410	346

3.

41	57	53	64
+ 289	+ 418	+ 469	+ 377
330	475	522	441

4.

302	729	655
+ 83	+ 50	+ 43
385	779	698

If you have less than 12 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(10) Directions: Add and check.

1.	56 + 811 867	34 + 205 239	80 + 709 789	482 + 16 498
2.	314 + 98 412	283 + 56 339	607 + 95 702	966 + 35 1,001
3.	53 + 436 489	13 + 206 219	62 + 914 976	47 + 532 579
4.	946 + 32 978	415 + 61 476	723 + 75 798	

If you have less than 12 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(11) Directions: Add and check.

1.	66 81 + 56 203	21 49 + 43 113	89 67 + 50 206	92 10 + 39 141
2.	87 19 + 72 178	60 54 + 38 152	31 28 + 44 103	79 96 + 83 258
3.	70 57 + 202 329	51 91 + 329 471	42 93 + 516 651	78 12 + 490 580
4.	63 85 + 854 1,002	84 43 + 977 1,104	20 74 + 627 721	95 80 + 417 592

If you have less than 13 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(12) Directions: Add and check.

1.

	91	15	23
	31	75	22
	78	76	87
+	66	+ 31	+ 99
	266	197	231

2.

	646	930	347
	60	15	38
	52	37	67
+	944	+ 376	+ 421
	1,702	1,358	873

3.

	94	40	27
	21	83	40
	39	26	67
	45	29	28
+	80	+ 33	+ 86
	279	211	248

4.

	57	43	86
	35	51	65
	12	74	84
	83	32	46
+	58	+ 36	+ 97
	245	236	378

If you have less than 10 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(13) Rows 1 - 5 Directions: Add and check.

1.	603 + 285 = 888	577 + 321 = 898	458 + 201 = 659	413 + 564 = 977
2.	805 + 163 = 968	761 + 135 = 896	432 + 245 = 677	854 + 133 = 987
3.	345 + 698 = 1,043	254 + 736 = 990	829 + 847 = 1,676	378 + 692 = 1,070
4.	748 + 642 = 1,390	293 + 718 = 1,011	786 + 692 = 1,478	267 + 541 = 808
5.	843 + 927 = 1,770	298 + 354 = 652	674 + 732 = 1,406	235 + 872 = 1,107

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(13) **Rows 6 - 10** Directions: Add and check.

6.	762	210	307	386	138
	+ 125	+ 648	+ 652	+ 402	+ 844
	887	858	959	788	982
7.	328	415	574	925	558
	+ 560	+ 383	+ 692	+ 381	+ 649
	888	798	1,266	1,306	1,207
8.	493	254	368	758	423
	+ 386	+ 255	+ 645	+ 452	+ 468
	879	509	1,013	1,210	891
9.	475	347	425	129	
	+ 321	+ 433	+ 716	+ 632	
	796	780	1,141	761	
10.	328	523	215	548	
	+ 972	+ 476	+ 256	+ 627	
	1,300	999	471	1,175	

If you have less than 18 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(14) Rows 1 - 5 Directions: Add and check.

1.	786 + 394 = 1,180	928 + 782 = 1,710	475 + 698 = 1,173	378 + 257 = 635
2.	378 + 269 = 647	543 + 786 = 1,329	834 + 729 = 1,563	541 + 269 = 810
3.	287 + 465 = 752	387 + 298 = 685	546 + 589 = 1,135	728 + 569 = 1,297
4.	384 + 429 = 813	968 + 518 = 1,486	652 + 478 = 1,130	409 + 583 = 992
5.	740 + 893 = 1,633	584 + 427 = 1,011	637 + 905 = 1,542	842 + 369 = 1,211

If you have less than 16 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(14) Rows 6 - 11 Directions: Add and check.

6.	683 + 417 = 1,100	257 + 683 = 940	594 + 417 = 1,011	267 + 936 = 1,203
7.	405 + 561 = 966	216 + 423 = 639	537 + 252 = 789	640 + 118 = 758
8.	689 + 836 = 1,525	546 + 921 = 1,467	786 + 293 = 1,079	548 + 687 = 1,235
9.	834 + 785 = 1,619	692 + 847 = 1,539	716 + 263 = 979	408 + 241 = 649
10.	715 + 486 = 1,201	709 + 983 = 1,692	607 + 406 = 1,013	219 + 389 = 608
11.	885 + 102 = 987	235 + 452 = 687		

If you have less than 18 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(15) Directions: Add and check.

1.

547	296	638
+ 6,151	+ 4,203	+ 5,141
6,698	4,499	5,779

2.

9,348	2,416	3,468
+ 341	+ 502	+ 330
9,689	2,918	3,798

3.

513	704	652
+ 6,256	+ 8,235	+ 3,144
6,769	8,939	3,796

4.

3,224	7,152	8,210
+ 641	+ 807	+ 326
3,865	7,959	8,536

If you have less than 10 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(16) Directions: Add and check.

1.

146	243	880
73	10	77
+ 718	+ 256	+ 523
937	509	1,480

2.

367	236	413	223
520	153	648	209
+ 124	+ 875	+ 381	+ 574
1,011	1,264	1,442	1,006

3.

175	357	526	162	845
263	113	683	842	464
+ 421	+ 318	+ 347	+ 682	+ 573
859	788	1,556	1,686	1,882

4.

316	214	817	552	621
470	275	646	673	897
+ 211	+ 463	+ 373	+ 631	+ 973
997	952	1,836	1,856	2,491

If you have less than 14 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(17) Directions: Use your scratch paper to add these numbers.
Use your calculator to check your answers.

1.

685	597	263	760	461	298
691	283	161	218	919	709
274	406	247	322	653	395
+ 394	+ 938	+ 459	+ 938	+ 597	+ 471
2,044	2,224	1,130	2,238	2,630	1,873

2.

518	114	806	638	441
782	726	992	793	348
764	953	528	136	635
207	199	666	483	914
+ 843	+ 727	+ 894	+ 397	+ 679
3,114	2,719	3,886	2,447	3,017

3.

272	944	357
107	775	106
814	753	197
760	107	371
591	779	810
467	107	849
157	811	693
+ 724	+ 661	+ 556
3,892	4,937	3,939

4.

494	165	618
847	559	622
511	428	159
577	135	285
905	650	341
699	417	675
359	505	662
+ 424	+ 876	+ 996
4,816	3,735	4,358

If you have less than 14 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(18) Directions: Add and check.

1.	8,027 + 1,932 = 9,959	3,329 + 4,060 = 7,389	6,203 + 2,351 = 8,554
2.	6,001 + 2,573 = 8,574	2,347 + 2,412 = 4,759	7,580 + 1,316 = 8,896
3.	4,825 + 3,034 = 7,879	1,756 + 6,213 = 7,969	6,073 + 2,515 = 8,588
4.	4,815 + 2,114 = 6,929	8,047 + 1,832 = 9,879	1,966 + 4,032 = 5,998
5.	4,116 + 4,572 = 8,688	7,038 + 2,521 = 9,559	2,413 + 4,334 = 6,747
6.	4,261 + 3,428 = 7,689	2,352 + 6,043 = 8,395	7,084 + 2,713 = 9,797

If you have less than 14 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(19) Directions: Add and check.

1.	7,244 + 2,351 = 9,595	8,563 + 1,234 = 9,797	5,042 + 2,635 = 7,677
2.	4,162 + 5,736 = 9,898	2,438 + 4,235 = 6,673	7,654 + 3,476 = 11,130
3.	4,651 + 3,238 = 7,889	3,527 + 1,417 = 4,944	6,355 + 3,846 = 10,201
4.	7,136 + 1,042 = 8,178	3,574 + 3,103 = 6,677	5,546 + 2,342 = 7,888
5.	2,746 + 8,337 = 11,803	8,437 + 5,895 = 14,332	4,825 + 2,164 = 6,989
6.	9,223 + 4,439 = 13,662	7,558 + 6,796 = 14,354	3,251 + 4,748 = 7,999

If you have less than 14 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(20) Directions: Add and check.

1.	2,562 3,114 + 3,201 8,877	4,658 3,226 + 1,814 9,698	5,673 2,225 + 3,070 10,968
2.	4,124 3,251 + 1,524 8,899	2,543 6,671 + 1,187 10,401	7,338 3,229 + 6,360 16,927
3.	8,779 2,286 + 5,269 16,334	4,855 2,849 + 1,754 9,458	7,630 4,108 + 7,068 18,806
4.	8,493 7,601 + 2,519 18,613	4,181 7,670 + 2,892 14,743	4,596 8,892 + 4,625 18,113
5.	9,478 6,791 + 5,912 22,181	3,997 9,254 + 4,529 17,780	5,504 2,741 + 3,116 11,361

If you have less than 12 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(21) Directions: Use scratch paper to add these numbers. Use your calculator to check your answer.

1.

3,948	6,787
7,758	3,316
6,799	4,213
+ 2,437	+ 5,449
20,942	19,765

2.

8,123	2,774
7,510	7,887
1,085	3,551
6,534	4,560
9,469	5,494
3,638	1,745
+ 1,086	+ 8,361
37,445	34,372

3.

8,649	7,099
7,856	9,592
4,822	3,683
4,776	9,971
6,252	1,617
2,791	2,193
+ 8,679	+ 8,062
43,825	42,217

4.

4,108	9,081
7,915	8,752
3,736	2,978
+ 2,615	+ 7,093
18,374	27,904

If you have less than 6 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(22) Directions: Add and check.

1.	24,207 + 15,072 39,279	54,156 + 30,422 84,578	32,854 + 43,104 75,958
2.	14,871 + 65,118 79,989	75,854 + 24,357 100,211	40,955 + 46,365 87,320
3.	36,745 + 42,031 78,776	56,092 + 23,805 79,897	72,033 + 21,563 93,596
4.	51,084 + 27,505 78,589	69,043 + 20,516 89,559	23,864 + 51,133 74,997
5.	25,401 + 22,367 47,768	86,996 + 97,668 184,664	27,514 + 22,384 49,898

If you have less than 12 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(23) Directions: Add and check.

1.	21,513 + 62,375 83,888	63,285 + 24,926 88,211	32,643 + 20,898 53,541
2.	18,946 + 51,032 69,978	70,128 + 16,641 86,769	54,223 + 32,564 86,787
3.	51,937 + 35,042 86,979	69,821 + 20,104 89,925	30,649 + 54,320 84,969
4.	58,971 + 28,099 87,070	72,064 + 27,248 99,312	38,684 + 20,314 58,998
5.	76,521 + 13,054 89,575		

If you have less than 10 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(24) Directions: Add and check.

1.

	52,364		35,086		20,316
+	2,305	+	1,213	+	8,271
	54,669		36,299		28,587

2.

	86,954		29,847		59,146
	21,326		31,866		28,759
+	40,579	+	49,230	+	61,238
	148,859		110,943		149,143

3.

	76,493		44,538		27,881
	66,590		64,908		92,855
+	27,286	+	70,435	+	33,064
	170,369		179,881		153,800

4.

	43,972		69,836		75,634
	61,258		71,234		32,408
+	30,417	+	33,927	+	21,046
	135,647		174,997		129,088

5.

	27,290	+	54,763
+	2,607		4,134
	29,897		58,897

If you have less than 11 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(25) Directions: Add and check.

1.

	392,844		693,295		476,698
+	547,276	+	248,708	+	781,786
	940,120		942,003		1,258,484

2.

	646,245		665,014		236,980
+	695,048	+	959,084	+	346,706
	1,341,293		1,624,098		583,686

3.

	683,945		382,769		473,586
+	821,596	+	737,892	+	469,218
	1,505,541		1,120,661		942,804

4.

	596,868		998,273		610,199
+	243,117	+	289,713	+	583,045
	839,985		1,287,986		1,193,244

5.

	592,768
+	409,826
	1,002,594

If you have less than 10 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(26) Directions: Add and check.

1.
$$\begin{array}{r} 642{,}865 \\ +\ 921{,}565 \\ \hline 1{,}564{,}430 \end{array} \qquad \begin{array}{r} 784{,}228 \\ +\ 843{,}627 \\ \hline 1{,}627{,}855 \end{array} \qquad \begin{array}{r} 372{,}486 \\ +\ 687{,}769 \\ \hline 1{,}060{,}255 \end{array}$$

2.
$$\begin{array}{r} 662{,}184 \\ +\ 234{,}013 \\ \hline 896{,}197 \end{array} \qquad \begin{array}{r} 729{,}832 \\ +\ 240{,}144 \\ \hline 969{,}976 \end{array} \qquad \begin{array}{r} 229{,}056 \\ +\ 500{,}832 \\ \hline 729{,}888 \end{array}$$

3.
$$\begin{array}{r} 367{,}455 \\ +\ 422{,}301 \\ \hline 789{,}756 \end{array} \qquad \begin{array}{r} 294{,}391 \\ +\ 748{,}692 \\ \hline 1{,}043{,}083 \end{array} \qquad \begin{array}{r} 249{,}382 \\ +\ 389{,}827 \\ \hline 639{,}209 \end{array}$$

4.
$$\begin{array}{r} 831{,}476 \\ +\ 978{,}937 \\ \hline 1{,}810{,}413 \end{array} \qquad \begin{array}{r} 210{,}976 \\ +\ 384{,}012 \\ \hline 594{,}988 \end{array} \qquad \begin{array}{r} 861{,}042 \\ +\ 121{,}446 \\ \hline 982{,}488 \end{array}$$

5.
$$\begin{array}{r} 478{,}695 \\ +\ 341{,}217 \\ \hline 819{,}912 \end{array}$$

If you have less than 10 correct, see your instructor for additional help.

Activity 4 - Adding Whole Numbers

(27) Directions:

1.	423,876,982	476,827,698	247,692,385
	+ 839,213,469	+ 928,022,809	+ 786,427,820
	1,263,090,451	1,404,850,507	1,034,120,205
2.	738,925,467	293,847,693	786,925,478
	+ 426,178,698	+ 542,769,827	+ 354,769,842
	1,165,104,165	836,617,520	1,141,695,320
3.	742,618,726	427,893,876	924,647,822
	+ 427,864,415	+ 738,264,699	+ 376,256,878
	1,170,483,141	1,166,158,575	1,300,904,700
4.	725,678,296	537,698,276	547,692,859
	+ 854,927,707	+ 654,276,987	+ 382,769,842
	1,580,606,003	1,191,975,263	930,462,701

If you have less than 10 correct, see your instructor for additional help.

Activity 5 - Solving Word Problems

1.	548 cartons
2.	275 miles
3.	$ 3.53
4.	72 gallons
5.	528 pounds
6.	841 employees
7.	5,672,199 crackers
8.	9,400,000 cookies and crackers
9.	1,976 pounds
10.	2,824 bundles
11.	118 units
12.	28,354 units
13.	6:55 p.m.
14.	$ 2.70
15.	2,663 boxes
16.	118,840 pounds
17.	1,285.5 grams
18.	1,479 pounds
19.	1,818 doughs
20.	Shift 1: 643 Shift 2: 376 Cumulative total = 1,019 Shift 3: 485 Cumulative total = 1,504
21.	Shift 1: 5,432 Shift 2: 4,987 Cumulative total = 10,419 Shift 3: 5,321 Cumulative total = 15,740
22.	81.98 net weight

If you have less than 18 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(1) Directions: Subtract.

1.

8	7	4	9	8	3	1	8	5	6
- 4	- 0	- 2	- 0	- 7	- 2	- 1	- 5	- 2	- 6
4	7	2	9	1	1	0	3	3	0

2.

6	5	7	4	9	8	2	6	7	9
- 3	- 4	- 7	- 3	- 2	- 5	- 0	- 2	- 6	- 6
3	1	0	1	7	3	2	4	1	3

3.

4	8	13	9	6	12	3	15	11	4
- 0	- 2	- 8	- 1	- 6	- 3	- 1	- 7	- 5	- 1
4	6	5	8	0	9	2	8	6	3

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(2) Directions: Subtract.

1.

10	5	18	8	6	15	9	16	5	12
- 5	- 1	- 9	- 2	- 6	- 7	- 7	- 9	- 5	- 4
5	4	9	6	0	8	2	7	0	8

2.

5	7	8	13	11	7	8	11	10	9
- 3	- 6	- 3	- 5	- 3	- 2	- 0	- 9	- 7	- 9
2	1	5	8	8	5	8	2	3	0

3.

13	12	11	2	7	13	6	6	9	13
- 8	- 3	- 5	- 2	- 0	- 9	- 5	- 1	- 0	- 6
5	9	6	0	7	4	1	5	9	7

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(3) Directions: Subtract.

1.

16	8	10	5	6	5	7	14	18	11
- 7	- 6	- 5	- 4	- 2	- 1	- 3	- 8	- 9	- 4
9	2	5	1	4	4	4	6	9	7

2.

12	10	12	14	7	10	16	5	7	11
- 5	- 3	- 8	- 9	- 5	- 4	- 7	- 4	- 3	- 4
7	7	4	5	2	6	9	1	4	7

3.

7	5	13	14	3	4	15	10	9	2
- 1	- 2	- 7	- 6	- 2	- 3	- 6	- 9	- 3	- 1
6	3	6	8	1	1	9	1	6	1

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(4) Directions: Subtract.

1.

13	4	9	5	8	3	1	8	11	12
- 7	- 3	- 3	- 0	- 5	- 3	- 1	- 7	- 6	- 7
6	1	6	5	3	0	0	1	5	5

2.

9	12	10	7	11	11	7	14	15	2
- 8	- 9	- 8	- 6	- 3	- 9	- 1	- 6	- 6	- 1
1	3	2	1	8	2	6	8	9	1

3.

10	14	12	6	7	11	9	10	1	8
- 1	- 9	- 6	- 0	- 5	- 7	- 5	- 4	- 0	- 1
9	5	6	6	2	4	4	6	1	7

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(5) Directions: Subtract.

1.

14	11	2	17	16	4	5	13	8	9
- 7	- 2	- 0	- 9	- 8	- 2	- 3	- 5	- 0	- 9
7	9	2	8	8	2	2	8	8	0

2.

6	5	10	13	8	17	7	3	15	11
- 4	- 0	- 2	- 4	- 5	- 8	- 4	- 3	- 9	- 8
2	5	8	9	3	9	3	0	6	3

3.

6	15	4	3	9	7	10	6	9	8
- 3	- 8	- 4	- 0	- 4	- 7	- 1	- 0	- 5	- 1
3	7	0	3	5	0	9	6	4	7

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(6) Directions: Subtract.

1.	1	14	6	8	9	15	11	10	4	12
	- 1	- 5	- 3	- 7	- 6	- 8	- 6	- 6	- 4	- 7
	0	9	3	1	3	7	5	4	0	5
2.	12	11	1	8	6	14	4	9	3	4
	- 6	- 7	- 0	- 6	- 2	- 8	- 0	- 1	- 1	- 1
	6	4	1	2	4	6	4	8	2	3
3.	8	7	10	5	3	10	6	13	7	11
	- 3	- 2	- 7	- 2	- 2	- 9	- 4	- 4	- 4	- 8
	5	5	3	3	1	1	2	9	3	3

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(7) Directions: Subtract.

1.

6	17	9	6	16	12	9	4	10	13
- 5	- 9	- 8	- 1	- 8	- 9	- 0	- 2	- 8	- 6
1	8	1	5	8	3	9	2	2	7

2.

10	17	15	14	9	10	9	8	13	8
- 2	- 8	- 9	- 5	- 6	- 6	- 2	- 8	- 6	- 4
8	9	6	9	3	4	7	0	7	4

3.

9	2	14	16	7	11	5	13	2	12
- 7	- 2	- 7	- 9	- 0	- 2	- 5	- 9	- 0	- 4
2	0	7	7	7	9	0	4	2	8

If you have less than 24 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(8) Directions: Subtract and check.

1.	60	35	77	74	58
	- 40	- 21	- 73	- 40	- 32
	20	14	4	34	26
2.	63	72	85	96	43
	- 22	- 70	- 34	- 62	- 43
	41	2	51	34	0
3.	91	62	33	52	45
	- 6	- 9	- 4	- 27	- 16
	85	53	29	25	29

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(9) Directions: Subtract and check.

1.	57	43	65	82	60
	- 18	- 25	- 8	- 75	- 42
	39	18	57	7	18
2.	36	48	51	25	74
	- 18	- 29	- 36	- 18	- 27
	18	19	15	7	47
3.	34	69	38	52	75
	- 22	- 35	- 31	- 32	- 51
	12	34	7	20	24

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(10) Directions: Subtract and check.

1.	82	27	21	95	63
	- 9	- 8	- 7	- 8	- 5
	73	19	14	87	58
2.	54	28	94	77	58
	- 33	- 14	- 51	- 36	- 48
	21	14	43	41	10
3.	83	95	50	68	97
	- 25	- 39	- 28	- 49	- 58
	58	56	22	19	39

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(11) Directions: Subtract and check.

1.	78	28	56	67	79
	- 15	- 10	- 12	- 25	- 54
	63	18	44	42	25
2.	67	95	48	68	84
	- 8	- 9	- 9	- 9	- 7
	59	86	39	59	77
3.	76	47	94	81	62
	- 7	- 8	- 8	- 40	- 11
	69	39	86	41	51

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(12) Directions: Subtract and check.

1.	85	44	68	70	42
	- 16	- 27	- 59	- 32	- 18
	69	17	9	38	24
2.	76	21	65	87	48
	- 71	- 11	- 53	- 62	- 17
	5	10	12	25	31
3.	53	28	97	79	64
	- 36	- 19	- 28	- 58	- 26
	17	9	69	21	38

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(13) Directions: Subtract and check.

1.	75	71	38	24	92
	- 17	- 26	- 19	- 11	- 39
	58	45	19	13	53
2.	57	61	92	41	37
	- 29	- 34	- 83	- 21	- 15
	28	27	9	20	22
3.	62	46	58	61	92
	- 21	- 25	- 26	- 47	- 29
	41	21	32	14	63

If you have less than 12 cor ect, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(14) Directions: Subtract and check.

1.	300	400	600	200	900
	- 37	- 45	- 63	- 34	- 51
	263	355	537	166	849
2.	553	417	864	241	752
	- 69	- 58	- 87	- 48	- 57
	484	359	777	193	695
3.	251	742	927	381	793
	- 38	- 27	- 18	- 53	- 86
	213	715	909	328	707

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(15) Directions: Subtract and check.

1.	896	692	546	695	588
	- 88	- 85	- 37	- 88	- 79
	808	607	509	607	509
2.	205	306	402	508	206
	- 86	- 38	- 46	- 59	- 49
	119	268	356	449	157
3.	795	932	866	357	614
	- 29	- 38	- 47	- 28	- 17
	766	894	819	329	597

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(16) Directions: Subtract and check.

1.	602	501	803	902	401
	- 58	- 29	- 37	- 44	- 53
	544	472	766	858	348
2.	968	141	572	543	519
	- 74	- 80	- 91	- 62	- 53
	894	61	481	481	466
3.	640	365	482	981	288
	- 27	- 48	- 75	- 63	- 59
	613	317	407	918	229

If you have less than 12 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(17) Directions: Subtract and check.

1.

	334		634		310
-	299	-	467	-	123
	35		167		187

2.

	246		983		643
-	134	-	672	-	482
	112		311		161

3.

	401		893		472
-	389	-	748	-	472
	12		145		0

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(18) Directions: Subtract and check.

1.

	641		812		559
-	500	-	602	-	247
	141		210		312

2.

	885		740		482
-	452	-	520	-	331
	433		220		151

3.

	562		496		842
-	491	-	263	-	761
	71		233		81

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(19) Directions: Subtract and check.

1.

	525	287	216
-	247	- 198	- 158
	278	89	58

2.

	305	207	401
-	278	- 199	- 285
	27	8	116

3.

	466	373	983
-	388	- 199	- 585
	78	174	398

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(20) Directions: Subtract and check.

1.

	502		308		604
-	263	-	149	-	326
	239		159		278

2.

	418		957		627
-	279	-	821	-	468
	139		136		159

3.

	650		848		567
-	440	-	232	-	356
	210		616		211

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(21) Directions: Subtract and check.

1.

	467		355		653
-	349	-	237	-	409
	118		118		244

2.

	983		578		356
-	147	-	429	-	180
	836		149		176

3.

	942		889		468
-	611	-	278	-	432
	331		611		36

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(22) Directions: Subtract and check.

1.

	893		972		331
-	655	-	408	-	125
	238		564		206

2.

	362		721		982
-	188	-	356	-	581
	174		365		401

3.

	371		684		143
-	269	-	547	-	128
	102		137		15

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(23) Directions: Subtract and check.

1. $\begin{array}{r} 974 \\ -\ 923 \\ \hline 51 \end{array}$ $\begin{array}{r} 567 \\ -\ 524 \\ \hline 43 \end{array}$ $\begin{array}{r} 534 \\ -\ 311 \\ \hline 223 \end{array}$

2. $\begin{array}{r} 337 \\ -\ 155 \\ \hline 182 \end{array}$ $\begin{array}{r} 812 \\ -\ 90 \\ \hline 722 \end{array}$ $\begin{array}{r} 764 \\ -\ 581 \\ \hline 183 \end{array}$

3. $\begin{array}{r} 952 \\ -\ 940 \\ \hline 12 \end{array}$ $\begin{array}{r} 540 \\ -\ 230 \\ \hline 310 \end{array}$ $\begin{array}{r} 686 \\ -\ 251 \\ \hline 435 \end{array}$

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(24) Directions: Subtract and check.

1.

	794		652		498
-	478	-	239	-	379
	316		413		119

2.

	563		777		835
-	185	-	298	-	348
	378		479		487

3.

	364		751		523
-	263	-	401	-	321
	101		350		202

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(25) Directions: Subtract and check.

1.

	458		691		854
-	349	-	227	-	536
	109		464		318

2.

	278		445		764
-	119	-	108	-	545
	159		337		219

3.

	249		553		916
-	134	-	243	-	503
	115		310		413

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(26) Directions: Subtract and check.

1.

	683		944		871
-	421	-	703	-	260
	262		241		611

2.

	772		908		197
-	341	-	305	-	122
	431		603		75

3.

	887		543		781
-	352	-	243	-	300
	535		300		481

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(27) Directions: Subtract and check.

1.

692	485	727
- 491	- 324	- 512
201	161	215

2.

739	609	957
- 628	- 203	- 342
111	406	615

3.

266	385	597
- 118	- 166	- 408
148	219	189

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(28) Directions: Subtract and check.

1.

	800		300		500
-	263	-	127	-	233
	537		173		267

2.

	400		600		200
-	291	-	382	-	194
	109		218		6

3.

	700		900		300
-	266	-	724	-	123
	434		176		177

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(29) Directions: Subtract and check.

1.

	5,037	1,201	5,834
-	329	642	855
	4,708	559	4,979

2.

	3,633	4,125	2,961
-	794	636	972
	2,839	3,489	1,989

3.

	1,896	1,896	1,896
-	484	494	498
	1,412	1,402	1,398

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(30) Directions: Subtract and check.

1.

	1,876	3,243	3,243
-	689	892	856
	1,187	2,351	2,387

2.

	5,648	6,345	1,827
-	649	258	918
	4,999	6,087	909

3.

	8,002	9,003	4,005
-	628	324	556
	7,374	8,679	3,449

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(31) Directions: Subtract and check.

1.	4,080	3,070	5,020
	- 387	- 991	- 438
	3,693	2,079	4,582
2.	1,896	1,004	4,468
	- 499	- 687	- 579
	1,397	317	3,889
3.	3,006	8,007	1,006
	- 439	- 299	- 307
	2,567	7,708	699

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(32) Directions: Subtract and check.

1.	2,040	3,060	1,050
	- 462	- 392	- 465
	1,578	2,668	585
2.	4,003	9,002	6,001
	- 621	- 972	- 430
	3,382	8,030	5,571
3.	7,263	4,775	5,176
	- 185	- 683	- 438
	7,078	4,092	4,738

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(33) Directions: Subtract and check.

1.

	8,240	2,334	1,615
-	327	516	807
	7,913	1,818	808

2.

	3,004	5,006	2,007
-	973	425	347
	2,031	4,581	1,660

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(34) Directions: Subtract and check.

1.

1,000	6,000	7,000
- 533	- 407	- 316
467	5,593	6,684

2.

5,000	4,000	8,000
- 436	- 228	- 927
4,564	3,772	7,073

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(35) Directions: Subtract and check.

1.	3,675	6,547	5,000
	- 1,786	- 3,849	- 2,485
	1,889	2,698	2,515
2.	5,010	2,010	8,010
	- 3,466	- 1,277	- 4,252
	1,544	733	3,758
3.	5,789	5,357	4,001
	- 3,576	- 3,152	- 3,792
	2,213	2,205	209

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(36) Directions: Subtract and check.

1.	6,050	2,040	3,010
	- 2,367	- 1,248	- 2,563
	3,683	792	447
2.	4,556	6,281	7,635
	- 2,377	- 4,182	- 3,576
	2,179	2,099	4,059
3.	7,008	6,180	3,557
	- 4,106	- 5,932	- 1,648
	2,902	248	1,909

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(37) Directions: Subtract and check.

1.	9,216	4,063	6,020
	- 8,136	- 2,357	- 4,273
	1,080	1,706	1,747
2.	2,111	3,992	2,612
	- 1,789	- 2,009	- 1,777
	322	1,983	835
3.	2,040	3,004	5,000
	- 1,537	- 1,252	- 2,430
	503	1,752	2,570

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(38) Directions: Subtract and check.

1.	8,559	7,388	9,161
	- 4,208	- 6,234	- 5,031
	4,351	1,154	4,130
2.	7,200	6,020	8,004
	- 4,357	- 5,919	- 7,465
	2,843	101	539
3.	5,642	7,873	9,483
	- 5,459	- 6,948	- 2,624
	183	925	6,859

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(39) Directions: Subtract and check.

1.	5,060	5,110	5,340
	- 2,481	- 3,116	- 1,409
	2,579	1,994	3,931
2.	6,200	3,060	4,002
	- 2,576	- 1,485	- 3,268
	3,624	1,575	734
3.	9,798	9,897	7,258
	- 9,624	- 3,572	- 6,125
	174	6,325	1,133

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(40) Directions: Subtract and check.

1.	6,000	3,050	8,010
	- 2,999	- 1,452	- 2,669
	3,001	1,598	5,341
2.	6,867	7,886	7,980
	- 3,260	- 4,253	- 3,210
	3,607	3,633	4,770
3.	9,004	5,005	8,003
	- 2,916	- 4,936	- 1,227
	6,088	69	6,776

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(41) Directions: Subtract and check.

1.	4,272 - 4,122 150	5,467 - 3,245 2,222	7,948 - 2,136 5,812
2.	6,111 - 5,333 778	9,635 - 7,936 1,699	3,243 - 2,876 367
3.	7,245 - 7,123 122	4,278 - 3,072 1,206	2,657 - 1,452 1,205

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(42) Directions: Subtract and check.

1.	7,253 - 2,879 4,374	5,280 - 3,285 1,995	7,880 - 6,881 999
2.	4,003 - 2,564 1,439	6,002 - 3,574 2,428	3,008 - 2,569 439
3.	6,235 - 5,221 1,014	7,819 - 4,308 3,511	6,798 - 6,217 581

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(43) Directions: Subtract and check.

1.	6,635	5,138	2,537
	- 4,278	- 4,357	- 1,682
	2,357	781	855
2.	9,000	7,000	2,000
	- 2,544	- 1,633	- 1,429
	6,456	5,367	571
3.	4,000	3,000	5,000
	- 2,338	- 1,426	- 3,258
	1,662	1,574	1,742

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(44) Directions: Subtract and check.

1.

	7,395	7,227	5,684
-	2,498	- 4,285	- 2,993
	4,897	2,942	2,691

2.

	1,875	7,620	4,144
-	1,096	- 4,586	- 2,139
	779	3,034	2,005

3.

	4,726	8,673	2,865
-	3,946	- 1,888	- 1,977
	780	6,785	888

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(45) Directions: Subtract and check.

1.	7,792	8,235	2,047
	- 4,829	- 3,516	- 1,839
	2,963	4,719	208
2.	9,113	2,474	3,323
	- 2,058	- 1,185	- 2,196
	7,055	1,289	1,127
3.	7,488	6,337	6,154
	- 2,499	- 3,878	- 2,165
	4,989	2,459	3,989

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(46) Directions: Subtract and check.

1.	2,328 - 1,489 839	5,181 - 2,397 2,784	8,760 - 5,764 2,996
2.	8,233 - 7,148 1,085	6,145 - 4,139 2,006	5,608 - 2,786 2,822
3.	4,871 - 2,984 1,887	6,524 - 3,576 2,948	2,775 - 1,799 976

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(47) Directions: Subtract and check.

1.

	5,167	4,660	7,133
-	2,758	1,857	2,924
	2,409	2,803	4,209

2.

	9,457	4,375	5,126
-	3,379	2,088	3,048
	6,078	2,287	2,078

3.

	9,310	3,124	8,725
-	4,975	2,368	4,956
	4,335	756	3,769

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(48) Directions: Subtract and check.

1.	16,253	96,973	42,763
	- 7,468	- 4,982	- 5,589
	8,785	91,991	37,174
2.	32,617	63,522	46,233
	- 1,758	- 7,740	- 6,451
	30,859	55,782	39,782
3.	14,441	47,757	81,912
	- 1,664	- 6,858	- 1,943
	12,777	40,899	79,969

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(49) Directions: Subtract and check.

1.	84,056	52,535	60,722
	- 2,081	- 8,218	- 5,401
	81,975	44,317	55,321
2.	75,823	87,214	59,656
	- 6,458	- 6,209	- 5,458
	69,365	81,005	54,198
3.	10,306	12,060	68,350
	- 9,378	- 3,061	- 4,060
	928	8,999	64,290

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(50) Directions: Subtract and check.

1.
$$\begin{array}{r} 93{,}532 \\ -\ 9{,}544 \\ \hline 83{,}988 \end{array}$$

$$\begin{array}{r} 83{,}124 \\ -\ 4{,}876 \\ \hline 78{,}248 \end{array}$$

2.
$$\begin{array}{r} 42{,}356 \\ -\ 9{,}485 \\ \hline 32{,}871 \end{array}$$

$$\begin{array}{r} 38{,}182 \\ -\ 8{,}491 \\ \hline 29{,}691 \end{array}$$

3.
$$\begin{array}{r} 87{,}421 \\ -\ 9{,}530 \\ \hline 77{,}891 \end{array}$$

$$\begin{array}{r} 41{,}591 \\ -\ 5{,}694 \\ \hline 35{,}897 \end{array}$$

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(51) Directions: Subtract and check.

1.
$$\begin{array}{r} 35{,}876 \\ -\ 8{,}977 \\ \hline 26{,}899 \end{array}$$

$$\begin{array}{r} 66{,}180 \\ -\ 7{,}293 \\ \hline 58{,}887 \end{array}$$

2.
$$\begin{array}{r} 92{,}309 \\ -\ 8{,}958 \\ \hline 83{,}351 \end{array}$$

$$\begin{array}{r} 86{,}583 \\ -\ 5{,}999 \\ \hline 80{,}584 \end{array}$$

3.
$$\begin{array}{r} 78{,}253 \\ -\ 9{,}682 \\ \hline 68{,}571 \end{array}$$

$$\begin{array}{r} 34{,}818 \\ -\ 5{,}847 \\ \hline 28{,}971 \end{array}$$

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(52) Directions: Subtract and check.

1.

	82,609	68,247	70,909
-	52,403	- 44,395	- 69,090
	30,206	23,852	1,819

2.

	74,925	53,286	42,755
-	23,936	- 43,689	- 22,697
	50,989	9,597	20,058

3.

	16,973	17,856	13,291
-	15,998	- 13,201	- 12,986
	975	4,655	305

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(53) Directions: Subtract and check.

1.	91,527	87,496	47,086
	- 20,415	- 32,422	- 17,025
	71,112	55,074	30,061
2.	33,619	10,254	71,528
	- 14,550	- 10,168	- 20,843
	19,069	86	50,685
3.	17,436	42,981	43,216
	- 17,350	- 31,996	- 21,402
	86	10,985	21,814

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(54) Directions: Subtract and check.

1.	24,635	58,437	25,317
	- 12,759	- 51,679	- 13,658
	11,876	6,758	11,659
2.	53,484	68,237	59,428
	- 33,251	- 32,025	- 41,314
	20,233	36,212	18,114
3.	53,644	37,562	75,826
	- 43,827	- 12,245	- 23,521
	9,817	25,317	52,305

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(55) Directions: Subtract and check.

1.	22,483	62,537	55,130
	- 19,584	- 56,849	- 43,273
	2,899	5,688	11,857
2.	86,947	56,739	92,465
	- 32,825	- 54,231	- 22,143
	54,122	2,508	70,322
3.	54,278	45,118	25,614
	- 32,489	- 21,279	- 16,726
	21,789	23,839	8,888

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(56) Directions: Subtract and check.

1.	40,007	80,006	70,003
	- 23,564	- 51,288	- 29,436
	16,443	28,718	40,567
2.	30,050	60,010	80,020
	- 23,972	- 41,237	- 25,146
	6,078	18,773	54,874
3.	50,400	60,050	50,002
	- 23,872	- 20,743	- 23,875
	26,528	39,307	26,127

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(57) Directions: Subtract and check.

1.	20,000	40,000	30,000
	- 18,954	- 25,364	- 11,456
	1,046	14,636	18,544
2.	80,500	20,600	40,800
	- 54,378	- 19,644	- 21,953
	26,122	956	18,847
3.	50,000	70,000	70,300
	- 23,812	- 42,307	- 25,638
	26,188	27,693	44,662

If you have less than 7 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(58) Directions: Subtract and check.

1.

237,646	568,953
- 198,759	- 454,005
38,887	114,948

2.

868,753	738,659
- 789,964	- 699,899
78,789	38,760

3.

543,950	437,032
- 418,513	- 214,877
125,437	222,155

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(59) Directions: Subtract and check.

1. $\begin{array}{r} 144{,}480 \\ -\ 142{,}895 \\ \hline 1{,}585 \end{array}$ $\begin{array}{r} 738{,}259 \\ -\ 589{,}767 \\ \hline 148{,}492 \end{array}$

2. $\begin{array}{r} 923{,}644 \\ -\ 849{,}357 \\ \hline 74{,}287 \end{array}$ $\begin{array}{r} 482{,}637 \\ -\ 297{,}148 \\ \hline 185{,}489 \end{array}$

3. $\begin{array}{r} 834{,}124 \\ -\ 535{,}217 \\ \hline 298{,}907 \end{array}$ $\begin{array}{r} 685{,}978 \\ -\ 498{,}369 \\ \hline 187{,}609 \end{array}$

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(60) Directions: Subtract and check.

1.

822,472	673,612
- 631,584	- 297,641
190,888	375,971

2.

421,276	477,563
- 311,043	- 251,412
110,233	226,151

3.

568,798	874,395
- 325,416	- 211,243
243,382	663,152

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(61) Directions: Subtract and check.

1.

$$\begin{array}{r} 688{,}540 \\ -\ 287{,}430 \\ \hline 401{,}110 \end{array}$$

$$\begin{array}{r} 628{,}345 \\ -\ 125{,}214 \\ \hline 503{,}131 \end{array}$$

2.

$$\begin{array}{r} 787{,}445 \\ -\ 257{,}312 \\ \hline 530{,}133 \end{array}$$

$$\begin{array}{r} 255{,}694 \\ -\ 241{,}454 \\ \hline 14{,}240 \end{array}$$

3.

$$\begin{array}{r} 923{,}457 \\ -\ 902{,}133 \\ \hline 21{,}324 \end{array}$$

$$\begin{array}{r} 860{,}956 \\ -\ 360{,}224 \\ \hline 500{,}732 \end{array}$$

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(62) Directions: Subtract and check.

1. $\begin{array}{r} 800{,}100 \\ -\ 488{,}326 \\ \hline 311{,}774 \end{array}$ $\begin{array}{r} 600{,}040 \\ -\ 357{,}926 \\ \hline 242{,}114 \end{array}$

2. $\begin{array}{r} 543{,}900 \\ -\ 418{,}513 \\ \hline 125{,}387 \end{array}$ $\begin{array}{r} 430{,}032 \\ -\ 214{,}877 \\ \hline 215{,}155 \end{array}$

3. $\begin{array}{r} 510{,}087 \\ -\ 376{,}468 \\ \hline 133{,}619 \end{array}$ $\begin{array}{r} 260{,}930 \\ -\ 197{,}895 \\ \hline 63{,}035 \end{array}$

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(63) Directions: Subtract and check.

1.

500,003	900,205
- 254,371	- 576,138
245,632	324,067

2.

400,180	760,004
- 198,765	- 378,274
201,415	381,730

3.

300,006	877,001
- 178,928	- 497,853
121,078	379,148

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(64) Directions: Subtract and check.

1.

700,000	300,000
- 491,297	- 207,605
208,703	92,395

2.

604,000	501,000
- 258,991	- 283,430
345,009	217,570

3.

320,000	700,300
- 102,533	- 489,714
217,467	210,586

If you have less than 5 correct, see your instructor for additional help.

Activity 6 - Subtracting Whole Numbers

(65) Directions: Subtract and check.

1.

200,000	500,000
- 120,432	- 418,950
79,568	81,050

2.

403,000	302,000
- 202,076	- 106,432
200,924	195,568

3.

800,000	107,000
- 326,175	- 98,416
473,825	8,584

If you have less than 5 correct, see your instructor for additional help.

Activity 7 - Calculating the Range of Whole Numbers (continued)

Directions: Underline the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	18	12	14	16	6
B)	21	27	23	25	6
C)	6	2	8	4	6
D)	9	7	5	3	6
E)	44	48	42	40	8
F)	33	35	32	36	4
G)	51	50	53	57	7
H)	17	11	6	3	14
I)	33	13	22	11	22
J)	213	266	245	202	64

If you have less than 24 correct, see your instructor for additional help.

Activity 7 - Calculating the Range of Whole Numbers (continued)

Directions: Calculate the range.

1. Find the range of the following oil readings:

   4 % 11 % 10 % 8 % 13 %

   Range: 9 %

2. Find the range of the following bag weights:

   18 oz. 17 oz. 14 oz. 12 oz. 10 oz.

   Range: 8 oz.

3. Calculate the range of the following wet weights:

   A) 74 69 67 Range: 7

   B) 76 72 67 Range: 9

   C) 69 72 68 Range: 4

   D) 70 74 66 Range: 8

   E) 76 75 65 Range: 11

4. Find the range of these oven temperatures:

   A) 410° 580° 550° 520° 415° 330° 420° 450°

   Range: 250°

   B) 350° 500° 510° 400° 340° 360° 300° 320°

   Range: 210°

If you have less than 7 correct, see your instructor for additional help.

Activity 9 - Subtracting Whole Numbers (Word Problems)

Directions: Use subtraction to solve the following problems:

1. Suppose lines 8 and 9 in a bakery produce Snackwells®. The total number of units produced daily is 32,988. Line 9 produces 18,752 units per day. How many units are produced by Line 8?

   Answer: 14,236

2. The total package weight of a box of Cheese Nips® is 383 grams. The tare weight is 73 grams. What is the net weight?

   Answer: 310

3. The total package weight of a package of Chips Ahoy!® is 18 ounces. The packaging tare is 2 ounces. What is the net weight?

   Answer: 16

4. The total package weight of a box of Premium® crackers is 16 ounces. The tare weight is 3 ounces. What is the actual product weight?

   Answer: 13

5. One Thursday, shift 2 produced 634 doughs and shift 3 produced 527 doughs. How many more doughs did shift 2 produce than shift 3?

   Answer: 107

6. On Wednesday, shift 1 produced 694 pounds of B&R and shift 2 produced 447 pounds of B&R. How much more B&R was produced by shift 1 than by shift 2?

   Answer: 247

Activity 9 - Subtracting Whole Numbers (Word Problems) (continued)

7. On Friday, three shifts produced Oreos®. Shift 3 produced 9,298 units, shift 1 produced 9,986 units, and shift 2 produced 8,897 units.

   A) How many more units did shift 1 produce than shift 3?

   Answer: 688

   B) How many more units did shift 1 produce than shift 2?

   Answer: 1,089

   C) How many more units did shift 3 produce than shift 2?

   Answer: 401

8. Find the following product weights:

   A) 178g of product; 10g of packaging material

   product weight: 168g

   B) 249g of product; 13g of packaging material

   product weight: 236g

   C) 254g of product; 12g of packaging material

   product weight: 242g

   D) 12 oz. of product, 2 oz. of packaging material

   product weight: 10 oz.

   E) 22 oz. of product; 4 oz. of packaging material

   product weight: 18 oz.

If you have less than 11 correct, see your instructor for additional help.

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

Directions: Before starting this exercise, read aloud to the instructor the decimals listed below. Write the place name of the last digit in each decimal in the blank provided. Underline all the digits that represent less than a whole.

(1)	29.3	tenths
(2)	679.23	hundredths
(3)	51.084	thousandths
(4)	392.19	hundredths
(5)	500.453	thousandths
(6)	14.7	tenths
(7)	38.22	hundredths
(8)	142.002	thousandths
(9)	25.6341	ten thousandths
(10)	12.36	hundredths

If you have less than 16 correct, see your instructor for additional help.

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

Directions: Rewrite the numbers below as decimals. When you've completed the exercise, read the decimals aloud to the instructor.

(1)	twenty-seven and eight tenths	27.8
(2)	forty-five and sixty-three hundredths	45.63
(3)	nineteen and two hundred forty-two thousandths	19.242
(4)	twenty-five and thirty-four ten thousandths	25.0034
(5)	fifty and thirty-three thousandths	50.033
(6)	eighty-one hundredths	.81
(7)	three and five tenths	3.5
(8)	one hundred thirty-seven thousandths	.137
(9)	twelve and fifteen thousand six hundred twenty-five hundred-thousandths	12.15625
(10)	eight hundred seventy-five ten-thousandths	.0875

If you have less than 8 correct, see your instructor for additional help.

Activity 10 - Decimal Place Values/Reading and Writing Decimals

Directions: Write the following decimals in words.

(1) .8 eighth tenths

(2) .09 nine hundredths

(3) .378 three hundred seventy-eight thousandths

(4) 10.475 ten and four hundred seventy-five thousandths

(5) .0028 twenty-eight ten-thousandths

(6) 8.000326 eight and three hundred twenty-six millionths

(7) 19.55 nineteen and fifty-five hundredths

(8) .0041 forty-one ten-thousandths

(9) .000208 two hundred eight millionths

(10) 16.013 sixteen and thirteen thousandths

If you have less than 8 correct, see your instructor for additional help.

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	.6	.3	.9	.1
	.5	.2	.7	.4
	.1	.4	.8	.7
	1.2	9	2.4	1.2
2.	.2	.3	.4	.5
	.4	.5	.6	.7
	.6	.7	.8	.9
	1.2	1.5	1.8	2.1
3.	.10	.12	.19	.13
	.15	.14	.17	.16
	.20	.16	.14	.18
	.45	.42	.50	.47
4.	.11	.15	.22	.19
	.32	.28	.73	.37
	.54	.45	.47	.51
	.97	.88	1.42	1.07

If you have less than 13 correct, see your instructor for additional help.

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	.4	.9	.1	.8
	.7	.5	.6	.4
	8.7	4.3	3.2	6.5
	9.8	5.7	3.9	7.7
2.	9.3	2.3	4.8	7.6
	17.7	18.6	16.4	15.2
	74.2	62.7	88.5	53.9
	101.2	83.6	109.7	76.7
3.	76.8	32.5	67.9	35.7
	119.42	321.26	392.28	231.09
	24.4	29.3	21.8	10.6
	220.62	383.06	481.98	277.39
4.	3.8	5.7	4.5	3.2
	2.1	3.2	1.3	2.5
	5.9	8.9	5.8	5.7

If you have less than 13 correct, see your instructor for additional help.

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	9.3 1.4 10.7	2.6 5.3 7.9	2.9 8.4 11.3	8.3 9.9 18.2
2.	3.02 8.3 11.32	7.29 5.0 12.29	6.55 4.3 10.85	4.69 6.4 11.09
3.	.412.8 9 3.30	.574.1 8 4.75	.23 7.08 7.31	.64 3.77 4.41
4.	.32 9.46 9.78	.13 2.06 2.19	.47 5.32 5.79	.16 4.82 4.98

If you have less than 13 correct, see your instructor for additional help.

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	6.6	2.1	8.9	9.2
	.81	.49	.67	.10
	.056	.043	.039	.500
	7.466	2.633	9.609	9.800
2.	60.3	.870	194.7	6.57
	2.85	1.54	84.02	29.35
	5.77	725.07	9.006	1.7
		3		
	68.92	727.48	287.72	37.62
		3	6	
3.	14.6	24.3	8.80	.223
	.73	.10	7.7	20.9
	7.18	25.67	52.3	57.46
	22.51	50.07	68.80	78.583
4.	.817	62.1	.5??	62.1
	6.465	8.97	6.83	8.97
	3.73	.973	3.4	.9730
	11.012	72.043	10.756	72.043
				0

If you have less than 13 correct, see your instructor for additional help.

Activity 11 - Adding Decimals (continued)

Directions: Calculate the following sums.

1. 5,342.1 + 367.22 = 5,709.32

2. 29 + 32.43 + 236.211 + 10.32 = 307.961

3. Following are net weights for 18-ounce packages of Chips Ahoy!® What is the total net weight for these six packages?

   Answer: 110.5 ounces

   17.9 18.2 18.4 18.7 18.5 18.8

4. Following are the net weights for 13.5-ounce boxes of Cheese Nips®. What is the total net weight for these 4 boxes?

   Answer: 53.403 ounces

   13.383 13.501 13.496 13.023

5. Following are the slug weights for six Chips Ahoy!® slugs. What is the total weight of the slugs?

   Answer: 1,542.9 grams

   255.3249.1254.6264.4257.8261.7

Activity 12 - Rounding Decimals

Directions: Round the numbers as indicated below.

1. Round the net weight of this product to he nearest tenth.

   16.37 ounces Answer: 16.4 ounces

2. Round the product moisture to the nearest tenth and the nearest hundredth.

   4.172% Answer: 4.2 % (tenth)
   Answer: 4.17% (hundredth)

3. Round the slug weight to the nearest tenth and the nearest one.

   254.65 grams Answer: 254.7 grams (tenth)
   Answer: 255 grams (one)

4. Round the following number to the nearest ten thousandth, thousandth, and hundredth.

   .01525 Answer: .0153 (ten thousandth)
   Answer: .015 (thousandth)
   Answer: .02 (hundredth)

If you have less than 6 correct, see your instructor for additional help.

Activity 12 - Rounding Decimals

Directions: Round the following decimals to the nearest tenth:

1)	4.57	4.6
2)	2.52	2.5
3)	1.85	1.9
4)	12.04	12 [12.0]
5)	.68	.7

Directions: Round the following decimals to the nearest hundredth:

6)	9.048	9.05
7)	7.563	7.56
8)	2.497	2.50
9)	3.299	3.30
10)	.485	.49

Directions: Round the following decimals to the nearest thousandth.

11)	5.1836	5.184
12)	7.4889	7.489
13)	1.6378	1.638
14)	.2546	.255
15)	.1168	.117

If you have less than 12 correct, see your instructor for additional help.

Activity 13 - Subtracting Decimals

Directions: Find the differences in the problems below.

(1)	6.2 - 3.76	=	2.44
(2)	45.92 - 23.07	=	22.85
(3)	5 - 2.493	=	2.507
(4)	382 - 46.20	=	335.8
(5)	12 - .936	=	11.064
(6)	835.091 - 482.320	=	352.771
(7)	3.2 - .1986	=	3.0014
(8)	78 - 35.83	=	42.17
(9)	29.34 - 16.52	=	12.82
(10)	.07 - .002	=	.068
(11)	1 - .047	=	.953
(12)	.47 - .3992	=	.0708
(13)	89.3 - .764	=	88.536
(14)	963.857 - 241.534	=	722.323

If you have less than 11 correct, see your instructor for additional help.

Activity 13 - Subtracting Decimals

Directions: Find the difference in the following problems.

1. 93.7 - 39.48 = 54.22

2. 3,724.266 - 859.001 = 2,865.265

3. Calculate the net weight of a box of Better Cheddars®:
   Total package weight (ounces): 9.86; Tare weight (ounces): 1.3

   Net weight: 8.56 ounces

4. Calculate the net weight of a box of Honey Maid Graham Crackers®:
   Total package weight (ounces): 17.6; Tare weight (ounces): 1.28

   Net weight: 16.32 ounces

5. Suppose the wet weight of a Premium® cracker sample is 89.8 grams. The dry weight is 86.45 grams. What is the difference between the wet and dry weights?

   3.35 grams

6. On Thursday, shift 1 produced 646.99 pounds of B&R and shift 2 produced 972.5 pounds. How much more B&R was produced by shift 2 than by shift 1?
   325.51 pounds

7. The average number of Oreo® units produced per day on shift 1 is 4,000.58. The average number of Oreo® units produced per day on shift 2 is 3,895.6. On average, how many more units does shift 1 produce than shift 2?

   104.98 units

If you have less than 6 correct, see your instructor for additional help.

Activity 14 - Comparing Decimals

Directions: Write the larger decimal of each pair in the blank below.

(1)	.502	.52	.52
(2)	.17	.21	.21
(3)	.6	.06	.6
(4)	.400	.500	.500
(5)	.30	.90	.90
(6)	.4	.45	.45
(7)	.57	.06	.57
(8)	.7	.2	.7
(9)	.14	.41	.41
(10)	.83	8	.83

If you have less than 8 correct, see your instructor for additional help.

Activity 14 - Comparing Decimals

Objective(s): This activity will enable participants to compare decimals.

Materials Required:
Pencil

You need to know: To compare decimals.....

1. Compare the digits to the left of the decimal point as whole numbers. If one whole number is larger, then that decimal is larger.

   EXAMPLE Compare: 427.36 with 425.263

   427 is larger than 425; therefore 427.36 is larger than 425.263.

2. When the whole numbers in decimals are equal, compare the first digit to the right of the decimal point. If one digit is larger, then that decimal is larger.

   You may give each decimal compared the same number of places by writing in zeros, if necessary. By using zeros as placeholders, you are giving each decimal a common denominator.

   EXAMPLE Compare: 18.331 with 18.47
   (18.331 with 18.47**0**)

   The whole numbers are identical (18 and 18). Four (4) is larger than 3; therefore, 18.47 is larger than 18.331.

3. If the digits in the first place to the right of the decimal point (tenths) are the same, then compare the next place to the right (hundredths). If one digit is larger, then that decimal is larger.

   EXAMPLE Compare: 1.486 with 1.49
   (1.486 with 1.49**0**)

   The whole numbers are identical (1 and 1). The digits in the first place to the right of the decimal point are the same (4 and 4). Nine (9) is larger than 8; therefore, 1.49 is larger than 1.486.

Activity 14 - Comparing Decimals

Directions: Write the larger decimal of each pair in the blank below.

(1)	.502	.52	.52
(2)	.17	.21	.21
(3)	.6	.06	.6
(4)	.400	.500	.500
(5)	.30	.90	.90
(6)	.4	.45	.45
(7)	.57	.06	.57
(8)	.7	.2	.7
(9)	.14	.41	.41
(10)	.83	.8	.83

If you have less than 8 correct, see your instructor for additional help.

Activity 15 - Calculating Range Using Decimals

Directions: Circle the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	16.8	16.08	15.1	15.11	1.69
B)	16.3	16.1	15.8	15.9	.5
C)	19.85	20.00	19.75	20.71	.96
D)	243.7	243.17	242.00	243.00	1.7
E)	41.0	41.3	40.0	41.6	1.6
F)	6.8	7.2	6.9	7.6	.8
G)	1.6	1.2	.8	1.0	.8
H)	3.07	3.04	3.09	3.03	.06
I)	15.85	15.90	16.05	16.25	.4
J)	19.2	19.8	20.4	20.8	1.6

If you have less than 24 correct, see your instructor for additional help.

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Activity 15 - Calculating Range Using Decimals

Directions: Circle the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	17.8	17.08	17.1	17.11	.72
B)	43	43.1	40	43.01	3.1
C)	234.9	234.19	233	234	1.9
D)	16.91	17.1	16.98	17.09	.19
E)	23.16	22.93	23.61	23.094	.68
F)	18.33	18.32	18.28	18.23	.10
G)	51.98	51.	51.9	51.89	.09
H)	46.7	46.71	46.75	46.78	.08
I)	19.75	19.80	20.00	19.85	.25
J)	34.99	34.9	35	35.72	.82

If you have less than 24 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(1) Directions: Find the following products.

1. 1.14 x .8 = .912

2. .23 x .47 = .1081

3. 6.59 x .701 = 4.61959

4. Suppose you make $16.75 per hour. Last week you worked 39.5 hours. What will be your gross wages for the week?

   $ 661.625 ($ 661.63)

5. The net weight of a box of crackers is 13.5 ounces. Assuming that all boxes have the same net weights, how much will 12 boxes weigh?

   162 ounces

If you have less than 4 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(2) Directions: Multiply.

1.	34.7 x 8 = 277.6	2.89 x 7 = 20.23	.551 x 6 = 3.306	60.3 x 9 = 542.7	7.18 x 4 = 28.72
2.	3.8 x 4 = 15.2	.92 x 9 = 8.28	6.7 x 6 = 40.2	5.3 x 8 = 42.4	.84 x 7 = 5.88
3.	41 x .03 = 1.23	78 x .5 = 39	59 x .09 = 5.31	86 x .4 = 34.4	19 x .06 = 1.14

If you have less than 12 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(3) Directions: Find the products in the problems below.

1.	.09 x .6 = .054	.05 x .7 = .035	.004 x .3 = .0012	.08 x .04 = .0032	.002 x .8 = .0016
2.	2.8 x 4.3 = 12.04	5.6 x .82 = 4.592	.72 x 5.7 = 4.104	.81 x .69 = .5589	.94 x 1.8 = 1.692
3.	41.8 x .7 = 29.26	3.90 x .08 = .312	.516 x .5 = .258	73.8 x .06 = 4.428	3.47 x .4 = 1.388

If you have less than 12 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(4) Directions: Multiply.

1.	5.6 x .2 = 1.12	.73 x .08 = .0584	9.2 x .7 = 6.44	.087 x .4 = .0348	3.3 x .06 = .198
2.	30.5 x .27 = 8.235	7.40 x 6.6 = 48.84	61.8 x 4.8 = 296.64	.514 x .91 = .46774	9.06 x 7.3 = 66.138
3.	906 = 63.42	504 x .002 = 1.008	783 x .8 = 626.4	652 x .06 = 39.12	467 x .003 = 1.401

If you have less than 12 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(5) Directions: Multiply.

1.	.02 x .8 = .016	.25 x .04 = .01	1.2 x .008 = .0096	.073 x .05 = .00365
2.	14.21 x 35 = 497.35	.216 x .24 = .05184	17.7 x 2.5 = 44.25	3.2 x 87 = 278.4
3.	547.1 x .73 = 399.383	3.07 x 731 = 2.244.17	17.39 x 12.4 = 215.636	1.754 x .23 = .40342
4	4.08 x .0017 = .006936	.0125 x .315 = .0039375	.468 x .1302 = .0609336	.12121 x .03 = .0036363

If you have less than 13 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(6) Directions: Multiply.

1.	17.32 x .16 = 2.7712	.0648 x 2.3 = .14904	913.2 x .049 = 44.7468	40.21 x 20.8 = 836.368
2.	45.21 x 5.6 = 253.176	3.748 x 73 = 273.604	206.9 x .28 = 57.932	.7488 x 4.9 = 3.66912
3.	.2789 x .17 = .047413	3.845 x 29.2 = 112.274	5183.6 x .0016 = 8.29376	303.003 x 56.8 = 17,210.57

If you have less than 10 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(7) Directions: Use the shortcut to multiply each of th following problems.

1.	10 x 7.6	= 76
2.	100 x .013	= 1.3
3.	10 x 7.64	= 76.4
4.	10 x .013	= .13
5.	10 x .7839	= 7.839
6.	100 x .002	= .2
7.	1,000 x .7839	= 783.9
8.	10 x .9084	= 9.084
9.	1,000 x .7839	= 783.9
10.	1,000 x 908.4	= 908,400
11.	10 x 7.9	= 79
12.	100 x 90.84	= 9,084

If you have less than 10 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(8) Directions: Multiply each of the following problems using the shortcut.

1.	.2 x 10	=	2
2.	45.06 x 100	=	4,506
3.	72.4 x 100	=	7,240
4.	.35 x 10	=	3.5
5.	.539 x 100	=	53.9
6.	.457 x 1,000	=	457
7.	.05 x 100	=	5
8.	42.4 x 100	=	4,240
9.	86.73 x 1,000	=	86,730
10.	2.97 x 100	=	297
11.	22.8 x 1,000	=	22,800
12.	.9 x 1,000	=	900

If you have less than 10 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(9) Directions: Multiply each of the following problems using the shortcut.

1) .34 x 10 = 3.4 1.24 x 100 = 124 3.85 x 1,000 = 3,850

2) .03 x 100 = 3.275 x 100 = 27.5 8.9 x 100 = 890

3) .8 x 10 = 8 .09 x 10 = .9 3.64 x 10 = 36.4

4) .9 x 1,000 = 900 2.36 x 1,000 = 2,360 .475 x 1,000 = 475

5) .06 x 1,000 = 60 .863 x 100 = 86.3.721 x 10 = 7.21

6) 1.6 x 1,000 = 1,600

If you have less than 13 correct, see your instructor for additional help.

Activity 17 - Dividing Decimals By 10, 100, or 1,000

Directions: Find the quotients using the shortcut.

1.	7.7 ÷ 10	= .77		.14 ÷ 10	= .014
2.	52.9 ÷ 100	= .529		64.7 ÷ 1,000	= .0647
3.	.239 ÷ 1,000	= .000239		58.09 ÷ 1,000	= .05809
4.	8.306 ÷ 100	= .08306		50.73 ÷ 1,000	= .05073
5.	.4 ÷ 1,000	= .0004			

If you have less than 8 correct, see your instructor for additional help.

Activity 17 - Dividing Decimals By 10, 100, or 1,000

Directions. Find the quotients using the shortcut.

1.	.62 ÷ 10	= .062		5.74 ÷ 100	= .0574
2.	.3 ÷ 10	= .03		12.09 ÷ 100	= .1209
3.	.08 ÷ 100	= .0008		.834 ÷ 100	= .00834
4.	21.6 ÷ 100	= .216		38.6 ÷ 1,000	= .0386
5.	84.7 ÷ 100	= .847			

If you have less than 8 correct, see your instructor for additional help.

Activity 19 - Calculating Percent of Oil

All ingredients in a product must be added in the amount specified by the master recipe. By doing so, consistency is maintained in the product and the product complies with labeling information provided for the consumer.

For instance the correct amount of spray oil on a product must be monitored. To perform this calculation you need to take weights, read the scale, subtract, divide, and multiply.

Step 1:
Record the dry weight of the product

Step 2:
Record the wet weight of the product (after the oil spray machine)

Step 3:
Subtract the dry weight from the wet weight

Step 4:
Divide the wet weight into the answer for step 3

Step 5:
Multiply your answer by 100. The answer is the percent of oil in that sample.

Now try the following:

	Wet Wt.	Dry Wt.	% Oil
1.	50	45	**10%**
2.	69	63	**8.7%**
3.	100	90	**10%**
4.	112	110	**1.8%**

Activity 20 - Calculating Cubic Footage

When working in Environmental Services, an employee must sometimes spray designated areas to prevent infestation. The chemicals must be used according to the label directions for the amount of space to be sprayed. Therefore, the cubic footage of the area to be sprayed must be determined.

To calculate cubic footage you must be able to measure width, length, height and then multiply.

If a room measures 70 feet by 80 feet and is 20 feet high, you multiply.
70 X 80 X 20 = 112,000 cubic feet.

Find the cubic footage of the following rooms.

Room A measures
100 ft. long, 45 ft. wide, 25 feet tall **112,500** cu. ft.

Room B measures
12 ft. wide, 15 ft. long, 8 ft. tall **1,400** cu. ft.

Room C measures
35.5 ft. long, 22.25 ft. wide, 12 ft. tall **9478.5** cu. ft.

Activity 21 - Calculating Sprays

An Environmental Services employee must sometimes use a spraying device for tasks such as administering pesticides. How much liquid you put in the spraying device is determined by the label directions and the amount of area or space to be sprayed.

First, you must calculate the space as you did in the previous activity. Next, you follow label directions, using division to calculate the amount of liquid to pour into the tank.

For instance, if the area to be sprayed is 10,000 cubic feet, and one gallon sprays 5,000 cubic feet, you will need 2 gallons, because

10,000 ÷ 5,000 = 2

Use the room measurements in the previous activity to calculate how many gallons of liquid will be needed if one gallon is necessary for 1000 cubic feet.

Room A **112.5** gallons

Room B **1.44** gallons

Room C **9.5** gallons

Cluster_____

Activity 1: Learning Military Time

Objective (s): This activity will enable participants

1. To become familiar with military time (24 hour clock time)

2. To understand how military time is organized

Materials Used: Pencils, Paper
Military Time Reference Sheet

You Need to Know:

In grade school we were all very proud when we learned how to tell time. We learned the purpose of the minute and hour hands on a regular manual clock. Then the digital display clocks came along and made it even easier for us to tell time.

However, there is another way to express the time of day and that is in military time. Military time denotes the number of hours into a new day and adds "hundred" as a suffix. For example, 12 noon, midday is expressed as 1200 hours - 12 hours into a new day followed by the phrase "hundred hours."

Many companies require that their employees use a "time-clock" that records hours worked in military time. Various areas of the Nabisco Facility use military time. For example, the Mixing Department uses this 24-hour clock method to calculate lay time, which is the time between the mixing and dumping of the dough. On the following page you will find a **Military Time Reference Sheet** that shows the equivalent conventional time. Take a few moments to review that sheet.

MILITARY TIME REFERENCE SHEET

	Conventional Time	Military Time
AM	12:00 midnight	2400 hours
	12:01 1-minute past midnight	0001 hours
	12:10 10 minutes past midnight	0010 hours
	1:00 1-O'clock in the morning	0100 hours
	2:00 2-O'clock in the morning	0200 hours
	2:30 2:30 in the morning	0230 hours
	3:00 3-O'clock in the morning	0300 hours
	4:00 4-O'clock in the morning	0400 hours
	5:00 5-O'clock in the morning	0500 hours
	6:00 6-O'clock in the morning	0600 hours
	7:00 7-O'clock in the morning	0700 hours
	8:00 8-O'clock in the morning	0800 hours
	9:00 9-O'clock in the morning	0900 hours
	10:00 10-O'clock in the morning	1000 hours
	11:00 11-O'clock in the morning	1100 hours
PM	12:00 noon, midday	1200 hours
	12:18 18-minutes past noon	1218 hours
	12:45 45-minutes past 12 noon	1245 hours
	1:00 1-O'clock in the afternoon	1300 hours
	1:05 5-minutes after 1 p.m.	1305 hours
	2:00 2-O'clock in the afternoon	1400 hours
	3:00 3-O'clock in the afternoon	1500 hours
	4:00 4-O'clock in the afternoon	1600 hours
	5:00 5-O'clock in the afternoon	1700 hours
	6:00 6-O'clock in the afternoon	1800 hours
	7:00 7-O'clock in the evening	1900 hours
	8:00 8-O'clock in the evening	2000 hours
	9:00 9-O'clock in the evening	2100 hours
	10:00 10-O'clock in the evening	2200 hours
	11:00 11-O'clock in the evening	2300 hours
	11:03 3-minutes past 11 at night	2303 hours
	11:22 22-minutes past 11 at night	2322 hours
	11:47 47 minutes past 11 at night	2347 hours

Activity 2 - Working with the Military Time Reference Sheet

Objective (s): This activity will enable participants

1. To become familiar with military time

2. To understand how military time is organized

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Look at the Military Time Reference Sheet. Observe the progression of the time and hours. For example, 12 noon by conventional time is the same as 1200 (12-hundred) hours in military hours. Locate that time on your reference sheet. The next time on the sheet is 12:18 p.m. or 1218 hours (18 minutes after 12 noon). Now complete the worksheet below by writing in the missing information. You may use your reference sheet.

Military Time Worksheet

Conventional Time		Military Time
AM	12:00 midnight	2400 hours
	12:01 1-minute past midnight	
	12:10 10 minutes past midnight	0010 hours
	1:00 1-O'clock in the morning	
	2:00 2-O'clock in the morning	0200 hours
	2:30 2:30 in the morning	
	3:00 3-O'clock in the morning	0300 hours
	4:00 4-O'clock in the morning	
	5:00 5-O'clock in the morning	
	6:00 6-O'clock in the morning	0600 hours
	7:00 7-O'clock in the morning	
	8:00	
	9:00 9-O'clock in the morning	0900 hours
	10:00 10-O'clock in the morning	
	11:00 11-O'clock in the morning	1100 hours

Activity 2 Continued...

Military Time Worksheet

	Conventional Time	Military Time
PM	12:00 noon, midday	1200 hours
	12:18 18-minutes past noon	
	12:45 45-minutes past 12 noon	1245 hours
	1:00 1-O'clock in the afternoon	
	1:05 5-minutes after 1 p.m.	1305 hours
	2:00 2-O'clock in the afternoon	
	3:00	
	4:00 4-O'clock in the afternoon	1600 hours
	5:00 5-O'clock in the afternoon	
	6:00 6-O'clock in the afternoon	1800 hours
	7:00 7-O'clock in the evening	
	18:00 8-O'clock in the evening	2000 hours
	9:00	
	10:00 10-O'clock in the evening	2200 hours
	11:00 11-O'clock in the evening	
	11:03 3-minutes past 11 at night	
	11:22 22-minutes past 11 at night	2322 hours
	11:47	

Activity 3 - Translating Conventional Time to Military Time

Objective (s): This activity will enable participants

1. To record military time

2. To translate conventional time to military time

Materials Used: Pencils, Paper
Military Time Reference Sheet

Directions

Write the correct military time in the blank spaces.

A. **Military Time Translation**

Conventional Time		Military Time
AM	12:00	_____
	12:01	_____
	12:10	_____
	1:00	_____
	2:30	_____
	11:00	_____

B. Military Time Translation

Conventional Time		Military Time
PM	12:00	_____
	12:10	_____
	1:00	_____
	2:00	_____
	4:17	_____
	11:00	_____

Activity 4 - Using Military Time in the Workplace

Objective (s): This activity will enable participants

1. To record military time

2. To translate conventional time to military time

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Read the work schedule below and write in the military time for the hours sanitation employees must clean the locker rooms and lounges each day. Write the military time in the spaces provided. Use your military reference sheet, if necessary.

Work Schedule

	Military Time
First Shift	
7:30 a.m.	_____
9:30 a.m.	_____
11:00 a.m.	_____
1:00 p.m.	_____
2:30 p.m.	_____

Activity 4 - Using Military Time in the Workplace

Second Shift

3:30 p.m. _____

5:30 p.m. _____

7:30 p.m. _____

9:00 p.m. _____

10:30 p.m. _____

Third Shift

11:30 p.m. _____

1:30 a.m. _____

3:30 a.m. _____

5:30 a.m. _____

6:30 a.m. _____

Activity 5 - Recording Military Time

Objective (s): This activity will enable participants

1. To record military time
2. Translate military time to conventional time

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Read the paragraphs below and write in the military time translation for the conventional time noted.

1. Clara plans to purchase a car at Nicker's Chevrolet today. She is going to meet John at 2:35 p.m. at the dealership. How is 2:35 p.m. expressed in military time?_____.

2. It took 10 hours to produce a cookie. If John started at 7:00 a.m., what time did he finish the process? Write the time he started and the completion time in military time. Start time:_____; Completion time: _____.

3. Jack is interviewing six people for jobs in the bakery. He intends to spend one hour with each person. Jack does not know military time. Help Jack by changing the military time to conventional time.

0900 hours _____

1100 hours _____

1400 hours _____

1800 hours _____

1900 hours _____

2100 hours _____

Activity 6- Using flash cards to learn military time

Objective (s): This activity will enable participants

1. To practice the use of military time
2. To Translate conventional time into military time

Materials Used: Pencils, Paper, Military Time Flash Cards

Directions

Ask your facilitator for a set of flash cards. Take one card from the stack and look at each side. Please note that one side has the conventional time and the other side has the military time. Use the flash cards to challenge yourself. You will need a blank sheet of paper to write your answers. Now, take another card from the stack. Look at the conventional side of the card. Do not look at the nswer on the military side. Write your answers on your sheet of paper. Continue this process until you have selected at least 20 cards. Then check your answers.

Activity 7 - Recording Military Time

Objective (s): This activity will enable participants

1. To record military time
2. Translate conventional time into military time
3. Practice using military time to complete work tasks

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Read the paragraph and write in the military time for the conventional time. Write the translation in the parenthesis provided. Do not use your military reference sheet.

John is a worker in the Mixing Department. On Tuesday, he reports to that department at 5:00 a.m. (_____**hours**). However, he was late and he clocked in at 5:30 a.m. (_____**hours**).

After talking to his supervisor for one half-hour. He actually started work at 6:00 a.m. (_____**hours**). His task for the day was to mix dough for Vanilla Wafers. He takes one-hour to mix the dough. It is now 7:00 a.m. (_____**hours**). According to his procedures, the dough must stand for six hours before it is dumped. The dough will be dumped at 1:00 p.m. (_____**hours**).

John Miller clocks out at that time. Therefore, Mary will dump the dough. Mary dumped the dough on time. Then she went to on break at 2:30 p.m. (_____**hours**). She returned at 2:45 p.m. (_____**hours**).

Mary took her lunch break at 4:30 p.m. (_____**hours**). She returned at 5:30 p.m. (_____**hours**). At 8:30 p.m., _____**hours**) Mary's day came to an end. She clocked out. It took her 20 minutes to get home. She arrived at home at 8:50 p.m. (_____**hours**).

On Wednesday, Mary will work the third shift. She must report to work at 11:00 p.m. (_____**hours**). John will work the second shift. He reports to work at 3:00 p.m. (_____**hours**). He intends to be on time. So, he leaves home one hour early. John will leave home at 2:00 p.m. (_____hours).

ANSWER SHEET

Exercise 2: Military Time Worksheet (Answers in bold print)

	Conventional Time		Military Time
AM	12:00	midnight	2400 hours
	12:01	1-minute past midnight	0001 hours
	12:10	10 minutes past midnight	0010 hours
	1:00	1-O'clock in the morning	0100 hours
	2:00	2-O'clock in the morning	0200 hours
	2:30	2:30 in the morning	0230 hours
	3:00	3-O'clock in the morning	0300 hours
	4:00	4-O'clock in the morning	0400 hours
	5:00	5-O'clock in the morning	0500 hours
	6:00	6-O'clock in the morning	0600 hours
	7:00	7-O'clock in the morning	0700 hours
	8:00	8-O'clock in the morning	0800 hours
	9:00	9-O'clock in the morning	0900 hours
	10:00	10-O'clock in the morning	1000 hours
	11:00	11-O'clock in the morning	1100 hours
PM	12:00	noon, midday	1200 hours
	12:18	18-minutes past noon	1218 hours
	12:45	45-minutes past 12 noon	1245 hours
	1:00	1-O'clock in the afternoon	1300 hours
	1:05	5-minutes after 1 p.m.	1305 hours
	2:00	2-O'clock in the afternoon	1400 hours
	3:00	3-O'clock in the afternoon	1500 hours
	4:00	4-O'clock in the afternoon	1600 hours
	5:00	5-O'clock in the afternoon	1700 hours
	6:00	6-O'clock in the afternoon	1800 hours
	7:00	7-O'clock in the evening	1900 hours
	18:00	8-O'clock in the evening	2000 hours
	9:00	9-O'clock in the evening	2100 hours
	10:00	10-O'clock in the evening	2200 hours
	11:00	11-O'clock in the evening	2300 hours
	11:03	3-minutes past 11 at night	2303 hours
	11:22	22-minutes past 11 at night	2322 hours
	11:47	47 minutes past 11 at night	2347 hours

Activity 3a. 2400 hours, 0001 hours, 0010 hours, 0100 hours, 0230 hours, 1100 hours.

Activity 3b. 1200 hours, 1210 hours, 1300 hours, 1400 hours, 1617 hours, 2300 hours

Activity 4. First Shift: 0730 hours, 0930 hours, 1100 hours, 1300 hours, 1430 hours. Second Shift: 1530 hours, 1730 hours, 1930 hours, 2100 hours, 2230 hours. Third Shift: 2330 hours, 0130 hours, 0330 hours, 0530 hours, 0630 hours.

Activity 5. 1. 1435 hours 2. started at 0700 hours (7:00 a.m.), finished at 1700 hours (5:00 p.m.). 3. 9:00 a.m., 11:00 a.m., 2:00 p.m., 6:00 p.m. 7:00 p.m.,9:00 p.m.

Activity 6. Flash Cards. See answers on back of flash cards.

Activity 7. 0500 hours, 0530 hours, 0600 hours, 0700 hours, 1300 hours, 1430 hours, 1445 hours, 1630 hours, 1730 hours, 2030 hours, 2050 hours, 2300 hours, 1500 hours, and 1400 hours.

Graph Comprehension

To the Facilitator:

The curriculum is color coded to indicate levels of difficulty. Yellow represents Minimum Level, blue represents Moderate Level, and Pink represents Maximum Level.

These levels correlate to the benchmarks established by employees and the results of the assessment process validated for selected jobs at the Nabisco Richmond Facility.

YELLOW

Graph Comprehension

Activity 1 - Understanding the Purpose and Use of Graphs

Objective (s): Participants will be able to

1. Become familiar with the purpose of graphs
2. Become familiar with the different types of graphs

Material Needed: Pencil

You Need to Know:

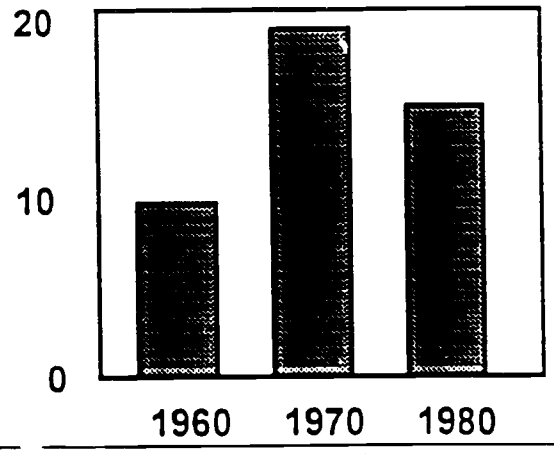
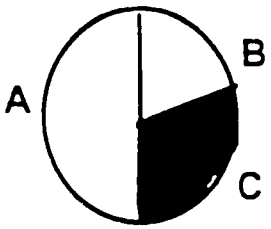
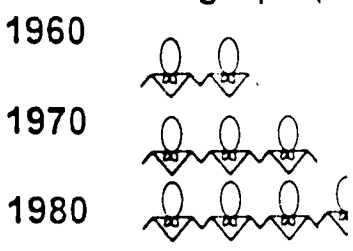
As we go about our everyday activities, we find it necessary to read charts, tables, and other graphic displays to gain information. For example, at the grocery store, we read nutrition facts tables on the back of cereal boxes. Likewise, at the Nabisco Facility employees read control charts, time charts, dials, gauges, thermometers and etc.

Photographs, drawings, cartoons, graphs, charts, diagrams, tables, and maps appear in all kinds of materials today. All of the visual aids mentioned above help us to understand and receive information. Graphs are used to show how number values relate. They are used in business reports, magazines, and even on television during the weather report. **Therefore, graphs are visual representations of information that show comparisons and relationships**.

The purpose of graphs is to clarify concepts that are presented about numerical data. Most people can understand information better when it is presented graphically. Modern textbooks and employee training manuals include graphic displays. Written text often appears to be more interesting to read when graphics are included.

Directions:
Turn to the next page. Read about the different types of graphs and their purpose.

Activity 1 - Understanding the Purpose of Graphs

Types of Graphs	Description & Purpose
Line 	Shows precise relationship between two sets of data. Each point (data point or dot) on the line graph represents the two items in relation to each other. This is the most accurate type of graph. It shows how a trend may be taking place. For example, the fluctuation of bag weights of Oreo cookies over a period of time.
Bar 	A bar graph allows you to show comparisons of values taken at different times or representing different age groups, sexes, product attributes, etc. The bars may be vertical (up and down) or horizontal (side to side). The bars may also be subdivided into parts of a whole or into percentages.
Pie (Circle) 	A pie graph is most commonly known as a circle graph or pie chart. It shows how various parts relate to a whole (100%) and shows percentages. One part of the circle graph is called a slice.
Pictograph (Pictogram) 	Often called a picture graph, a pictogram is the easiest to read, but is difficult to draw. It shows approximate comparisons as bar graphs do, but uses representational figures such as cars, people, or other items being compared.

Activity 2 - Identifying different types of Graphs

Objective(s): Participants will be able to

1. Identify different types of graphs

Materials Needed: Pencil

You Need to Know:

There are many types of graphs used in manufacturing industry. The majority of graphs fall into one of four types: line, bar, pie (circle) or pictograph. Each type of graph has certain advantages. For example, a circle graph is used to show how various items are part of a whole (percentage of 100%). However, a line graph is used to show a trend of the price of sugar. The type of graph used to display information depends on the type and quantity of data that is being presented.

Directions: In the previous activity you learned about four kinds of graphs. First, think of where you may have seen a particular type of graph in the bakery. Then think of where else you may have seen such a graph. Fill in the blank with the department or location.

I have seen examples of line graphs in the_____department.
I have seen examples of line graphs _____.

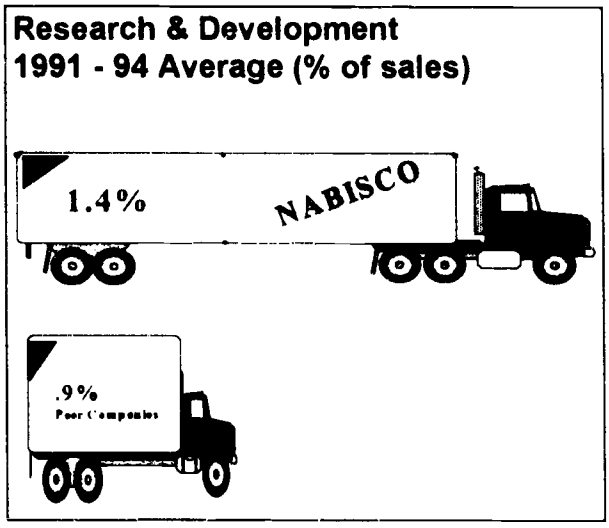
I have seen examples of bar graphs in the _____ _____department.
I have seen examples of bar graphs _____.

I have seen examples of pie charts in the_____department.
I have seen examples of pie charts _____.

I have seen examples of pictographs in the_____department.
I have seen examples of pictographs _____.

Activity 2 - Identifying different types of Graphs, Continued

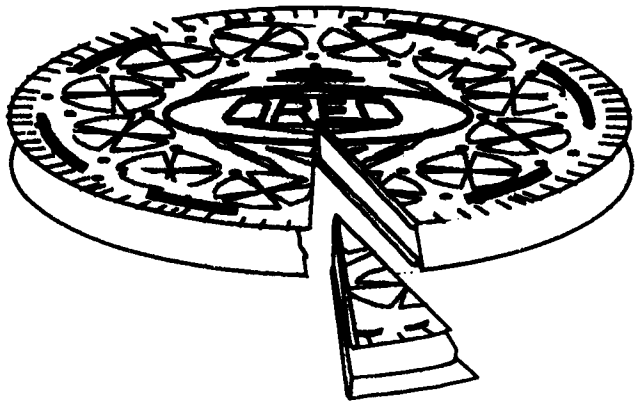
Directions:
Review the different types of graphs or visual displays below and on the following pages. In the blank spaces provided, identify the type of graph. If you need help, refer back to the first activity.



A.

Rate of OREO Production (In LBS.)

180,633 lbs. per day

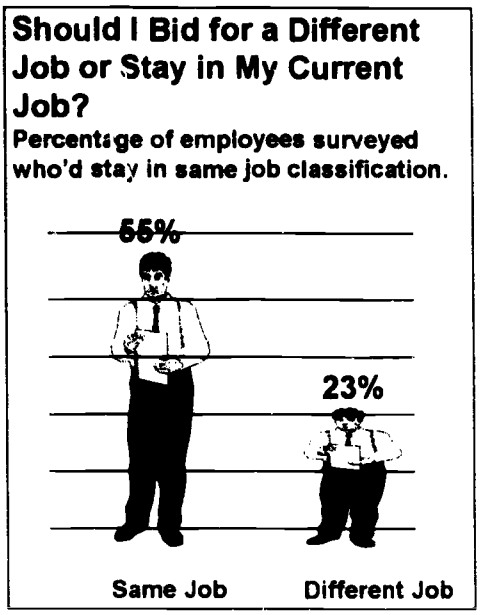


127 lbs. per minute

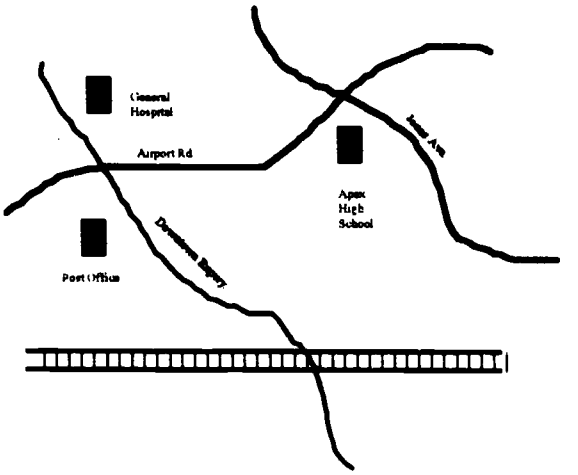
B.

	PHONE COSTS - ☎ = $10,000
1994	☎ ☎ ☎ ☎ ☎ ☎ ☎
1993	☎ ☎ ☎ ☎ ☎
1992	☎ ☎ ☎ ☎
1991	☎ ☎ ☎ ☎

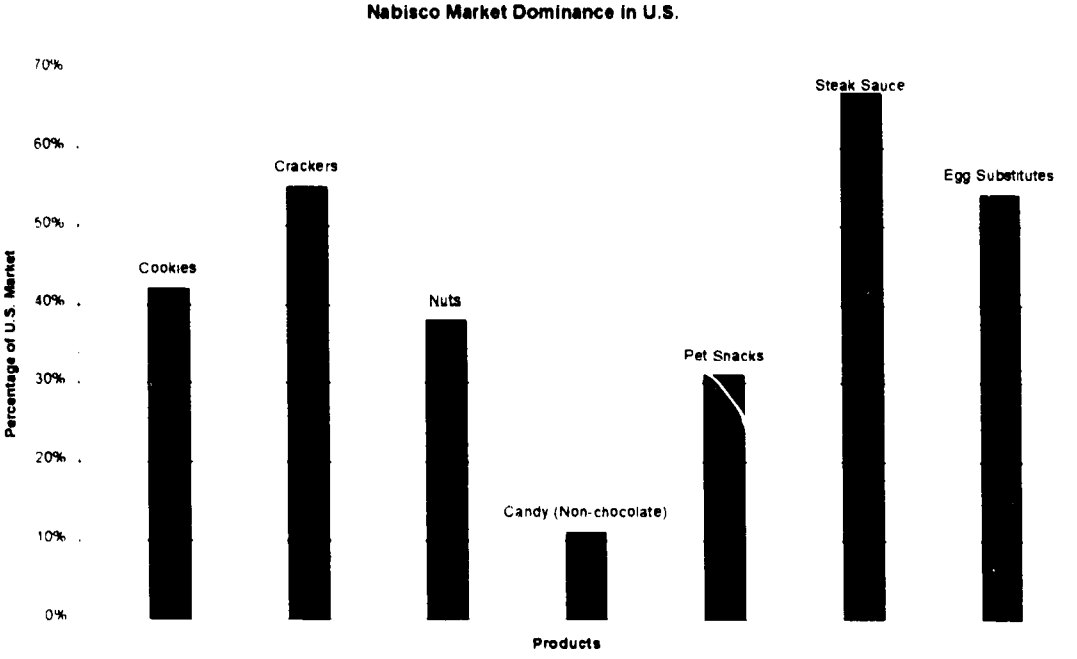
C.


Should I Bid for a Different Job or Stay in My Current Job?
Percentage of employees surveyed who'd stay in same job classification.
55%
23%
Same Job
Different Job

D. _____


Airport Rd
Apex High School
Post Office

E. _____

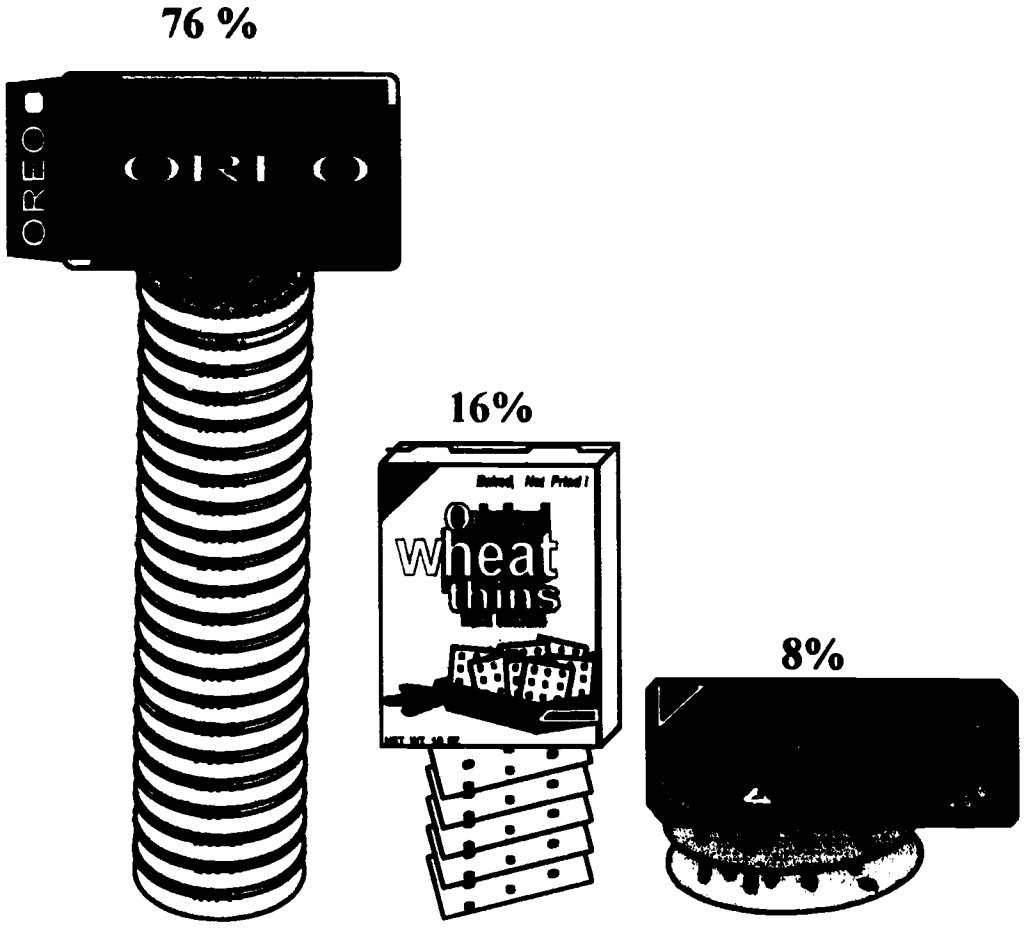

Nabisco Market Dominance in U.S.
70%
60%
50%
40%
30%
20%
10%
0%
Percentage of U.S. Market
Cookies
Crackers
Nuts
Candy (Non-chocolate)
Pet Snacks
Steak Sauce
Egg Substitutes
Products

F. _____

NABISCO INTERNATIONAL SALES

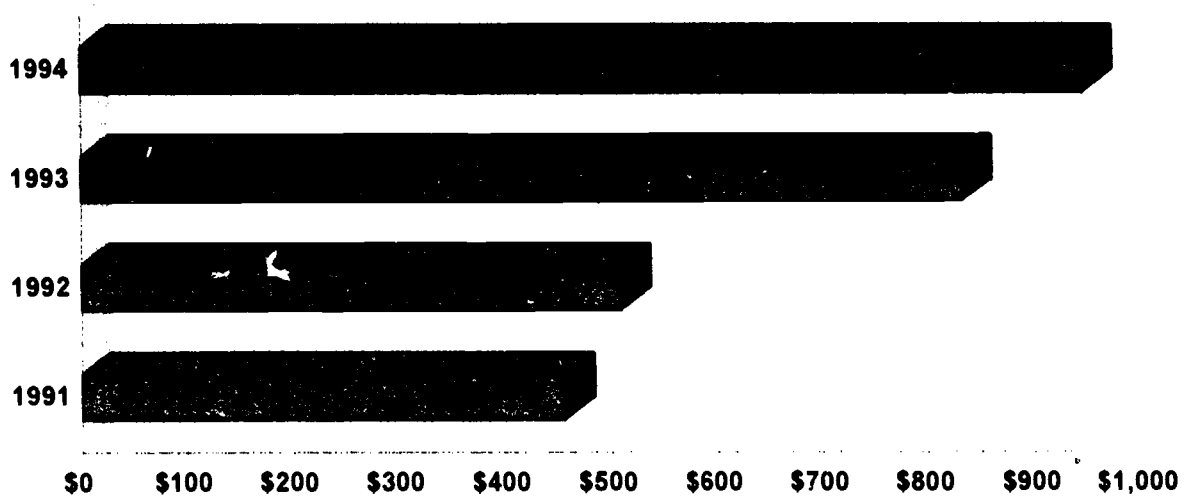
G. _____

A group of 25 Richmond, VA third graders compared their favorite Nabisco products. Their data are graphed below.



H. _____

Nabisco New Product Sales in the U.S.
(in millions)



I. _____

Activity 3 - Learning to Read Graphs

Objective(s): Participants will be able to

1. Become familiar with general tips for reading graphs

Materials Needed: Pencil

<u>You Need to Know:</u>

Tips for reading graphs

1. Notice the title and type of graph you're reading. The title will tell you the purpose and main idea.

2. Notice the arrangement of the data (numerical values). Read the vertical and horizontal column headings to get an understanding of what is being compared. For example, a graph may compare the amount of salt used in the Ritz cracker with the Sociables.

3. Notice the scale. What are the increments (number of spaces) of increase or decrease? Be aware of any fluctuation of the data. Look at the pattern of the data points.

4. Read the key (same as legend). It tells you the meaning of the symbols. Color coding and surface patterns are important. For example, look at heavy shading, dots, crossed lines etc.

5. Notice the symbols being used. This is particularly important with pictographs. Some symbols are decorative or may be very meaningful. That's why it is so important to check the key.

6. Read any text around the graph. Relate the graph to any written text. Do some critical thinking. Draw conclusions based on the data presented only. Ask yourself, what comparisons are being made?

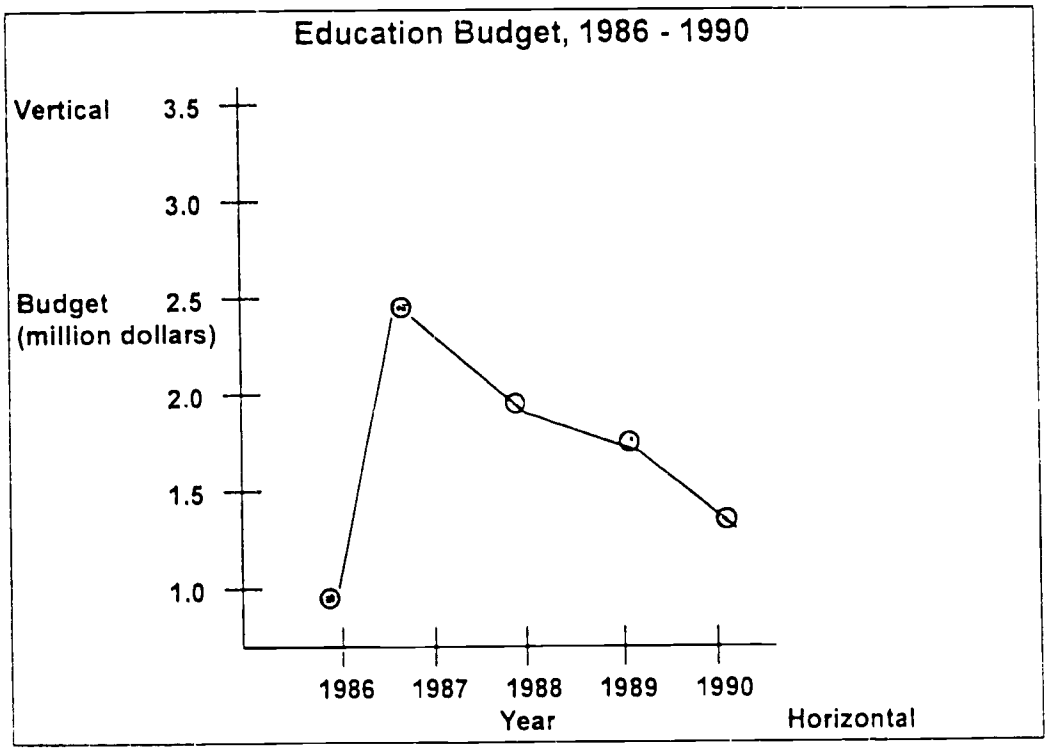
Activity 4 - Reading and Understanding Line Graphs

Objective(s): Participants will be able to

1. Read graphs using tips identified in the previous activity.
2. Practice reading line graphs.

You Need to Know:

Line graphs are easy to read. They present precise values. Line graphs have reference lines called axis. **The horizontal (side to side) line is called the x-axis. The vertical (up and down) line is called the y-axis.** Look at the graph below.



The horizontal axis that goes from left to right usually shows the units of time. The units may be hours or days, months, etc. Each mark on the scale stands for one unit of time. The vertical axis (up and down) shows the amount that is being measured. The amount may be dollars, pounds, or another kind of unit. Each rnark stands for one unit.

The graph shows education budget for the years 1986 through 1990. Look at the horizontal axis (x-axis). What unit does each mark represent?

Each mark on the time axis represent one year. Each mark on the dollar axis represent a certain money amount: one-tenth of $1 million ($100,000).

To read the amount, you read the mark on the dollar axis that's directly across from the point. Then you read the mark on the time axis that is directly beneath the point.

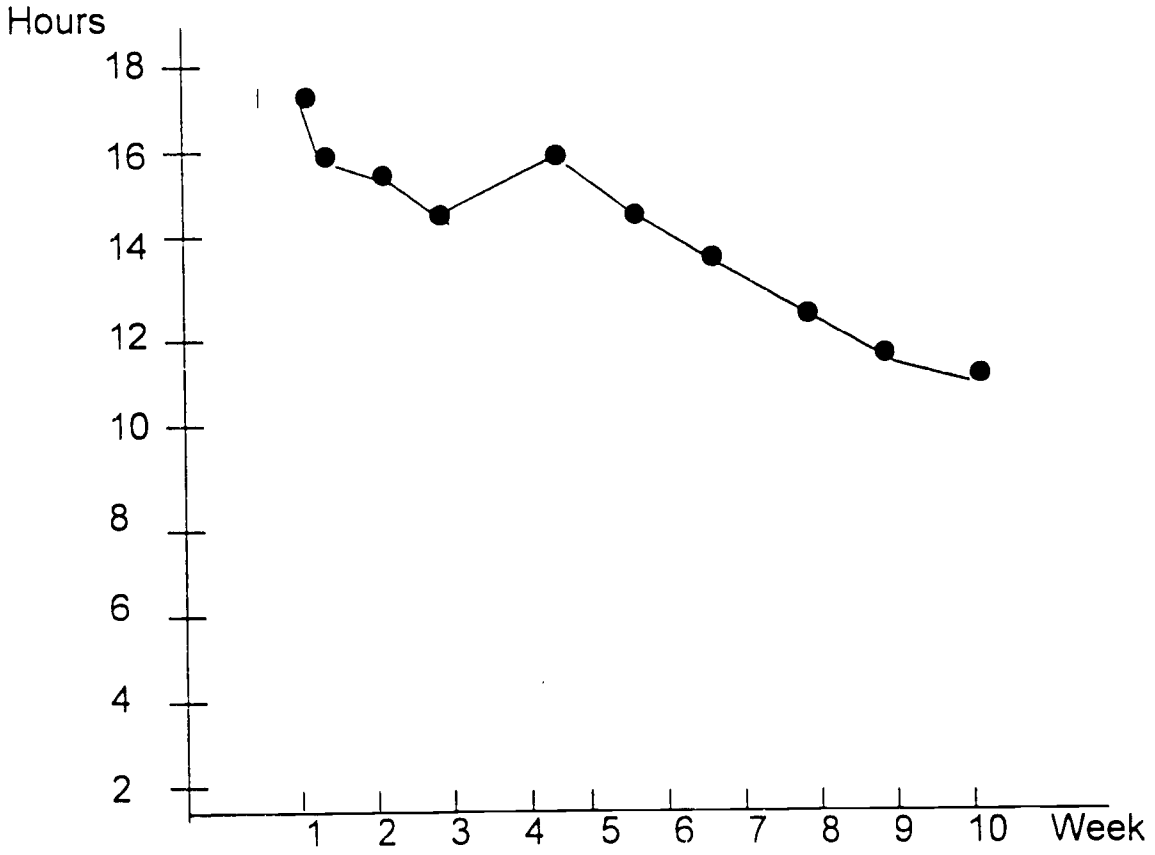
Look at the point that is farthest to the left. What amount does it represent?

You would read the amount as $1.0 million in 1986.

Activity 4 - Understanding and Reading Line Graphs

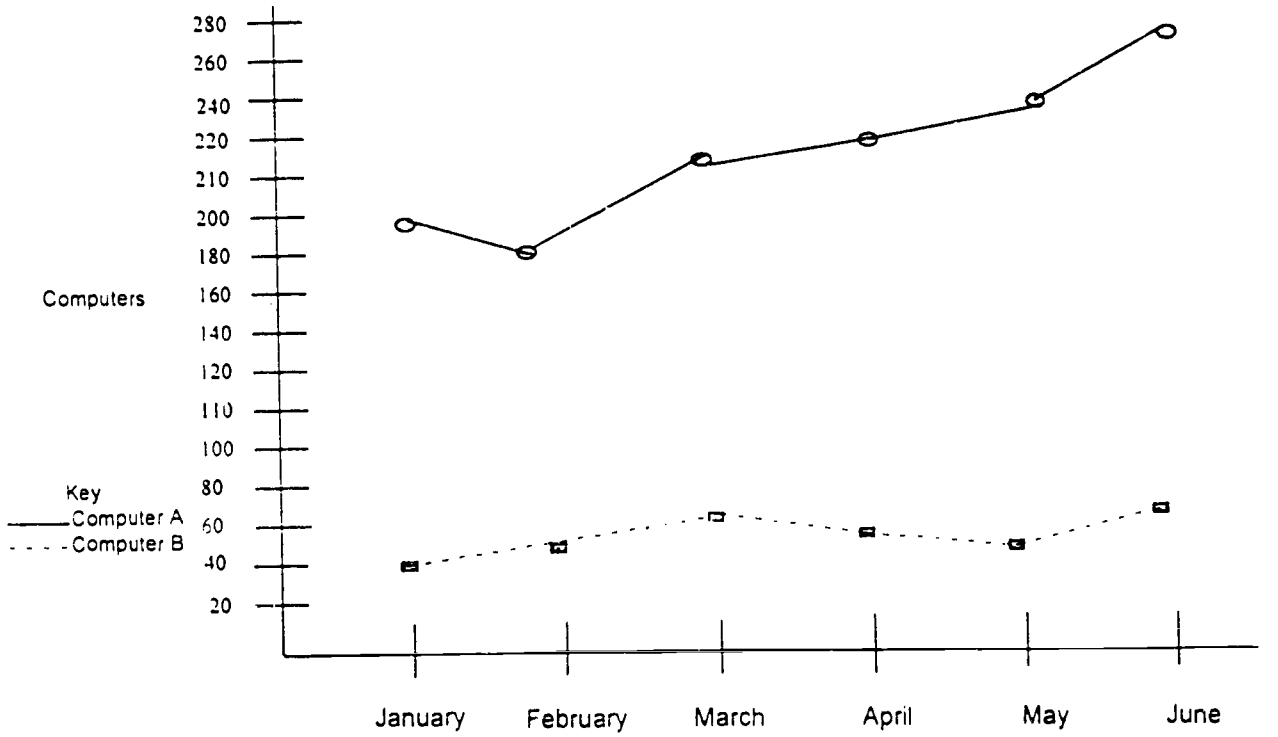
Line graphs can also be used to show how something has changed over a period of time. Data points (dots) are used to represent trends or relationships. Look at the example of the amount of down time recorded each week because of computer failure.

Computer Failure - Down Time



Sometimes a graph is used to show two or more different trends. These line graphs allow you to compare the changes in the trends during the same time period. A computer store may want to see how many of the two different brands of computers sold from January to June. Turn to the example on the next page.

Sales of Computers A and B, January - June



Look at the line graph. How do you know which line stands for computer A?_____.

The tips you learned in previous activities helped you understand that you should always notice the key (legend). Sometimes, a line may be identified by a label (word). Now identify the two lines above by writing ***Computer A*** or ***Computer B*** beside the right line on the graph.

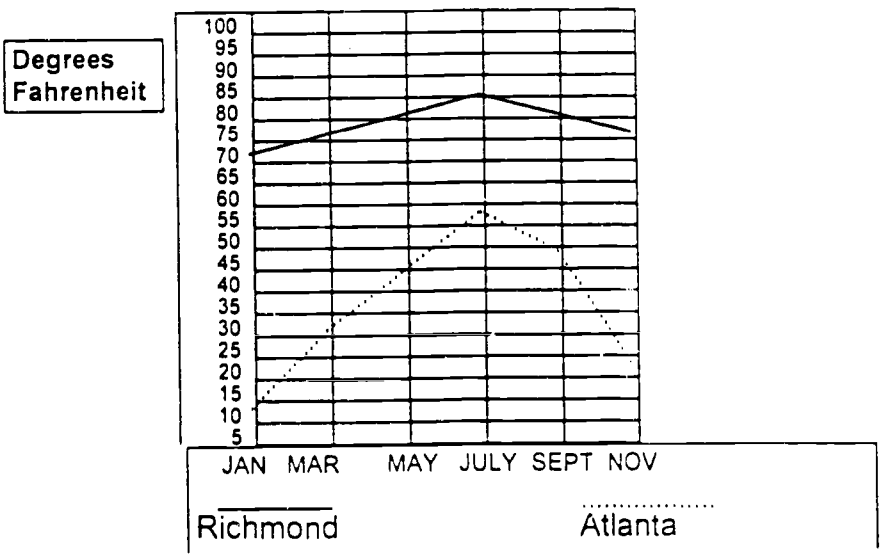
Activity 5 - Reading and Understanding Line Graphs

Objective(s): Participants will be able to

1. Read graphs using the tips identified in the previous activity.
2. Practice reading line graphs.

Directions:
Nabisco's bake shop employees are usually concerned about the weather because temperatures affect the baking process. Read the graph, and answer the questions.

Monthly Normal Temperatures



1. Which line represents Richmond?_____

2. How were you able to determine which line represented Richmond?_____

Activity 5 - Reading and Understanding Line Graphs, Continued

3. Which city, Richmond or Atlanta, has the greatest range of temperatures during the year?_____

4. During which month is there the least amount of difference between the temperatures of the two cities?_____

5. During January, how much warmer is Richmond's average temperature than Atlanta? _____

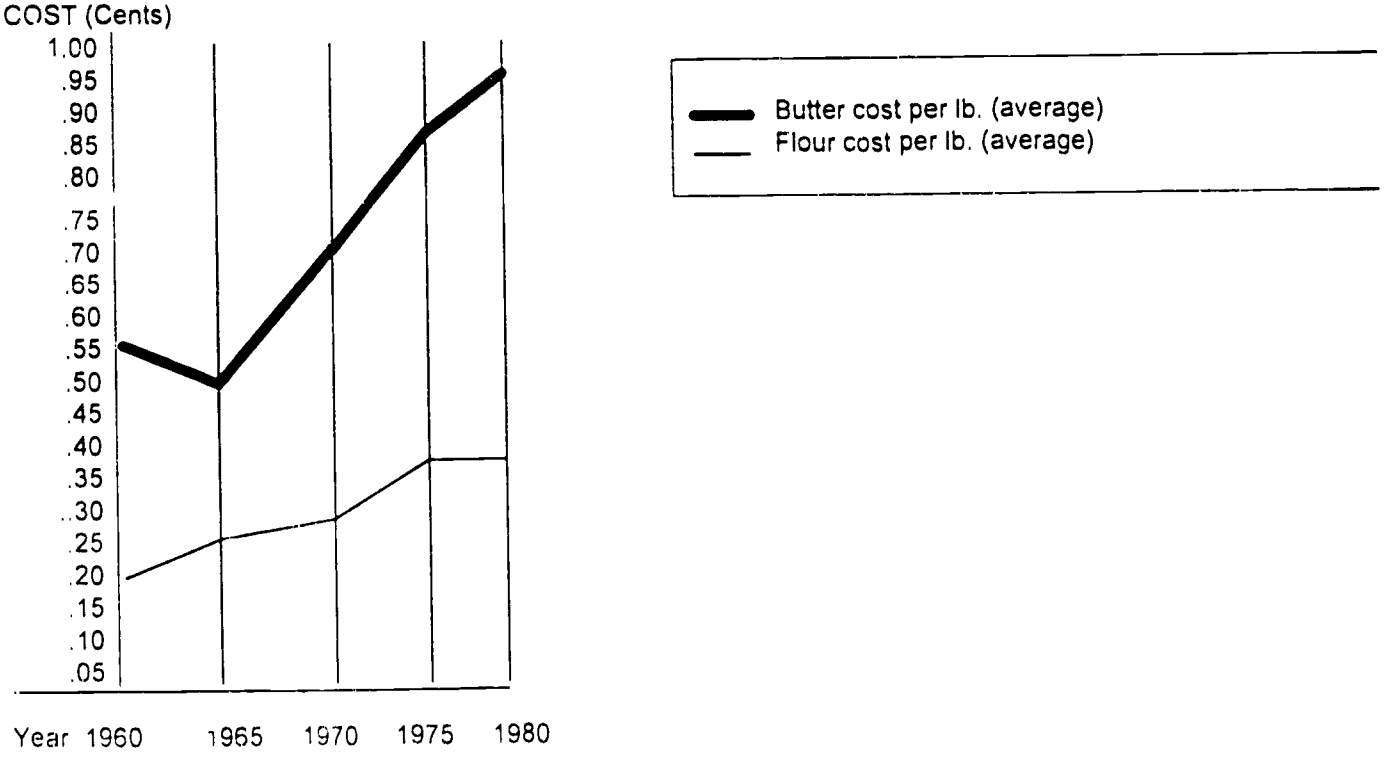
6. What relationship or comparison is being made here? *(Write your answer using a complete sentence.)* _____

_____

_____

Directions: Read the line graph below. Answer the questions.

Price Trends for Butter and Flour



1 How much did a pound of flour cost in 1960?_____

Activity 5 - Reading and Understanding Line Graphs, Continued

3. How much did a pound of butter cost in 1960?_____

4. Between which two years did the price of butter fall?
_____

5. How much more did a pound of flour cost in 1980 than in 1960?
_____

6. In 1980, how much more did a pound of butter cost than a pound of flour?_____

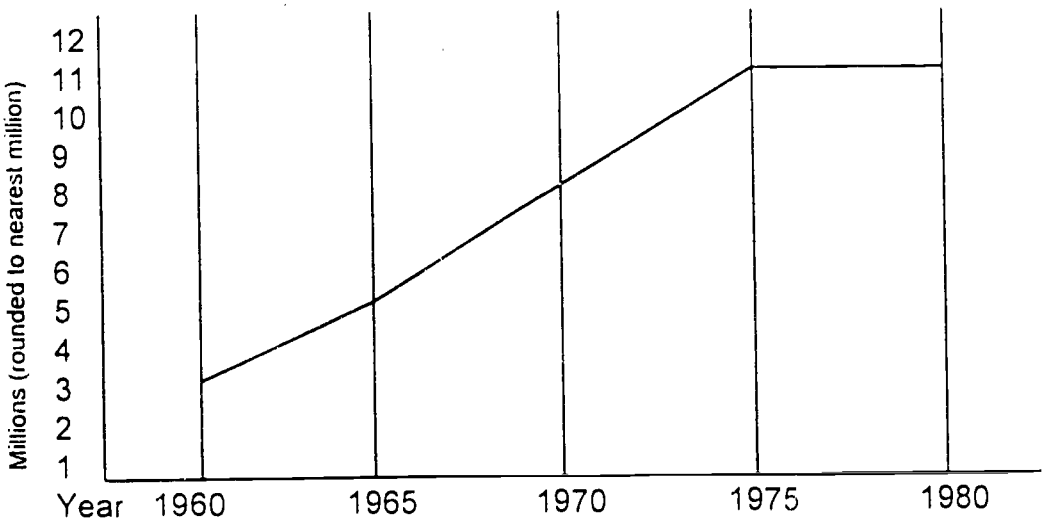
Activity 6 - Reading and Understanding Line Graphs

Objective(s): Participants will be able to

1. Practice reading line graphs.

Directions:
Read the line graphs below. Answer the questions.

Total Number of Crackers Purchased By Year



1, Does the graph show exact numbers or approximate numbers?

_____

2. About how many crackers were purchased in 1970?

_____

3. Between which years did the number of purchases level off?

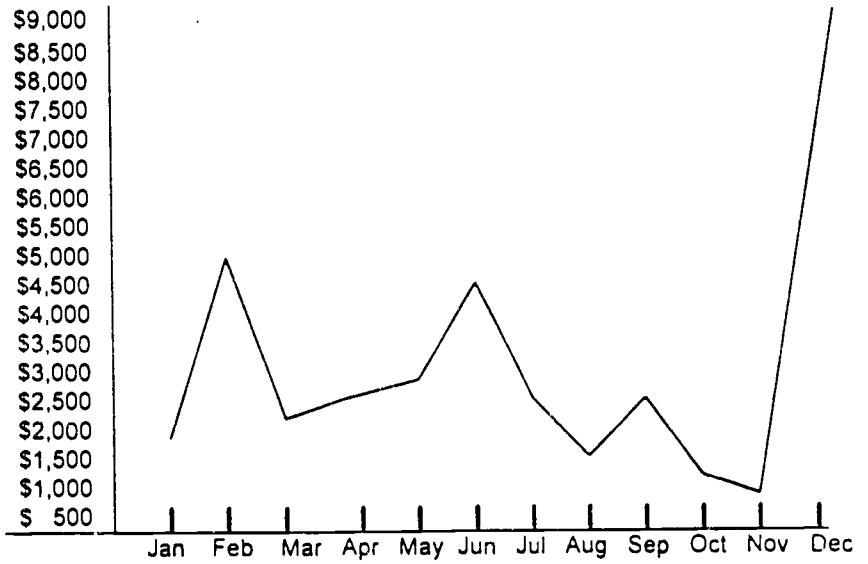
_____

4. About how many more purchases were made in 1970 than in 1960?

_____

Activity 6 - Reading and Understanding Line Graphs, Continued

1990 Monthly Sales of Animal Cookies



1. What is the subject of the line graph (write a complete sentence)?
   _____

2. What is the main point?_____

3. In what month did the store make the fewest sales?_____

4. In what month did the store make the greatest sales?_____

5. What interesting conclusion can you draw about the great rise in animal cookies sales in December?_____
   _____

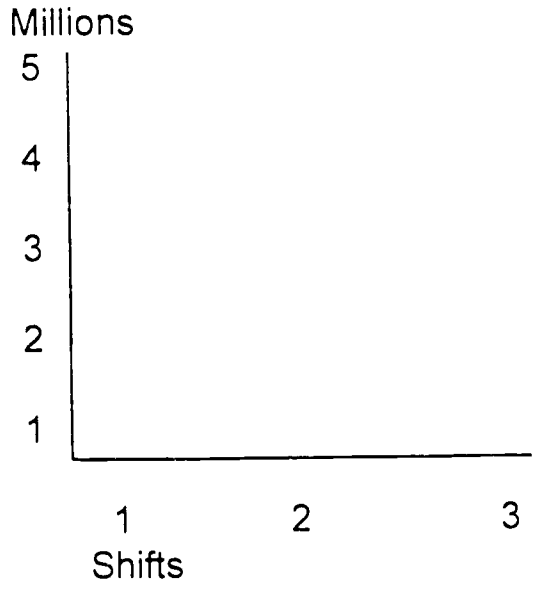
Activity 7 - Understanding Line Graphs in the Workplace

Objective(s): Participants will be able to

1. Read graphs using tips identified in the previous activity.
2. Practice reading line graphs.

Directions:
Read the line graph below. Answer the questions.

Premium Crackers Produced Per Shift



1. What is the unit of the y-axis?_____

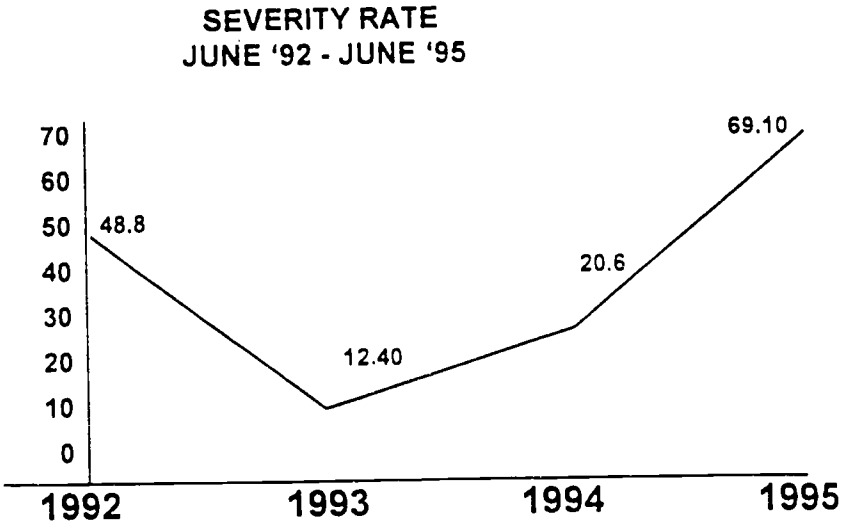
2. Plot the data points for each shift. The first one has been done for you (*Shift 1* - 1.0 million). *Shift 2* - 2.5 million; *Shift 3* - 4 million Now draw a line connecting the data points.

2. At what point were the fewest crackers produced?
_____

3. What conclusion can be drawn from the graph about the production of crackers?_____.

Activity - 7 Understanding Line Graphs in the Workplace, Continued

Directions: The line graph below depicts the severity of accidents that have occured at a factory from June '92 through June '95. Read the line graph below. Answer the questions.



1. Based on the data how would you summarize the accident severity rate over the time period indicated?_____

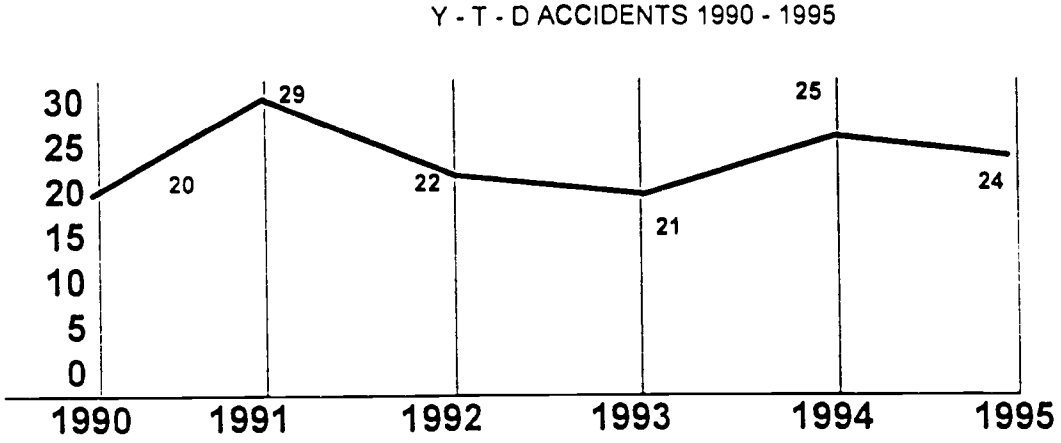
2. This line graph depicts the accident severity rate over what time period?_____
_____

3. Compare the serverity rate of 1992 to 1995. Is it increasing or decreasing?_____

4. What is the difference in the severity rate for 1995 and 1993?
_____

Activity - 7 Understanding Line Graphs in the Workplace, Continued

Directions: The line graph below depicts the number of accidents that have occured at a company from 1990 and 1995. Read the line graph below. Answer the questions.



1. In what year was the highest number of accidents recorded?
   _____

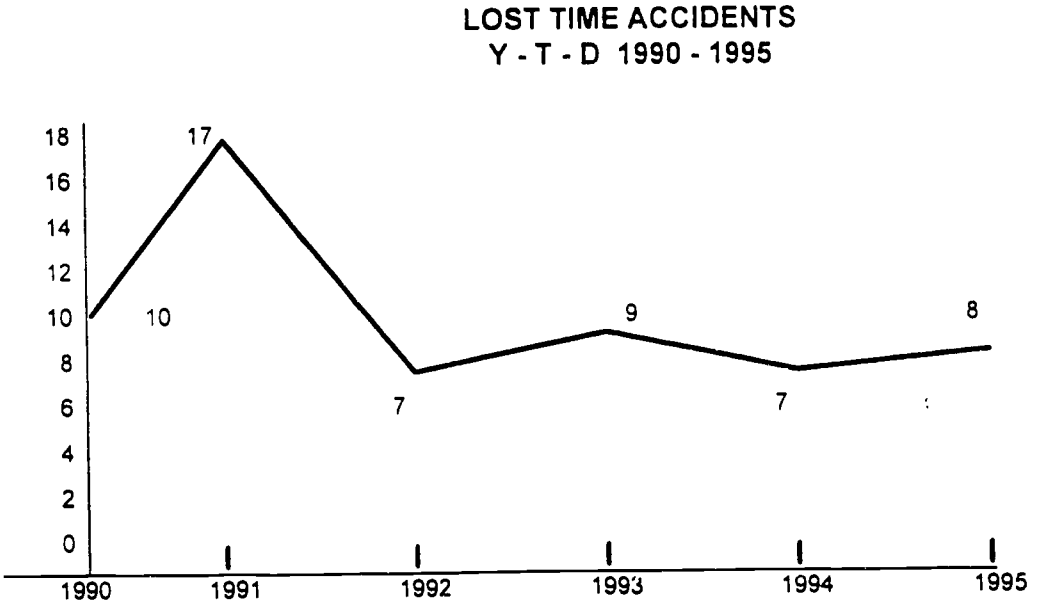
2. In what year was the lowest number of accidents recorded?
   _____

3. Between which years did the accident rate seem to almost level off?_____

4. What is the difference in number of accidents between 1992 and 1993, and 1994 and 1995? _____

Activity - 7 Understanding Line Graphs in the Workplace, Continued

Directions: The line graph below depicts the amount of time lost due to accidents at a factory from 1990 and 1995. Read the line graph below. Answer the questions.



1. What year was recorded as having the largest amount of time lost due to accidents?_____

2. What years were recorded as having the smallest amount of time lost due to accidents?

   _____

3. What conclusion can be drawn regarding the amount of lost time in 1991 and 1994?_____

   _____

Activity - 8 Creating a Line Graph

Objective(s): Participants will be able to

1. Practice creating a line graph.

Materials Needed: Pencil, graph paper

Directions:
Use graph paper to create a line graph. Study the data presented below to determine what should be represented. Give the graph a title. You may refer back to the graphs in the previous activities.

Number of Oreos produced per day
1 million
1.5 million
2 million
2.5 million
3 million
3.5 million
4 million

5 days of production
Monday through Friday

Activity 9 - Reading and Understanding Bar Graphs

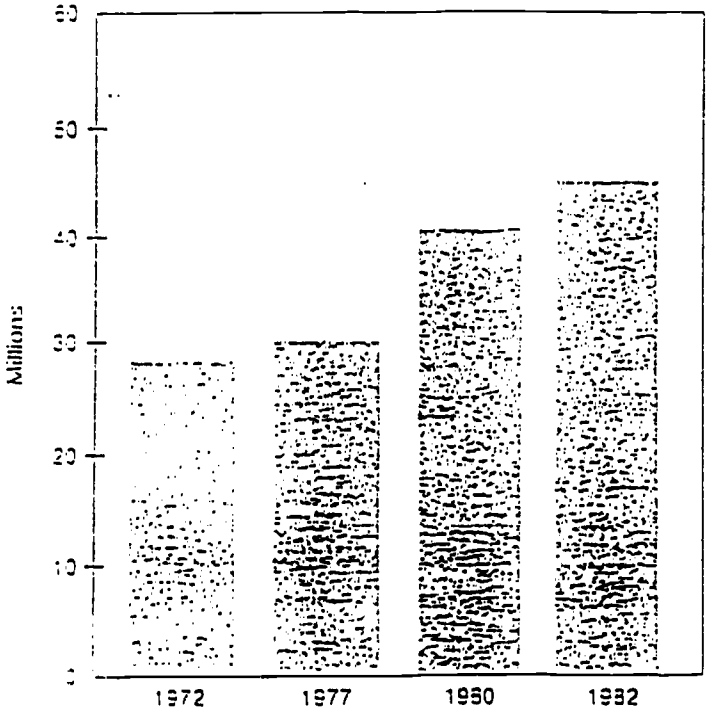
Objective(s): Participants will be able to

1. Practice reading bar graphs.

You Need to Know:
The same tips you used to read line graphs can be applied when reading bar graphs. If you need to review the tips, refer back to activities three and four.

Directions: Read the bar graph below. Answer the questions.

Employee Recreational Activities Attendance



1 This graph provides information for how many years?_____

2 Is the participation in recreational activities increasing or decreasing?_____

3 About how many more people participated in recreational activities in 1980 than in 1977?_____

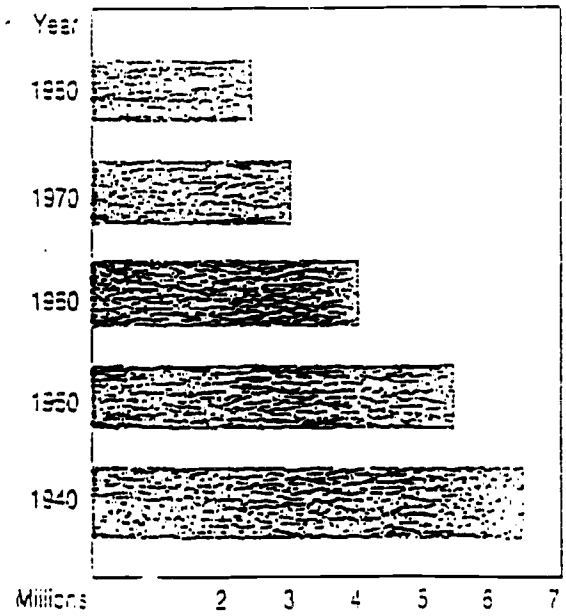
Activity 10 - Reading and Understanding Bar Graphs

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph below. Answer the questions.

Number of Manufacturing Plants in the United States



1. Is this a vertical or horizontal bar graph?_____

2. About how many plants were there in the United States in 1960?

_____

3. About how many more plants were there in 1940 than in 1980?

_____

4. Based on the trend shown in the chart, would you expect there to be more or fewer plants by the year 1985? _____

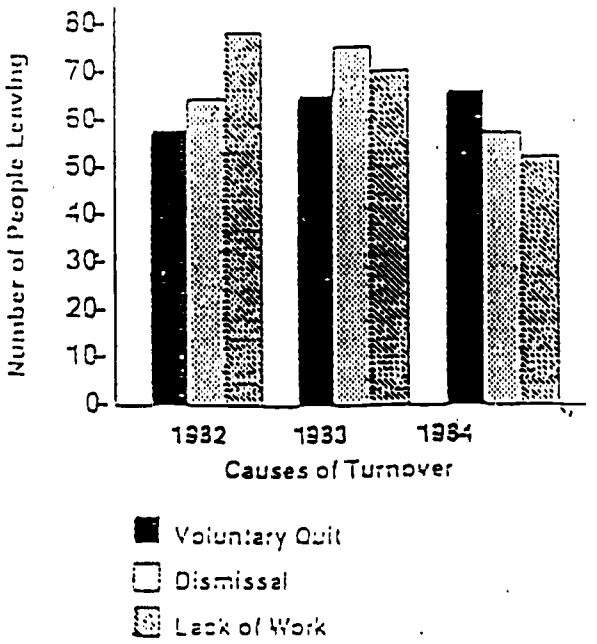
Activity 11 - Reading and Understanding Bar Graphs

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph below. Answer the questions pertaining to it below. Circle true or false or write the answer in the blank.

Causes of Turnover at Company XYZ



1. Based on the data shown, in 1984 were there more dismissals than voluntary quits? T F

2. There were more dismissals in 1983 than in any other year? T F

3 Which year represented the least about of voluntary quits?_____

4 What are the increments of increase on the y-axis?_____

5 What does the y-axis data represent?_____

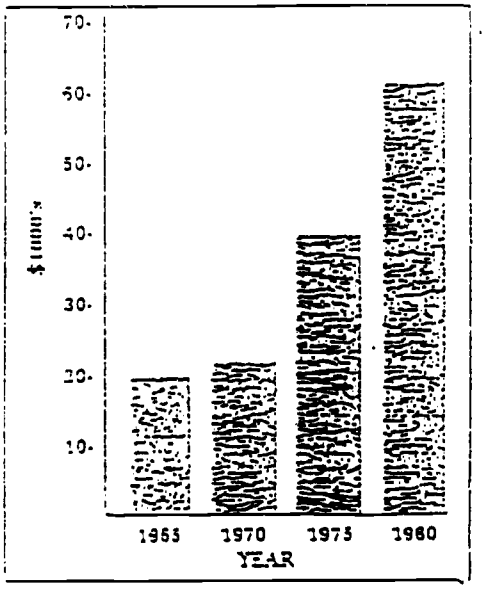
Activity 12 - Reading and Understanding Bar Graphs

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph below. Answer the questions pertaining to it below.

Average Price of Roller Belts



1. Does this graph show exact numbers or approximate numbers?_____

2. What was the average price of a roller belt in 1965?

_____

3. Between which years shown on the graph did the price of a the roller belt increase the least amount?_____

4. About how much more did a roller belt cost in 1980 than in 1970?

_____

5. Based on the graph, would you expect the price of roller belts to rise in the future?_____

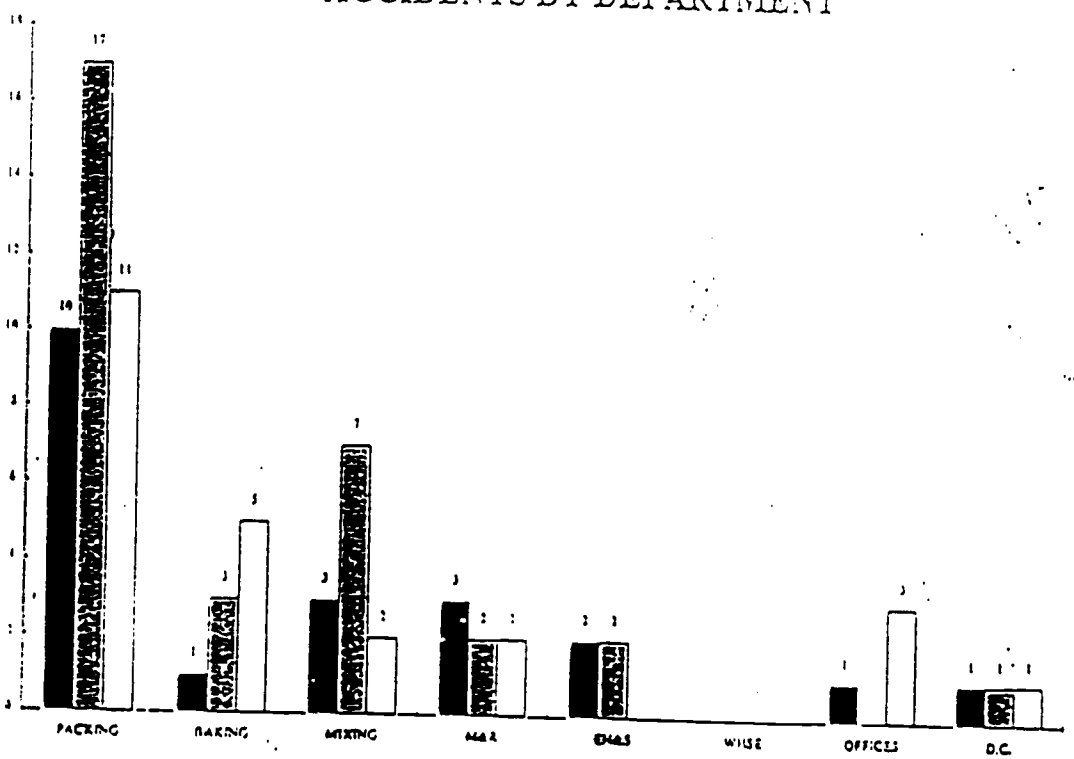
Activity 13 - Reading and Understanding Bar Graphs in the Workplace

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph. Answer the questions.

ACCIDENTS BY DEPARTMENT



1. Which department had the lowest number of accidents in 1993?_____

2. Which department had the lowest number of accidents in 1994?_____

3. Which department recorded the most accidents over the three year period?_____

Activity 14 - Creating a Bar Graph

Objective(s): Participants will be able to

1. Practice creating a bar graph.

Materials Needed: Pencil, graph paper

You Need to Know:

Before attempting to create a bar graph, study the problem or question to determine what information is given for the values.

Determine the type of units should be shov : on the x-axis. Do the same for the y-axis. If you need help, turn back to previous activities.

Directions:

Use graph paper to create a bar graph. Study the data presented below to determine what should be represented. Give the graph a title.

Number of students attending REACH from M&R, Packing, Mixing

Department	*Number of Students*
M&R	5
Packing	15
Mixing	3

Activity 15 - Reading and Understanding Pie Graphs (Charts)

Objective(s): Participants will be able to

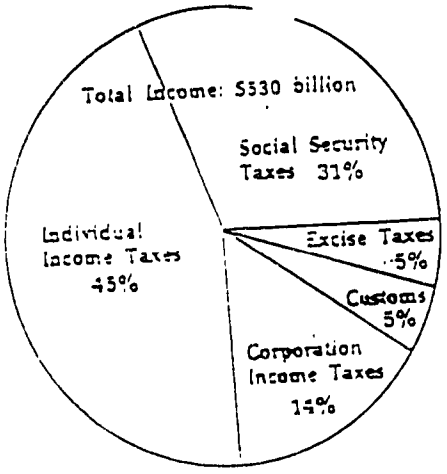
1. Practice reading pie graphs.

You Need to Know

Circle graphs show an entire quantity divided into various parts. Each part of the circle is called a segment or slice. Each segment has its own name and value. In most cases, values of circles graphs are parts of a dollar or percent of a whole (100%). They are usually used to show budget percentages. For example, the sources of each dollar that in the federal government budget.

Directions: Read the pie charts below. Answer the questions.

Government Spending



1. What is being presented in this graphic?_____

2. The federal government received about 76% of its money from two sources. What are the two sources?_____

_____

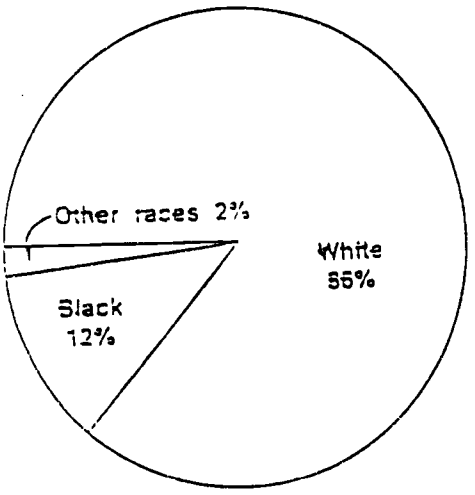
3. What percent of the government's income came from customs and excise taxes combined? _____

Activity 15 - Reading and Understanding Pie Graphs (Charts), Continued

4. About how much money did the government's receive from customs and excise taxes combined?_____

5. What is being compared or the relationships of the numbers in this graphic?_____

Population of Maine
Total Population: 6 Million



1. What is the total population of Maine?_____

2. What percent of Maine's population is white?_____

3. What percent of non-whites live in Maine? _____

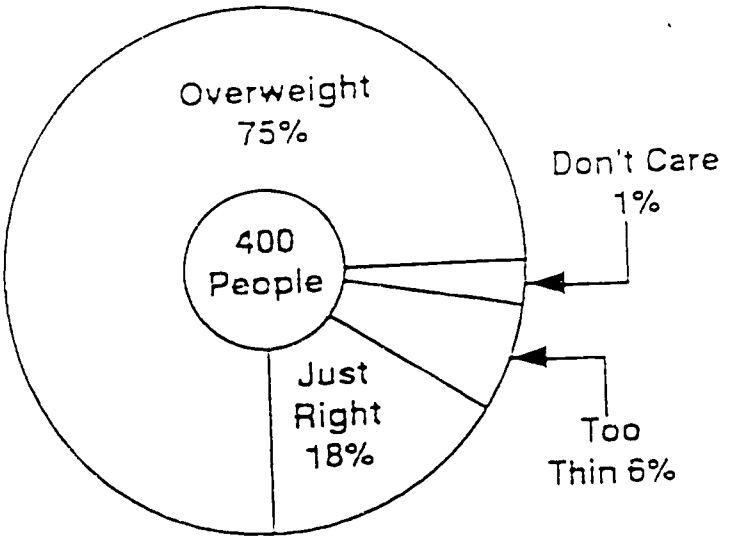
Activity 16 - Reading and Understanding Pie Graphs

Objective(s): Participants will be able to

1. Practice reading pie graphs.

Directions: Read the pie chart below. Answer the questions.

Survey of Feelings About Weight



1. How many categories of feelings are presented in the chart?_____

2. What percentage of people felt they were overweight?_____

3 What is the total number of people who participated in the survey?

_____

4 More people felt they were "just the right size" than the overweight?
(circle one) or F

5 What percentage of people "didn't care" about the weight question?

_____

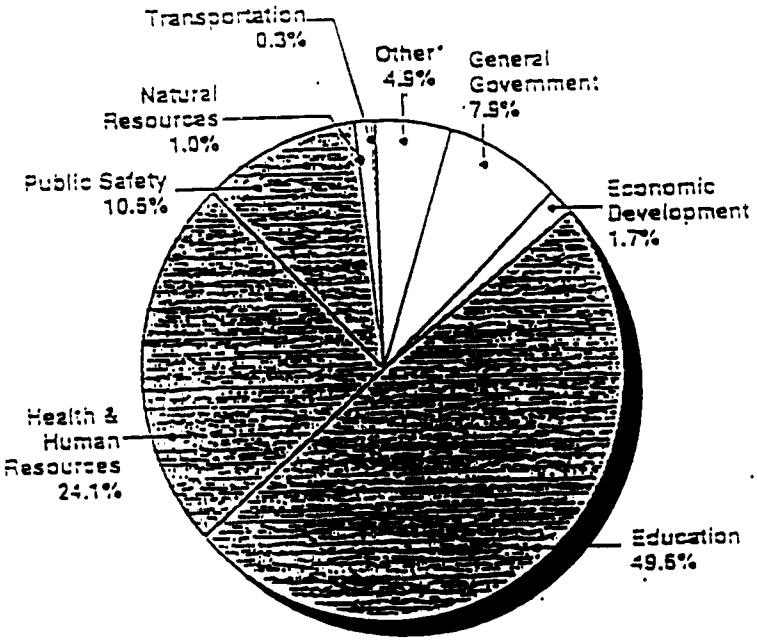
Activity 17 - Reading and Understanding Pie Graphs

Objective(s): Participants will be able to

1. Practice reading pie graphs.

Directions:
Read the pie chart below. Answer the questions.

Montana's General Fund Budget 1992



1. Most of the budget came from what three areas?

_____, _____,
_____

2. What is the combined percentage of the budget directed to Transportation and Natural Resources? _____

3. What slice of the pie presents the lowest percentage of the budget?

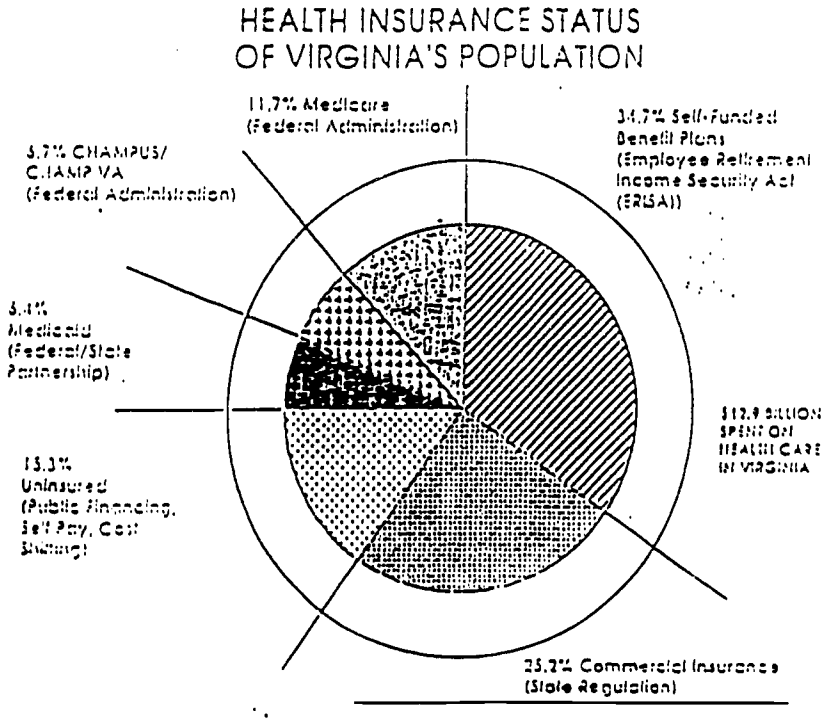
_____

Activity 18 - Understanding Pie Graphs

Objective(s): Participants will be able to

1. Practice reading pie graphs.

Directions:
Read the pie chart below. Answer the questions.



1. How many Virginians were uninsured?_____

2. How many Virginians receive Medicare?_____

3. The majority of Virginians participate in self-funded benefit plans? T or F

4. What is the combined percentage of Virginians that participate in Champus, Medicaid, and Medicare plans?_____

Activity 19 - Creating a Pie Graph

Objective(s): Participants will be able to

1. Use numerical data given to create a pie charts.

Materials Needed: Pencil, graph paper

Directions:
Below you will find figures on the number of people who purchased OREO cookies last year and the results of a NILLA's taste survey. Create pie charts using the figures. Use graph paper and don't forget to give the charts a title and label all slices.

Chart # 1
1977 Oreo Purchasers
25% people in age range of 20-25
45% in age range of 30-35
20% between ages of 40-45
10% Unknown

Chart #2
Nilla Wafers, Taste Survey
78% - Liked the taste with peanut butter
20% - Didn't like the taste with peanut butter
2% - No preference

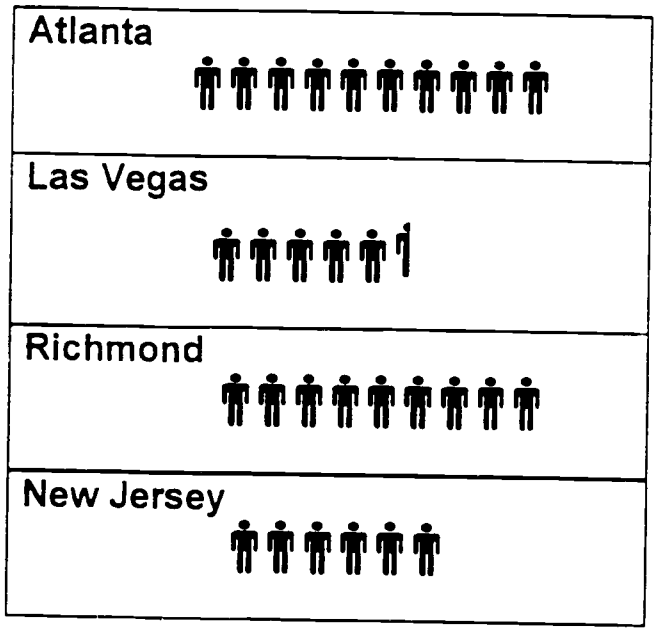
Activity 20 - Reading and Understanding a Pictograph

Objective(s): Participants will be able to

1. Practice reading a pictograph.

Directions: Read the pictograph below. Answer the questions.

Nabisco Facility Employee Population



= 100

1. What is being compared in this graphic?_____

2. What type of graphic is represented?_____

3. According to the graph, about how many people are employed by the Las Vegas facility?_____

4. About how many people are employed by the New Jersey facility?_____

5. How many people are employed by the Las Vegas, Richmond, and the Atlanta facilities combined? _____

Activity 21 - Reading and Understanding a Pictograph

Objective(s): Participants will be able to

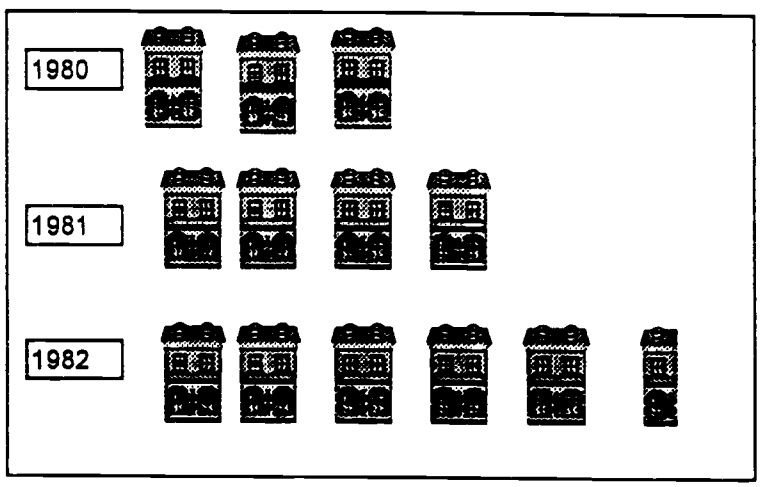
1. Practice reading a pictograph.

Directions: Read the pictograph. Answer the questions.

New Homes Built in James City

New Houses Built

= 1,000 houses



1. What is the value of one house on the graph?_____

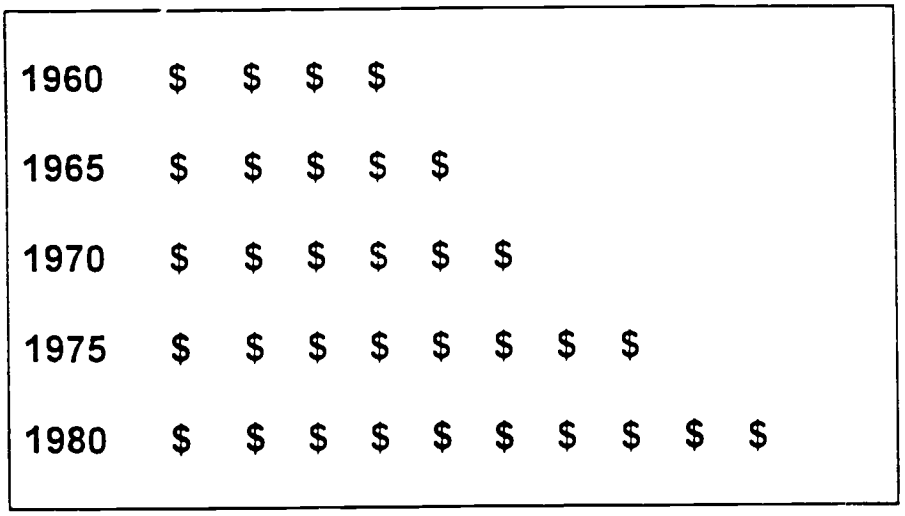
2. In 1980, about how many houses were built in James City?

   _____

3. Find the total number of houses built in James City for the years 1980, 1981, and 1982?

Activity 21 - Reading and Understanding a Pictograph, Continued

Average Yearly Cost of Tuition &
Fees at Public Colleges
$ = $200



1. What was the average cost of tuition and fees for the year 1965?
_____

2. Is the cost of tuition and fees increasing or decreasing?_____

3. How much more did tuition and fees cost in 1980 than in 1960?
_____

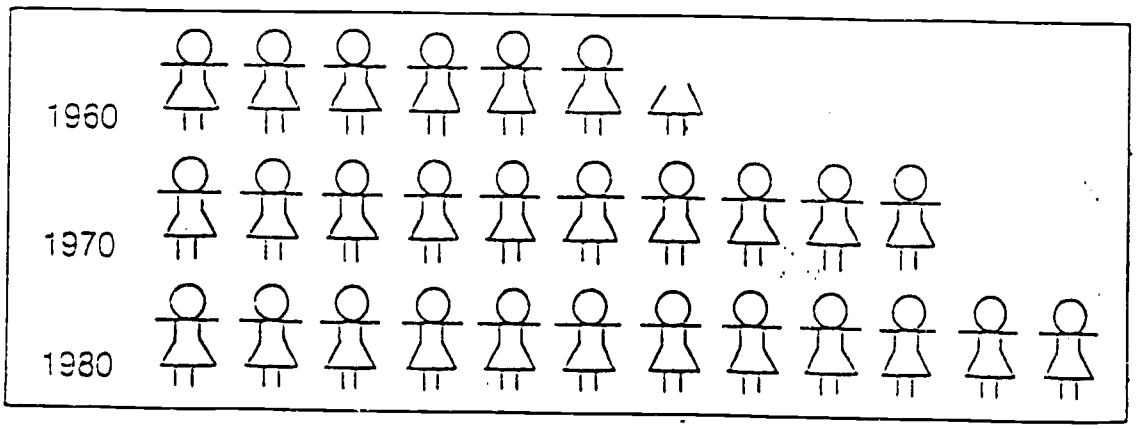
Activity 22 - Reading and Understanding a Pictograph

Objective(s): Participants will be able to

1. Practice reading a pictograph.

Directions: Read the pictograph. Answer the questions.

Working Women in the United States



1. If the trend shown in the graph continues, would you expect there to be more or fewer working women by the year 1985?_____

2. About how many working women were there in 1960?_____

3. About how many more working women were there in 1980 than in 1960?_____

Activity 23 - Creating a Pictograph

Objective(s): Participants will be able to

1. Use numerical data to create a pictograph.

Materials Needed: Pencil, graph paper

You Need to know:
Determine what information needs to be represented. Consider what figure would best represent the information to be presented. Create a key (legend) to help readers understand what the values.

Directions:
Below you will find figures on the number of people who commute to work each day. Create a pictograph using a car as your symbol to represent the following numerical values.

Carpools by Van by Shifts
Shift 1 - 15
Shift 2- 10
Shift 3 - 4

BLUE

Activity 24 - Understanding the Purpose of Charts

Objective (s): Participants will be able to

1. Become familiar with the purpose of charts
2. To identify different types of charts

Materials Needed: Pencil

You Need to Know:

Charts are used to organize information.

Charts are visual summaries of important steps or relationships. They may combine pictorial, symbolic, numeric, and or verbal elements.

Directions: Read the information about charts that follows.

Types of Charts Description & Purpose
Flow Chart Shows simple and complex sequences. Shows a process, organization, or functional relationship.
Tree Shows the way many things developed from one source. Also shows what has developed from the root to many branches.
Time Line Shows relations among events, cause and effect, sequence, multiple lines may be used to show overlapping events.

Comparison
Shows differences and similarities (compare and contrast, pros and cons, advantages and disadvantages. May be verbal or statistical.
Diagram
Shows structure of a system (a schematic), steps ir a process. Classifies complex procedures.

Activity 25 - Learning how to read Charts

Objective (s): Participants will be able to

1. Become familiar with general tips used to read charts.
2. Practice using the tips to read charts.

Materials Needed: Pencil

<u>You need to Know</u>:

Here are some tips for reading charts:

1. Notice the title and type of chart. This will give you the main idea and purpose.

2. Notice symbols. Notice details. Observe relationships.

3. Notice the pattern of organization:
   - cause and effect
   - comparison/contrast
   - chronological order
   - classification
   - step-by-step procedure
   - system

4. Think about the data. Draw conclusions based on the data.

5. Read any text that is associated with the chart.

Now, let's look at a mileage chart on the next page.

Activity 25 - Learning How to Read Charts, Continued

MILEAGE DISTANCE CHART

Mileage shown does not always represent the shortest route. To find the distance between two towns, trace down the vertical column of one town to its intersection with the horizontal row of the other town. To convert miles to kilometers multiply miles by 1.61 (approximate).

	ALTON	AURORA	BLOOMINGTON	BURLINGTON, IOWA	CAIRO	CARBONDALE	CHAMPAIGN	CHESTER	CHICAGO	CLINTON, IOWA	DANVILLE	DECATUR	DE KALB	DIXON	DUBUQUE, IOWA	EAST ST. LOUIS	EFFINGHAM	ELGIN	EVANSVILLE, IND.	FREEPORT	GALESBURG	HARRISBURG	INDIANAPOLIS, IND.	JACKSONVILLE
AURORA	255																							
BLOOMINGTON	151	113																						
BURLINGTON, IOWA	183	194	135																					
CAIRO	179	357	256	355																				
CARBONDALE	122	325	207	295	57																			
CHAMPAIGN	159	130	52	185	234	200																		
CHESTER	64	322	208	254	95	33	220																	
CHICAGO	286	41	135	223	374	332	133	353																
CLINTON, IOWA	229	103	152	114	402	335	205	323	144															
DANVILLE	184	143	85	219	273	235	37	257	140	238														
DECATUR	107	152	45	173	216	157	43	164	181	198	85													
DE KALB	253	23	117	181	333	323	144	325	55	95	178	155												
DIXON	254	53	108	142	374	314	164	303	103	44	195	156	42											
DUBUQUE, IOWA	231	152	204	145	451	337	256	355	177	62	299	249	125	94										
EAST ST. LOUIS	24	274	160	204	153	100	157	83	295	255	203	116	277	283	306									
EFFINGHAM	98	204	109	224	164	122	78	143	211	287	115	64	217	220	312	99								
ELGIN	283	22	132	203	385	343	149	340	42	224	158	179	37	64	142	292	222							
EVANSVILLE, IND.	187	320	255	340	143	101	209	139	295	380	175	181	348	344	436	166	117	324						
FREEPORT	294	98	146	179	412	352	202	341	113	59	234	193	53	37	83	320	258	73	424					
GALESBURG	155	151	87	45	336	253	129	250	185	71	172	132	145	99	122	183	195	174	341	127				
HARRISBURG	151	375	225	323	81	33	220	77	332	376	187	175	338	335	411	129	122	344	52	373	311			
INDIANAPOLIS, IND.	282	220	173	307	305	252	124	253	182	325	90	173	246	283	376	240	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	244		
JACKSONVILLE	81	214	101	119	248	193	120	145	236	170	156	73	216	198	221	85	123	233	252	225	104	207	244	
JOLIET	247	25	97	190	352	309	135	305	46	133	115	145	54	93	187	257	129	43	250	124	147	310	152	201

A mileage distance chart shows how far it is from one city to another. The chart above shows the distance in miles between major cities and towns.

If you wanted to find the distance between East St. Louis, Illinois, and Indianapolis, Indiana. First trace down the column that says East St. Louis. Then find the row that says Indianapolis, Indiana. Trace across the row and find the point where the two cities intersect, or meet. That number is the miles between the two cities. Look at the chart, the 240 miles has been circled for you. Now use the chart to answer the questions below.

1. The distance from Burlington, Iowa, to Alton, Illinois, is_____miles.
2. The distance from Decatur, Illinois to Champaign, Illinois is___miles.
3. The distance from Clinton Iowa, to East St. Louis,Illinois , is ___miles.

Activity 26 - Reading and Understanding Tables

Objective (s): Participants will be able to

1. Become familiar reading tables
2. Interpret data presented in tables

Material Needed: Pencil

You Need to Know:
When you want only certain facts, getting them for a table is usually much easier. A table has columns and rows of data. Columns are read up and down. Rows are read from side to side. A table may be as simple as two columns and two rows or it may be a complex as twenty columns and twenty rows of data. All of the data in a certain column is related in some way. Likewise, all of the data in a certain row is related in some way. Tables may include abbreviations or symbols and a key to explain what they mean.

Directions: Use the tables that follow to answer the questions.

Comparison of Weekly Earnings by Occupations

	Average Weekly Earnings		Women's Pay as Percentage of Men's
	Women	Men	
Postal clerks	$347	$359	97%
Nurses, dietitians, therapists	$292	$305	96%
Health technicians	$253	$299	85%
Textile workers	$175	$206	85%
Secondary school teachers	$290	$347	84%
Social workers	$263	$322	82%
College teachers	$349	$448	78%
Food-service workers	$138	$176	78%
Computer specialists	$335	$439	76%
Lawyers	$397	$532	75%
Editors, reporters	$286	$389	74%
Scientists	$325	$455	71%
Accountants	$277	$400	69%
Cashiers	$149	$216	69%
Engineers	$348	$503	69%
Assemblers	$186	$272	68%
Office-machine operators	$201	$296	68%
Bookkeepers	$203	$306	66%
Factory inspectors	$204	$314	65%
Office managers	$255	$392	65%
Retail-sales clerks	$140	$216	65%

1. According to the table, what is the average weekly pay for a woman computer specialist?_____

2. Of those listed, in how many occupations do women average more pay than men?_____

3. On average how much more do men cashiers make per week than do do women cashiers?_____

4. What type of comparison or relationship is presented in this graphic?_____

Activity 26 - Reading and Understanding Tables, Continued

A Parent's Guide for Immunizations of Children

Immunization	Age (months) 2	4	6	12	15	18	60 (5 years)
Diphtheria	x	x	x			x	x
Whooping cough	x	x	x				
Tetanus	x	x	x			x	x
Polio	x	x	x			x	x
Measles					x		
German Measles					x		
Tuberculosis (TB) Test				x			

1. What is the subject of the table?

   _____

2. A parent brings in her six-month-old child for his immunization. What immunizations will the child receive?_____

3. A parent brings in her 15-month old child for two immunizations. What are they?_____

4. A parent has one-year old twins. She wants to know what they must take?_____

Activity 27 - Reading and Understanding Tables in the Workplace

Objective(s): Participants will be able to

1. Become familiar reading tables.
2. Interpret data presented in tables.

Oven Profile - Oven C, May 5, 1992

TOP	ZONE	1	2	3	4	5	6	7	8
	TEMP	400	585	500	510	400	300	425	420
	PRES	10	20	22	19	20	18	5	7
	BURNERS	ON	ON	ON	ON	ON	ON	OFF	ON
BOTTOM	ZONE	1	2	3	4	5	6	7	8
	TEMP	300	500	525	425	375	370	350	300
	PRES	10	12	5	1	0	0	1	0
	BURNERS	ON	ON	ON	ON	ON	OFF	OFF	OFF
	ZONE	1	2	3	4	5	6	7	8
	FANS	OFF	OFF	ON	ON	ON	OFF	ON	OFF
	DAMPERS	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
	COMMENTS								

1. What is the temperature in zone 4 of the top portion of the oven?____

2. Are the burners on in Zone 1? (check one) Yes____ No____

3. How many zones are recorded on the table?_____

Activity 28 - Reading and Understanding Graphic Measurements

Objective (s): Participants will be able to

1. Become familiar with graphic measurements
2. Practice reading graphic measurements

Material Needed: None

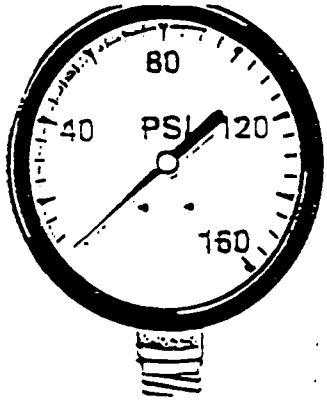
You Need to Know:

The Nabisco facilty has various graphic measurements that employees use to record data in order to monitor some part of the production process. For example, employees in the mixing department monitor the mixing process by checking the potentiometer read-out. Likewise, bake shop employees are constantly checking temperature gauges. They are also familiar with Scorpion Charts. (A Scorpian is a device that measures variation in temperature in different parts of an oven.)

A gauge is an instrument that measures pressure, temperature, and levels. One of the most common temperature gauges is the thermometer. Many people use a thermometer to measure heat and cold in ovens or refrigerators. Water heater installers use a thermometer test gauge when they are trying to find problems with a water heating system. If a house has a gas heater, it has a gas gauge that measures how much gas is used. There are also pressurized gauges, like gas, air, or water gauges. Pressurized gauges display the amount of pressure. However, they can also indicate high or low pressure.

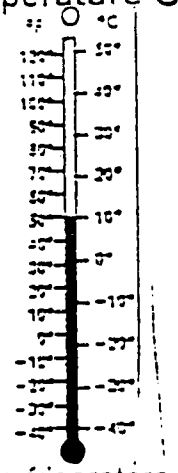
Directions: Turn to the next page. Look at the different types of guages. Then move on to the next practice activity.

Pressure Gauge



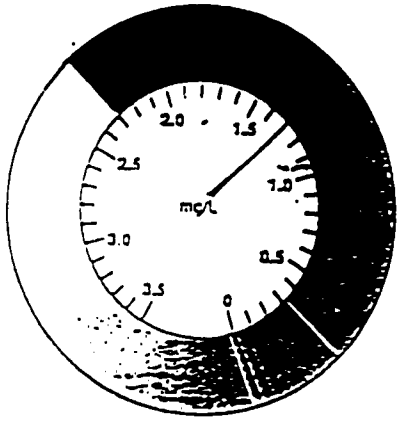
Shows a certain amount of pressure or level (e.g., gas,water, air gauges)

Temperature Gauge



Measures heat and cold in ovens or refrigerators (e.g., test gauge) for water heater.

Level Gauge

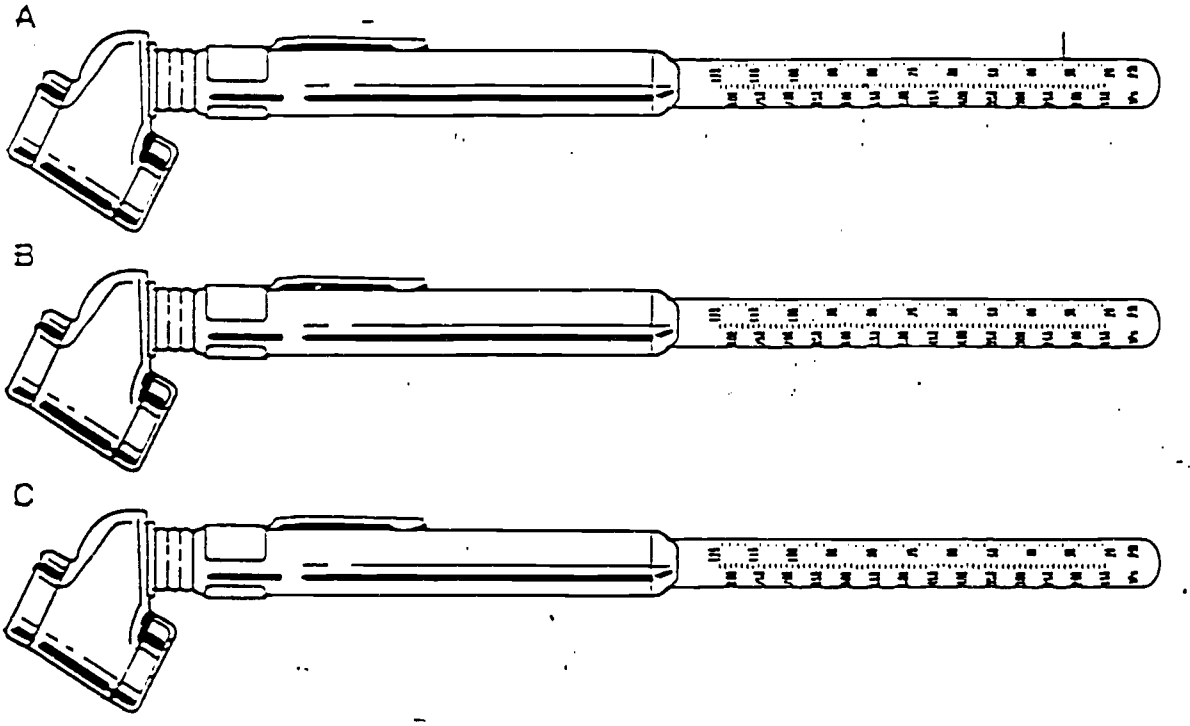


Measures levels and standards (e.g. level gauge).

Activity 28 - Reading and Understanding Graphic Measurements, Continued

Let's look at the air pressure gauges below. Gauge A has a mark at the 32 psi unit. Using Guage A as your guide, place a mark at the correct air pressure for tires B and C.

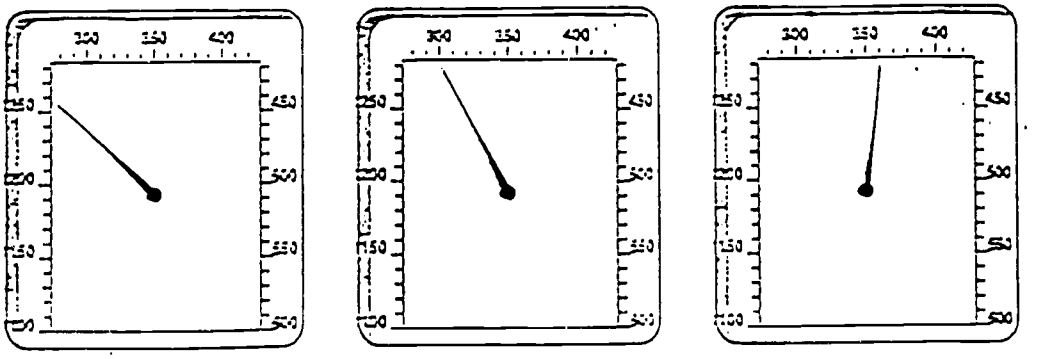
Tire B: 40 pounds
Tire C: 110 pounds



Activity 29 - Reading and Interpreting Thermometers

Thermometers measure temperature. Thermometers measure temperature in either Fahrenheit (F) or Celsius (C) readings. One common thermometer is a clinical thermometer. A clinical thermometer is used by doctors' offices, medical clinics, and hospitals. Clinical thermometers measure body temperature.

Directions: Now let's practice reading thermometers. Here is a baking scenario. The Nabisco bakery has been having problems with certain products baking properly. After five unacceptable batches, the employees to do a test to determine if the oven is malfunctioning. Read the temperature on each thermometer below. Then record the temperatures in the space provided.



A B C

Time	Thermostat Setting	Actual Temperature
1. 7:45 A.M.	A. 325°F	A.
2. 9:45 A.M.	B. 375°F	B.
3. 2:15 P.M.	C. 450°F	C.

Activity 30 - Reading and Interpreting Potentiometer

You Need to Know:
Potentiometer charts are used by employees in the Mixing Department. A Potentiometer is a gauge on the mixing machine that prints out a snapshot of what is happening as the dough is being made. This print out helps employees to analyze the texture of the dough. The texture of the dough is very important to the production process. This chart allows employees to determine the how tight or loose a dough may be. For example, the read-out may show a high resistance. The problem may be too much flour or too much water.

A sample of a cookie dough guideline is attached. The chart shows three stages of the process. In the Cream-Up stage the sugar and oils are being mixed at the start of the process. The second stage is the Shortening Cream-Up is all liquid, oils are mixed. Then the flour is mixed in the dough mix stage.

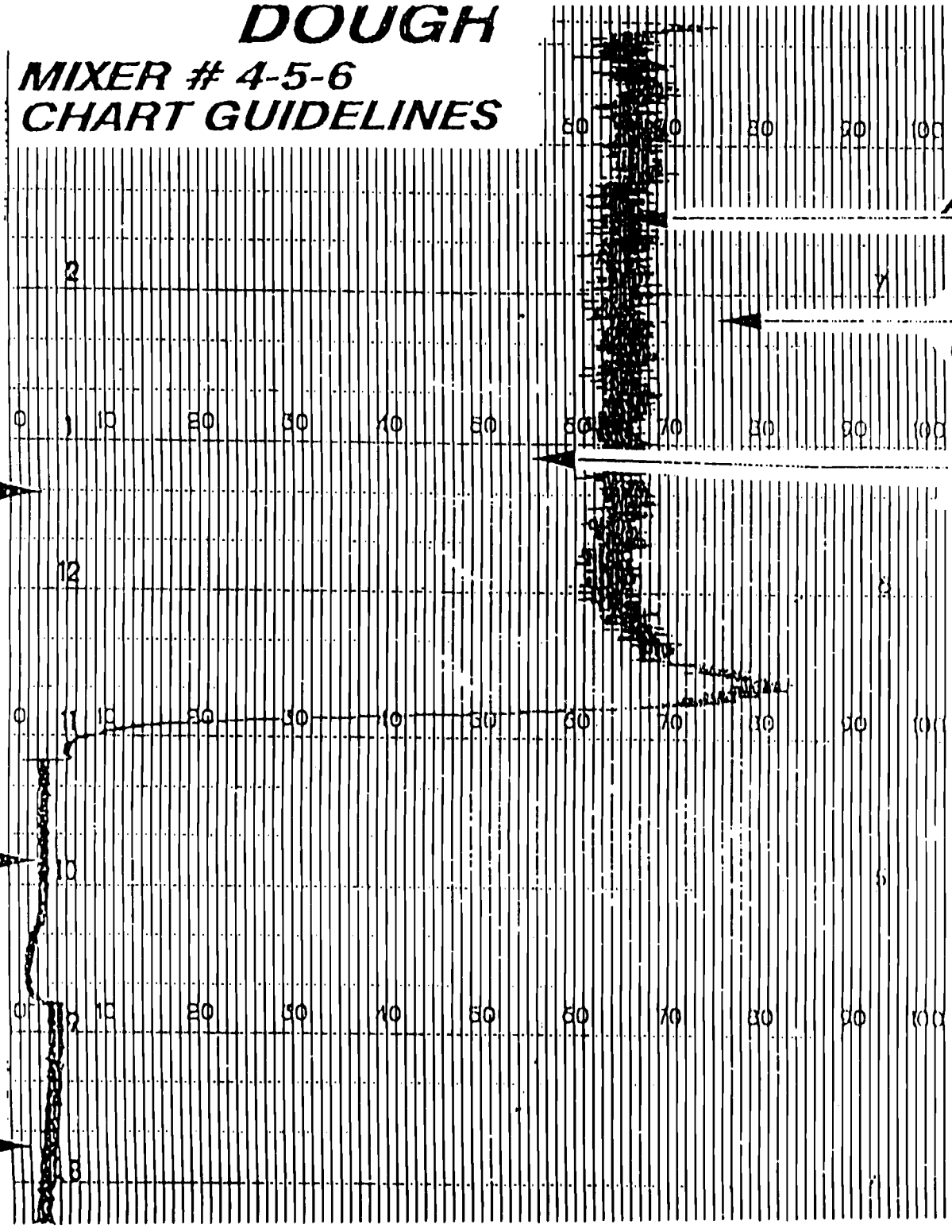
When the reading the chart, the vertical (up and down lines) is a representation of the time the dough has been mixing. The horizontal lines is a representation of the resistance of the dough. If the resistance is charted above or below the control limits, a supervisor is called. In the case some products, a dough with soft resistance is more acceptable. Employees monitor charts on the mixer at regular intervals.

Directions: Now you know how a Potentiometer Charts is used in the Mixing Department. Now think of other charts or tables you use on the job. Write the name of the chart and its use in the spaces provided.

Chart Name	*Chart is used to...*
_____	_____
_____	_____
_____	_____

DOUGH

MIXER # 4-5-6
CHART GUIDELINES



AIM POINT 65

UCL LIMITS 75
CALL SUPERVISOR

LCL LIMITS 55
CALL SUPERVISOR

DOUGH MIX

SHORTENING
CREAM UP

CREAM UP

USING MEAL

PINK

Activity 31 - Understanding the Purpose of Control

1. Interpret data using charts and make decisions based on the data.
3. Plot data points on charts

Materials Needed: Pencil, Attached handout of decision rules

You Need to Know:

Nabisco employees have to make decisions on a daily basis about improving their work processes. They do this by using Process Operating Guidelines (POG). They use control charts to collect facts and data. Then they decide what should be changed to improve the quality of the product. Data collection is very important because it helps employees identify the causes of problems and monitor the production process.

What kind of problems might occur during the production process? The list of possibilities is great. However, a few are listed below:

- dough temperature out of control
- dry weights out of control
- stack heights out of control

In order to get a handle on what temperatures are acceptable for the dougns, an employee will take samples of dough at particular times during a shift. The data collected is plotted on a control chart manually or by computer. Once the data is collected, employees use standard decision rules to make decisions about the production process. In this activity, you will plot data manually and learn to read a computer generated chart.

Directions: Look at the sections of a control chart that are outlined on the attached pages. You will be guided through the process of manually completing a control chart.

CONTROL CHART

DATE 9/16/95 | PRODUCT #019 | SHIFT 2 | ATTRIBUTE Wet Weights | LINE NO 1 | OPER Denner #14962

TIME	3:30	4:00	4:30	5:00	5:55	6:00	6:25	7:00	7:30	8:00	8:30	9:00	9:30	10:00	10:30	11:00
E 1	74	72	69	70	72	76	76	70	73	71	68	75	71	70	70	74
M 2	69	69	72	74	71	75	72	74	70	75	69	74	72	75	69	67
W 3	67	65	68	65	68	65	67	66	70	66	73	64	67	64	67	69
ANALYSIS 4																
5																
6																
SUM Σ	210															
AVERAGE $\bar{x}$	70															
RANGE R	7															

UCL 73
72
AIM 71
70
69
68
LCL 67

UCL 7
6
3
0

ASSIGNABLE CAUSE LOG

ACTION	CAUSE

DECISION RULES

1 IN RED

2 OF 3 IN YELLOW

4 IN A ROW

7 IN A ROW IN AN UPWARD OR DOWNWARD TREND

INVESTIGATE/REACT/DOCUMENT

CONTROL CHART NB-5260-E

DATE 9/16/95 | PRODUCT #019 | SHIFT 2 | ATTRIBUTE Wet Weights | LINE NO 1 | OPER. Dana #4962

TIME		3:30	4:00	4:30	5:00	5:35	6:00	6:25	7:00	7:30	8:00	8:30	9:00	9:30	10:00	10:30	11:00
ANALYSIS E	1	74	72	69	70	72	76	76	70	73	71	68	75	71	70	70	74
ANALYSIS M	2	69	69	72	74	71	75	72	74	70	75	69	74	72	75	69	67
ANALYSIS N	3	67	65	68	65	68	65	67	66	70	66	73	64	67	64	67	69
	4																
	5																
	6																
SUM	Σ	210															
AVERAGE	X̄	70															
RANGE	R	7															

UCL 73

72

AIM 71

70

69

68

LCL 67

UCL 7

6

RANGE

3 535

4

ASSIGNABLE CAUSE LOG

ACTION	CAUSE

DECISION RULES

1	IN RED
2 OF 3	IN YELLOW (ALL ON SAME SIDE OF AIM)
5	IN A ROW (ALL ON SAME SIDE OF AIM)
5	IN A ROW IN AN UPWARD OR DOWNWARD TREND (BETWEEN CONTROL LIMITS)

535

INVESTIGATE/REACT/DOCUMENT

Directions Continued: The top part of the control chart includes the following: the date (September 15, 1995) , product name (Product #019), shift number (2) , the type of data being collected (attribute), production line number (1), and the operator's name (Denner).

In this case, wet weights are being monitored for Product #019. Denner collects data or samples every half-hour, starting at 3:30 p.m. His samples are collected from three conveyor belt areas, the East, Middle, and West. Reading down the row, under the 3:30 p.m., his weights were 74, 69, and 67. He does the same procedure for the rest of the samples. Look at the times the samples were taken. Did he take all samples on time?
Yes___ No___

After taking the samples, Denner computed an average of the samples. for example, at 3:30 p.m., he added 74+69+67=210. Then he divided 210 by 3 to get an average of 70. After obtaining his average, Denner computed the range by subtracting the highest number from the lowest, 74-67 = 7. Now help Denner out by computing the average and range of the rest of the samples. Use the exact numbers, do not round off.

Denner knows that the target (aim) weight is 70. The aim is also called the control limit. If all weights were hitting the aim, then he has a really good control of the process. However, some variation is expected in the process, but within acceptable limits. The Upper Control Limit is 72, meaning no weights should average above this limit. The Lower Control Limit is 67, so no average should weigh less than 67. Ideally, the points plotted, representing the collected data, should fall randomly between the upper and lower control limits, fluctuating above, below, and on the aim or target line. Therefore, Denner continues to monitor his process by plotting the data points to determine how his process is running.

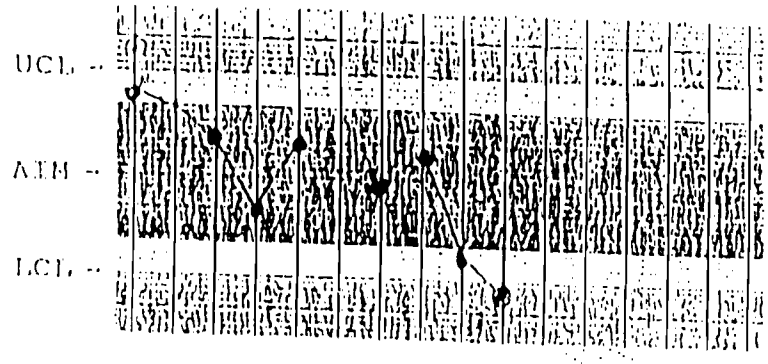
Let's help Denner out by plotting the average and range of the wet weights. The first five have been plotted for you. After plotting the points, draw lines to connect the data points (dots). Look at the results. Denner would analyze the results and apply decision rules when necessary.

DECISION RULES

As you monitor the process, watch for these examples. If any of the examples below occur on your control chart, investigate immediately and take action if necessary.

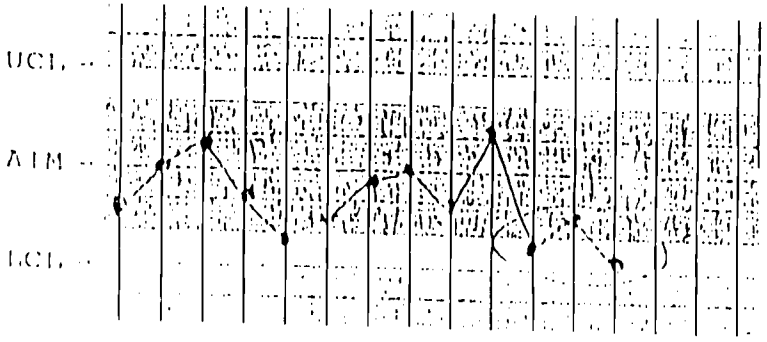
1. POINT BEYOND UPPER OR LOWER CONTROL LIMIT

When a point is plotted above the upper control limit, or below the lower control limit, adjust the process immediately. Take a recheck and continue this procedure until point is within the acceptable limits. Plot all checks.



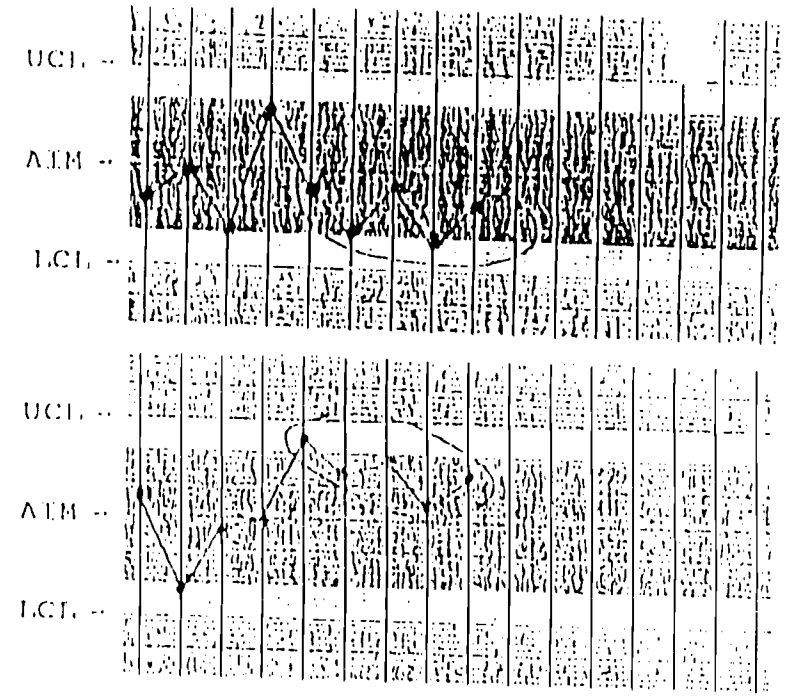
2. 2 OUT OF 3 POINTS IN YELLOW

When 2 points out of 3 fall in the yellow, on the same side of the aim line, a shift may be forming. Check for possible causes and notify your supervisor. Make adjustments if instructed. Take a recheck if any adjustment is made and continue this process until the points fall nearer the aim.



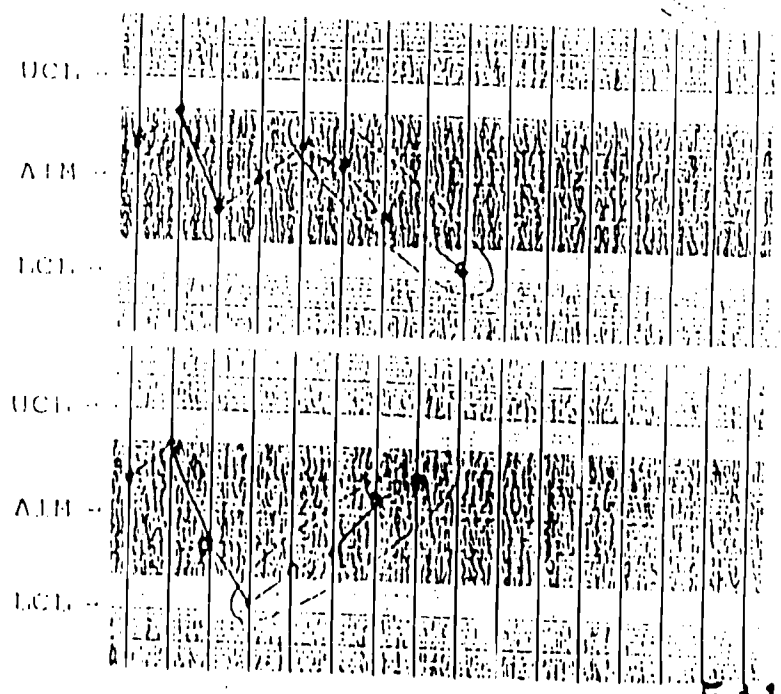
3 SHIFT OR RUN

When 7 or more points in a row are plotted between the aim line and either the upper or lower control limits, adjust the process and recheck immediately. Check for any changes such as in temperatures, raw materials, or parts wearing out. Continue to monitor the process making adjustments and rechecks to ensure the shift has been corrected.



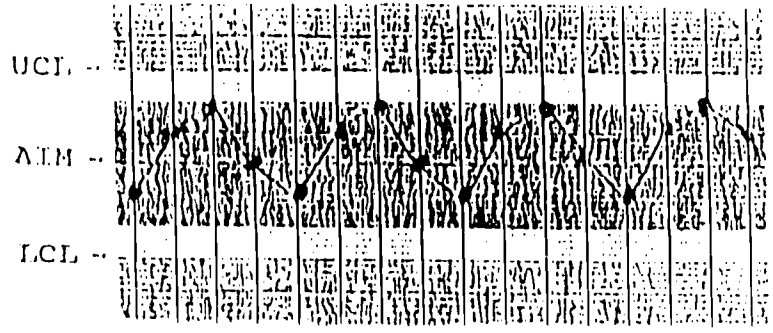
4 TREND

A trend is forming when 5 or more plotted points in a row form an upward or downward pattern between the upper and lower control limits. The trend may cross the aim line. If this happens, notify your supervisor.



5. PERIODICITY

When the points you have plotted form a repeating pattern, notify your supervisor.



The decision rules are summarized on the bottom right corner of the control chart. After reading about the decisions, summarize in the blanks below, what decision should be made about this process.

Summary of Decision_____

_____

_____

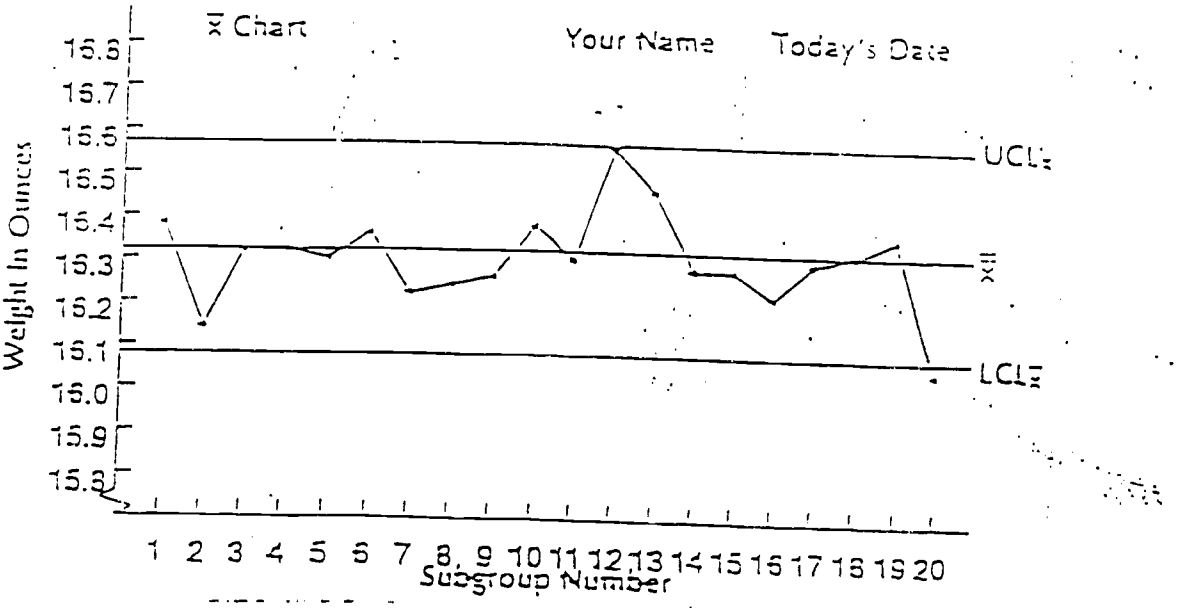
_____

Activity 31, Continued

Directions: Use the decision rule handout to determine which rule each of the example charts represent.

Chart #1- Decision Rule_____

Wheat Thins - 16 oz.
Shift 3, Line 7



Line: Oreo

Chart #2 - Decision Rule_____

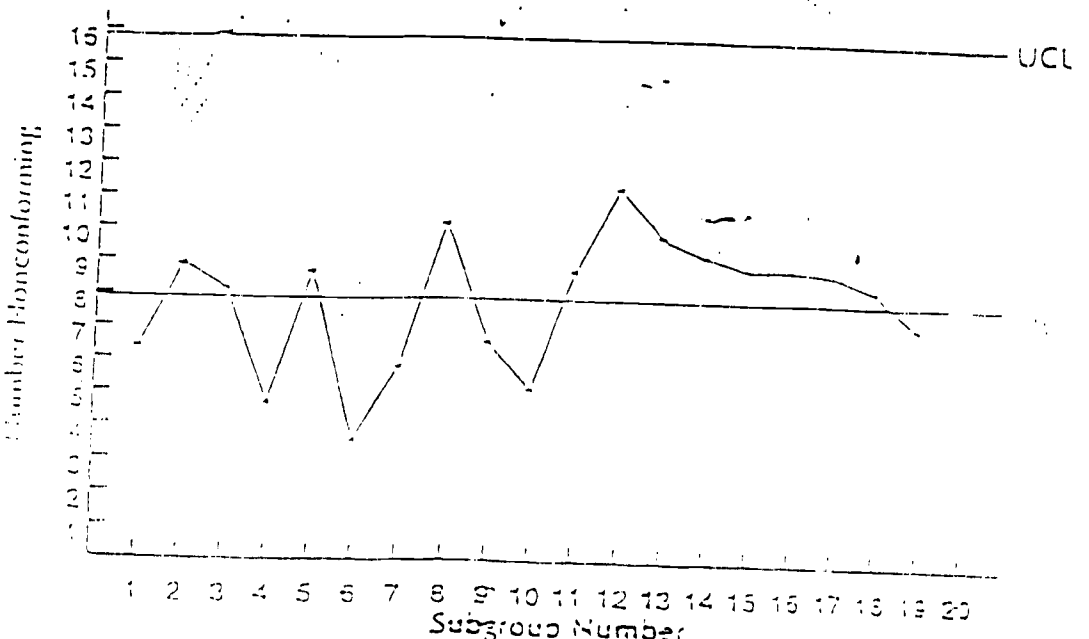
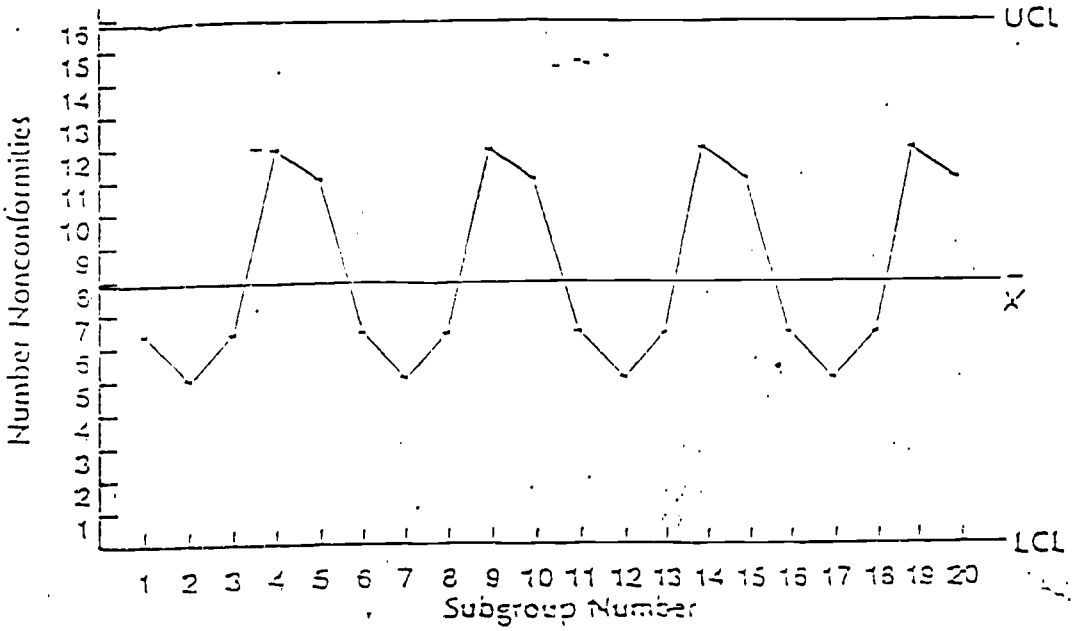


Chart #3 - Decision Rule_____

Line: Chips Ahoy!



Activity 31 - Understanding and Using Control Charts

Material Needed: Blank Control Chart

Directions: Plot the range on a blank control chart for the following scenario. You are making Cheese Nips and the weight samples are ranging between .5 and 1.5. The lower control limit for range is 0. The upper control limit for this chart is 2. Plot the ranges below on the control chart.

.5
.7
.8
.1
1.0
1.5
1.2
.9
1.5
.6
.6
.5
1.5
.4
1.3
1.4

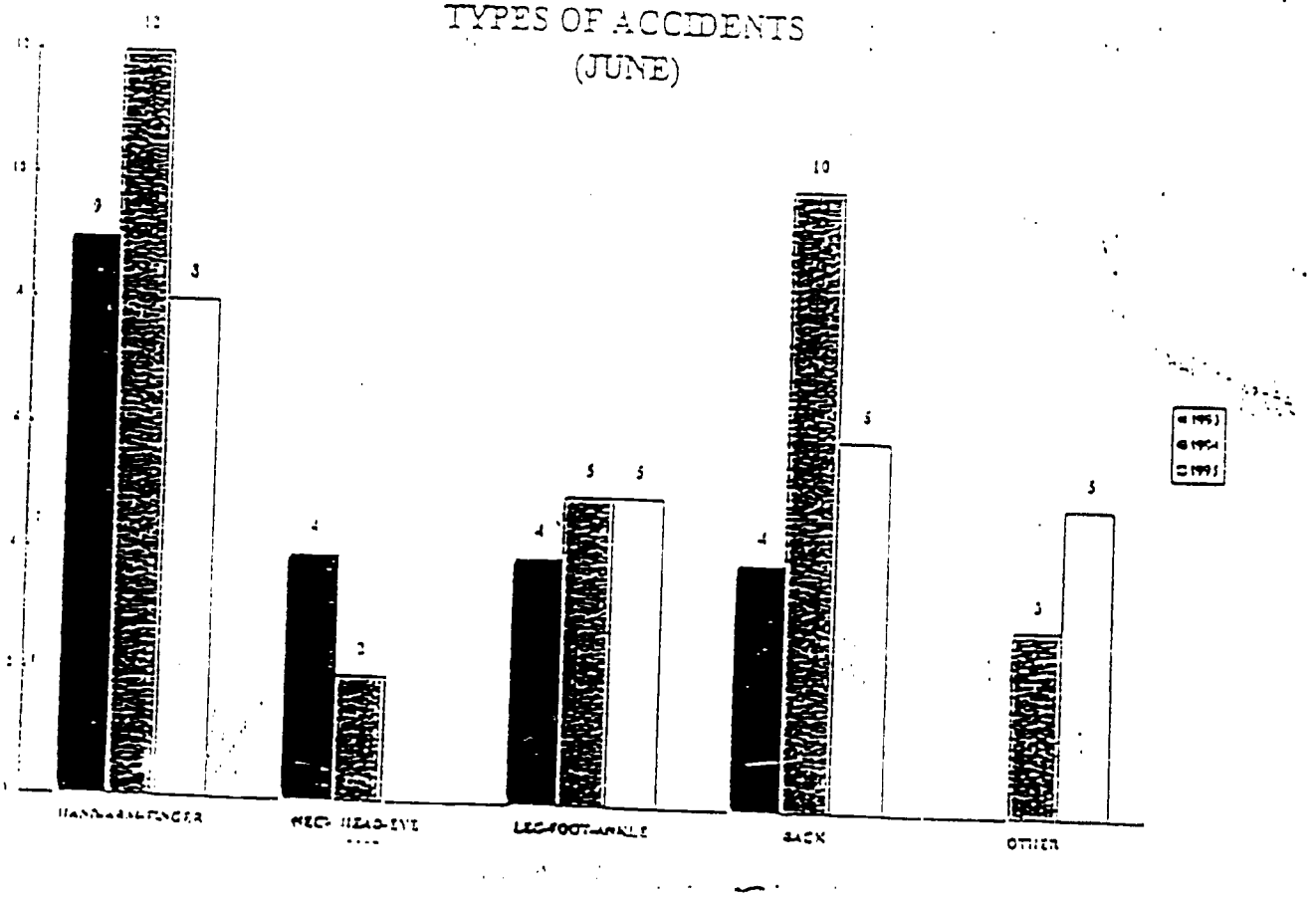
Activity 32 - Using Graphs & Charts in the Workplace Review

Objective (s): Participants will be able to

1. Understand trends relationships and decision making.

Material Needed: Pencil

Directions: Read the graphs and charts below. Use the tips you've learned in this module to answer the questions.



1. What is the title of this graph?_____

2 What type of data is represented on the x-axis?_____

3 What type of units are represented on the y-axis?_____

4. Is this a vertical graph? Yes____ No____

5. In what two years were the leg-foot-ankle accidents the same?
_____

6. What conclusion can you draw about the graph regarding the number of accidents that have occurred in June of 1994?_____

7. Compare the number of back accidents over the three year period?
_____

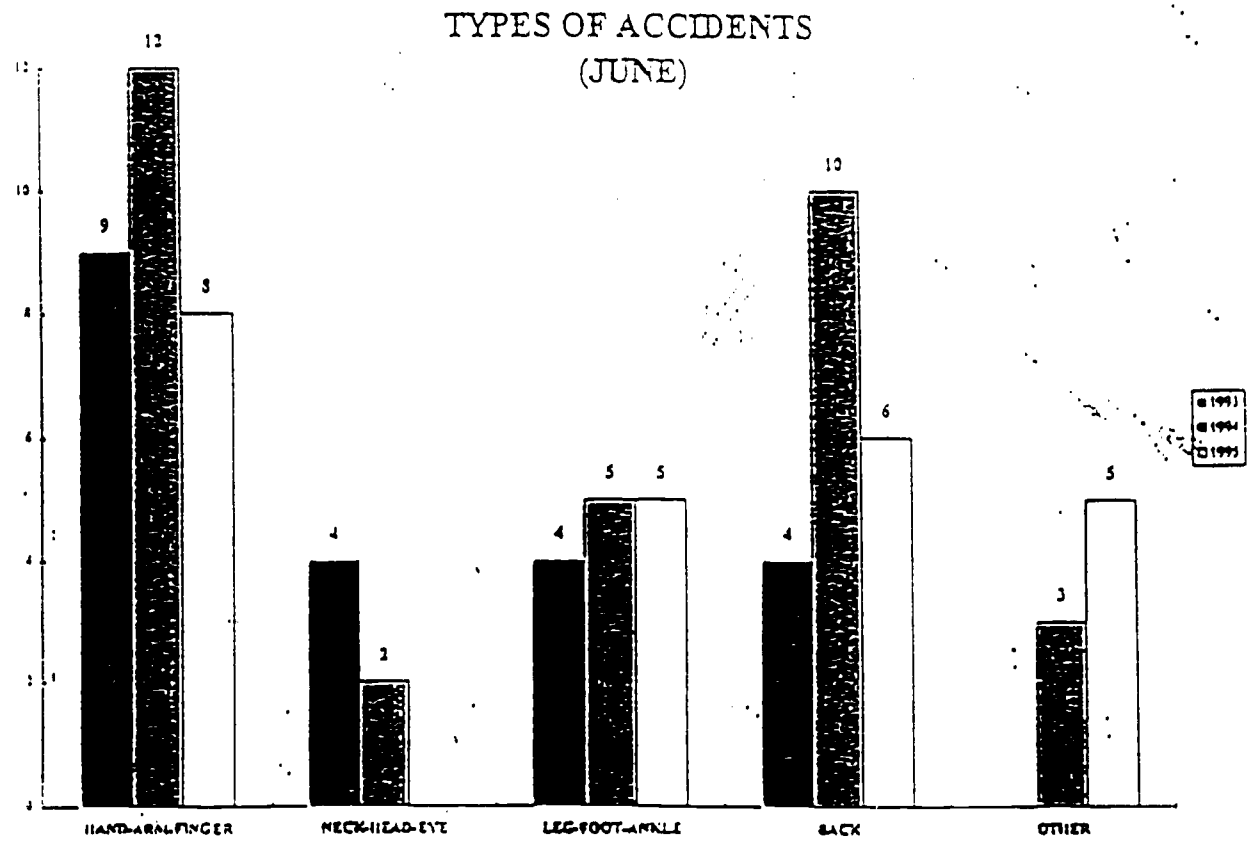
Activity 32 - Using Graphs & Charts in the Workplace Review

Objective (s): Participants will be able to

1. Understand trends relationships and decision making.

Material Needed: Pencil

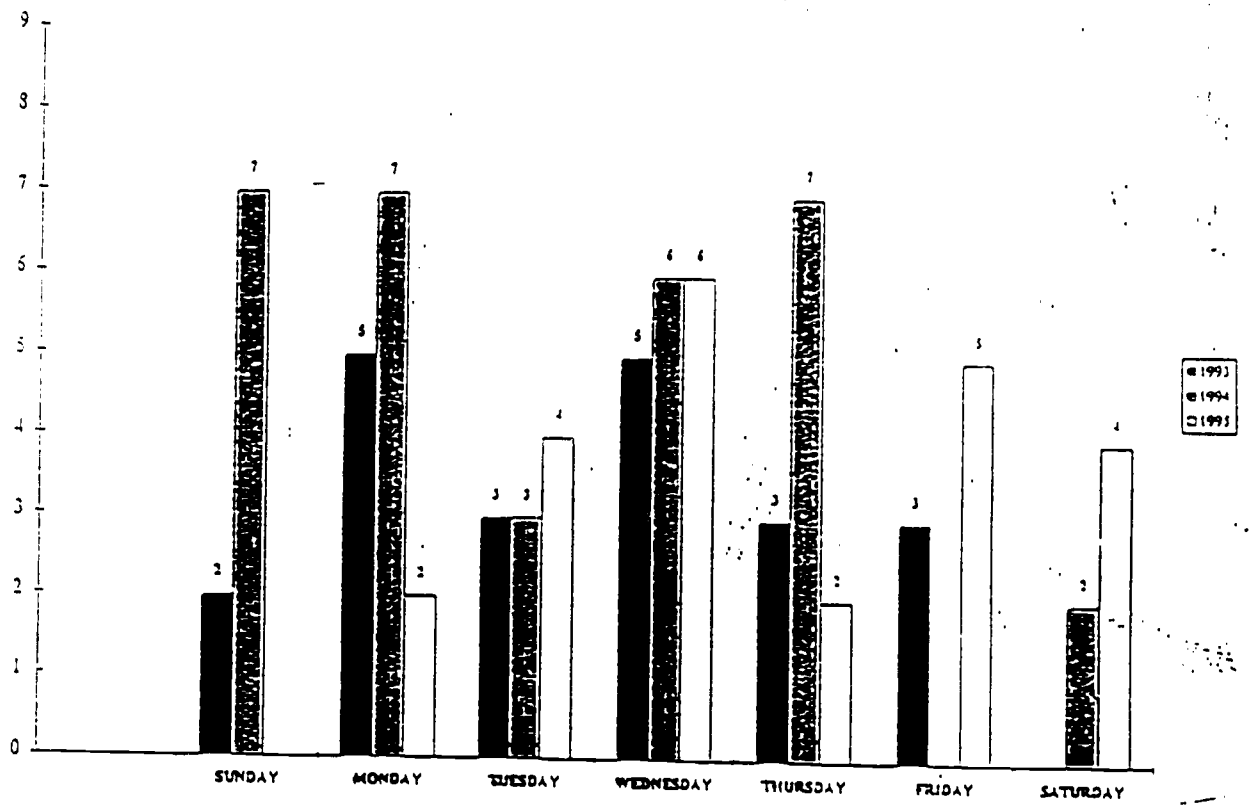
Directions: Read the graphs and charts below. Use the tips you've learned in this module to answer the questions.



1. What is the title of this graph?_____

2. What type of data is represented on the x-axis?_____

3. What type of units are represented on the y-axis?_____



1. In 1994, which days show the same number of accidents per day?

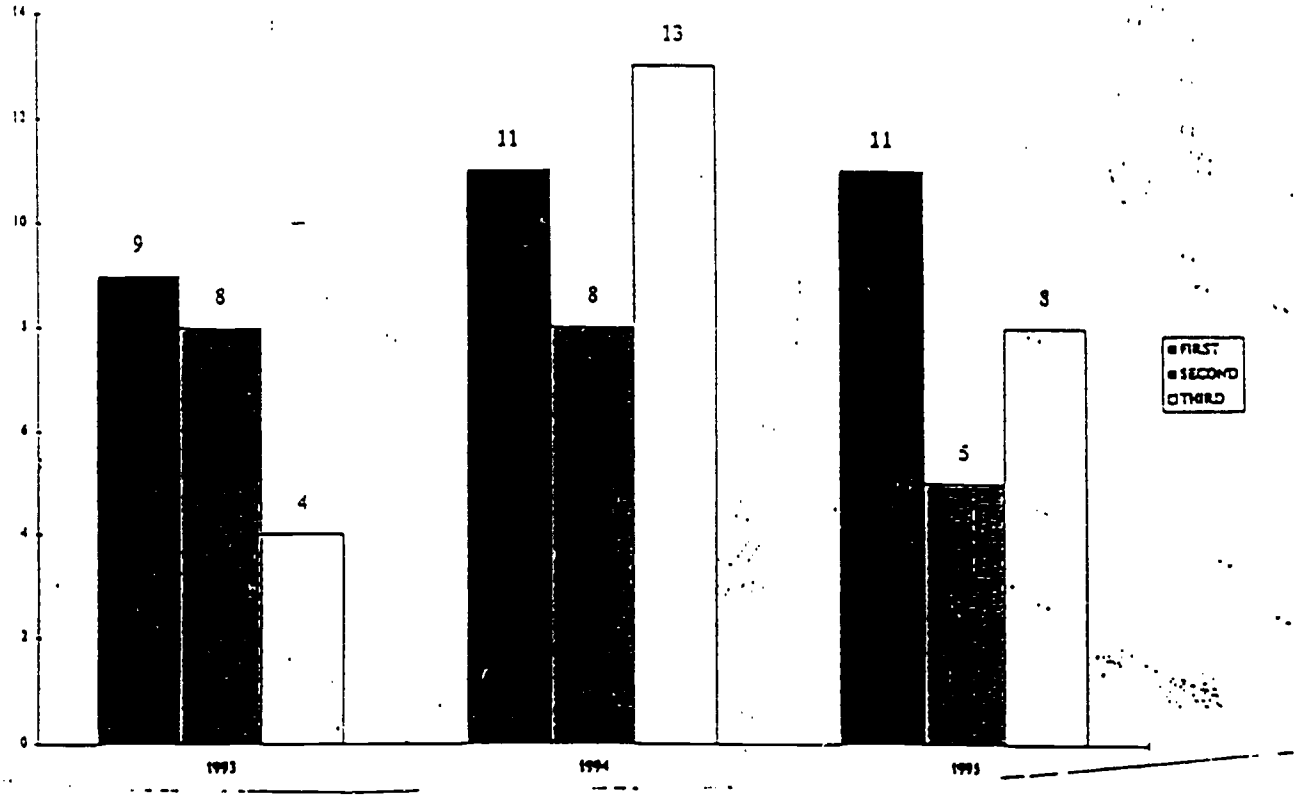
_____

2. In 1993, which day show the least amount of accidents per day?

_____

3. In 1995, there were accidents no recorded accidents on Sunday? (circle one) T or F

ACCIDENTS BY SHIFT



1. Which shift has recorded the highest number of accidents in 1994?
_____

2. Based on the data how would you summarize the accidents by shift over the time periods indicated?_____

Directions: Read the table below. Answer the questions.

DEPARTMENT	HOURS	JUNE ACCIDENTS	Y-T-D ACCIDENTS	JUNE LW D	Y-T-D LWD
MAINT.	23000	0	4	0	0
MIXING	16360	2	1	0	1
BAKING	16800	0	2	0	1
PACKING	62745	1	3	0	2
ENVIRON.	6609	0	0	0	0
WAREHOUSE	1345	0	0	0	0
SALARIED	20209	0	1	0	1
TOTAL	147068	3	11	0	5

1. According to the table, the Packing Department recorded the highest number of hours? (circle one) T or F

2. What was the total number of hours for all departments?_____

3. What was the June accident rate for the Mixing Department?_____

4. What is the Y-T-D Accident Rate for this facility?

_____

Directions: Look at the computer print outs of various data collected by Nabisco employees as they monitor the production process. Then answer the questions.

Chart #1 Product A

1. What are the upper and lower control limits shown on the chart?

   _____

2. The first sample on August 11 was at 7:40 a.m. Express that time in military time._____

3. In your own words, explain what information you understand is being shown in this chart?_____

   _____

Product A, Shift 2, August 7-11, % Moisture

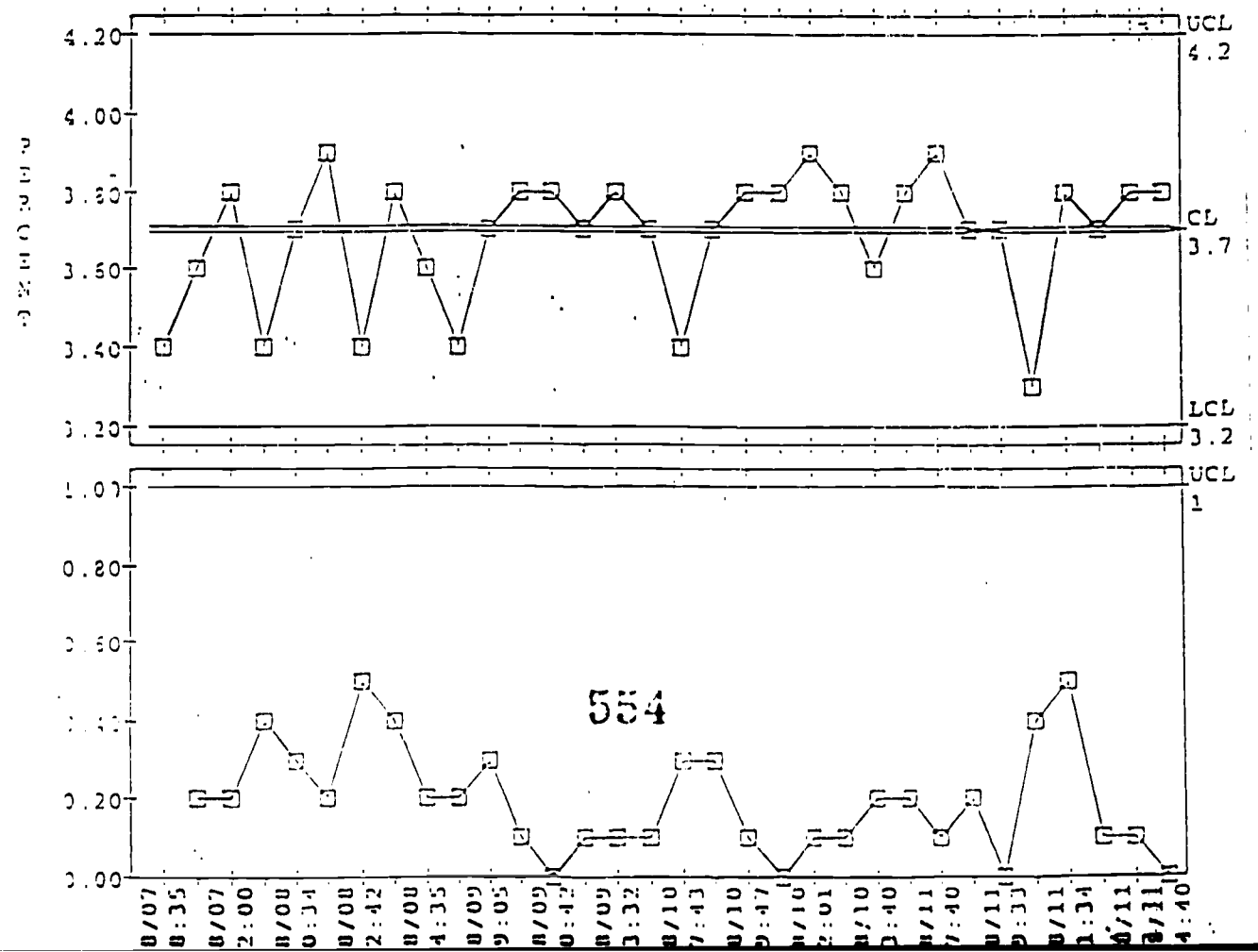
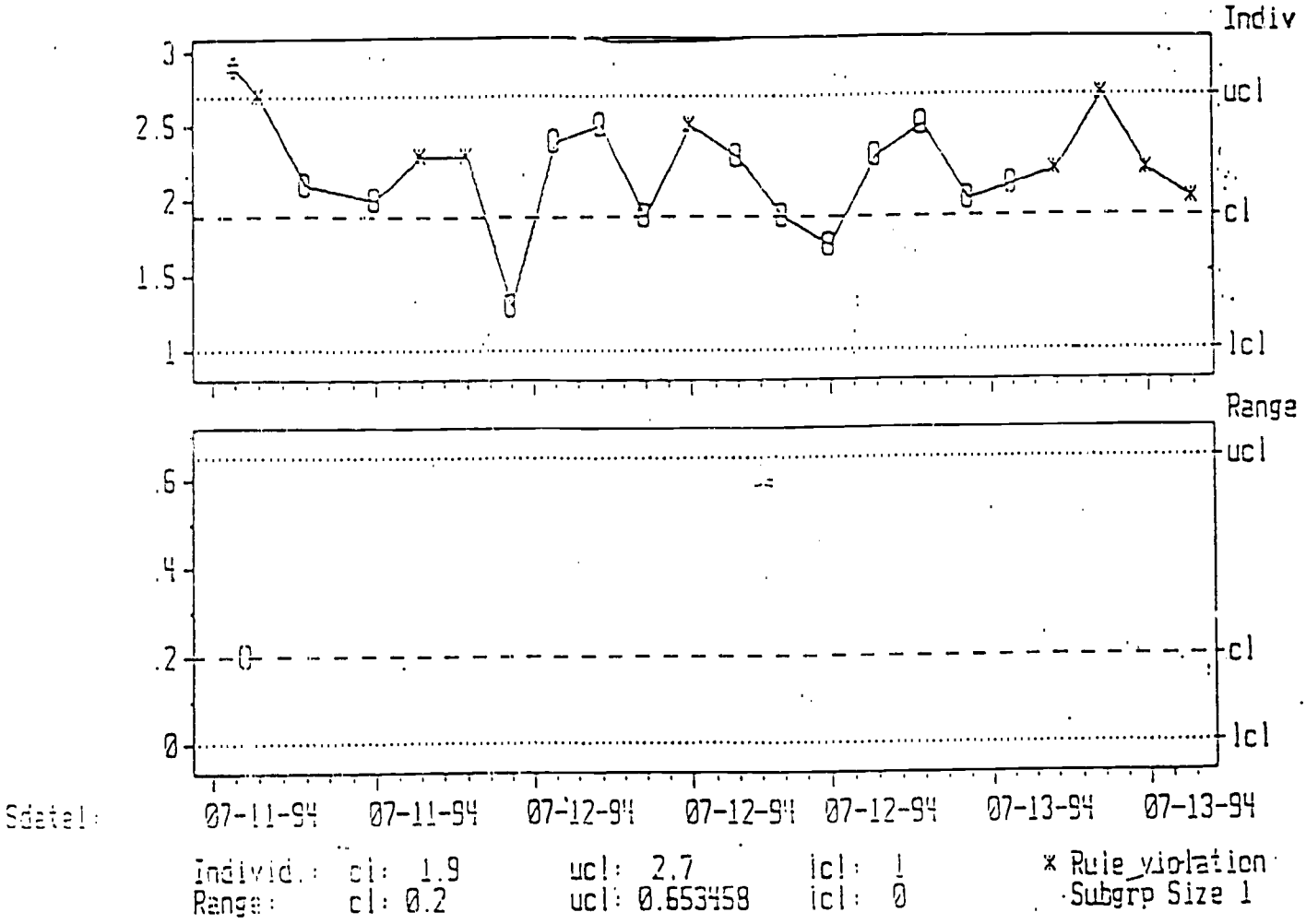


Chart #2

Product B, Shift 3, July 11-13, % Moisture



1. What is the upper control limit shown on the chart?

_____

2. According to the data on the chart, numerous rule violations occurred. True____ False____

3. What symbol represents a rule violation on this chart?_____

_____

4. In your own words, explain what information you understand is being shown in this chart?_____

Reading Comprehension

To the Facilitator:

The curriculum is color coded to indicate levels of difficulty. Yellow represents Minimum Level, blue represents Moderate Level, and Pink represents Maximum Level.

These levels correlate to the benchmarks established by employees and the results of the assessment process validated for selected jobs at the Nabisco Richmond Facility.

Reading

YELLOW

Activity: 1 - Workplace Vocabulary

Objective(s):
1. Recognize and read workplace vocabulary words.
2. Change information from one form (syllables) to another form (full word).
3. Transfer information accurately.

Materials Required:
1. Workplace Vocabulary Lists

You need to know:

1. Syllables are parts of words. (Syl-la-bles)
2. Some words have only one syllable. For example: salt
3. Most words have more than one syllable.
   For example: sodium = so-di- um
4. Most of the time, syllables need to have a vowel to help them make the sounds that distinguish words from each other.
   The vowels are: a, e, i, o, u and sometimes y.

Directions:
1. Look at the list of workplace words and phrases on the opposite page.
2. The words and phrases have been separated into syllables.
3. Try to sound out or read the syllables.
4. Say the syllables together until you think you recognize the word or phras
   Have you heard the word before?
5. Write the word or phrase (group of words) you recognize in the space ne:
   to the syllables of the word.
6. What other vocabulary words can you think of from your work area?
7. Add those words to the list. Ask for help if you need it.

Activity: - Workplace Vocabulary (continued)

Syllable	Word	Syllable	V
1. ad-just-ments			
2. a-ver-age			
3. con-trol charts			
4. de-part-ment			
5. dough build-up			
6. dough edg-es			
7. dough hop-per			
8. dough sam-ples			
9. gra-vi-ty			
10. guage rol-ler			
11. mal-func-tion			
12. mon-i-tor			
13. o-ven-band			
14. re-si-due			
15. salt hop-per			
16. salt read-ing			
17 suc-tion hose			

Workplace Vocabulary - Sanitor/Utility

Syllables	Word
o ver heads	
sa ni tize	
fil ter bags	
brea ther bags	
mag ne tic se pa ra tor	
flo ta tion u nit	
mez za nine	
sif ter tail ings	
con ta mi na tion	
in fes ta tion	
pher mone	
fu mi ga tion	
phos tox in	
me thyl	
py re thrum	
gas tech	
mo dule	
re si du al spray	
ha zar dous ma te ri al	
ex haust	
fork lift	
flo ta tion u nit	
in ven to ry sheet	
cer ti fi ca tion	

Syllable	Word
e le va tor pits	
mag ni fy ing glass	
e mer gen cy kit	
neu tra lize	
a ci dic	
pes ti cide	
meal grin ders	
che ni cal sub stan ces	
phy si cal ha zard	
e mer gen cy pro ce dures	
pro tec tive e quip ment	
safe ty man u al	
ha zard com mu ni ca tion	
com bus ti ble	
cor ro sive	
car ci no gen	
ha zar dous in gre di ent	
flam ma ble	
per mis si ble ex po sure li mit	
dis po sa ble	
dis in fec tant	
ras pi ra tor	
cer ti fied ap pli ca tor	

Activity: 1 - Workplace Vocabulary

Objective(s):

1. Recognize and read workplace vocabulary words.
2. Change information from one form (syllables) to another form (full word).
3. Transfer information accurately.

Materials Required:

1. Workplace Vocabulary Lists

You need to know:

1. Syllables are parts of words. (Syl-la-bles)
2. Some words have only one syllable. For example: salt
3. Most words have more than one syllable.
   For example: sodium = so-di-um
4. Most of the time, syllables need to have a vowel to help them make the sounds that distinguish words from each other.
   The vowels are: a, e, i, o, u and sometimes y.

Directions:

1. Look at the list of workplace words and phrases.
2. The words and phrases have been separated into syllables.
3. Try to sound out or read the syllables.
4. Say the syllables together until you think you recognize the word or phrase. Have you heard the word before?
5. Write the word or phrase (group of words) you recognize in the space next to the syllables of the word
6. What other vocabulary words can you think of from your work area?
7. Add those words to the list. Ask for help if you need it.

Activity: 1 - **Workplace Vocabulary** (continued)

Syllable	Word	Syllable	Word

Activity: 2 - Abbreviations and Symbols (continued)

_____ 1	a.
_____ 2	b.
_____ 3	c.
_____ 4	d.
_____ 5	e.
_____ 6	f.
_____ 7	g.
_____ 8	h.
_____ 9	i.
_____ 10	j.
_____ 11	k.
_____ 12	l.
_____ 13	m.
_____ 14	n.
_____ 15	o.
_____ 16	p.
_____ 17	q.
_____ 18	r.
_____ 19	s.
_____ 20	t.
_____ 21	u.
_____ 22	v.
_____ 23	w.
_____ 24	x.
_____ 25	y.
26	z.

Activity: 2 - Abbreviations and Symbols

Objective(s):

1. Recognize workplace abbreviations and acronyms commonly used.
2. Change information from one form (whole word) to another form (abbreviation).

Materials Required:

Pen or pencil

You need to know:

1. Abbreviations are a short way to write a word.
2. Most abbreviations are made by taking some of the letters out of a word.
3. Some abbreviations are very different from their words.
4. Acronyms are a special kind of abbreviation. Acronyms are words that are made from the first letters of a phrase. Example: WOW stands for War on Waste at the Richmond Nabisco Facility.

Directions:

1. On the next page, put the letter of the abbreviation next to the correct word.

2. Can you think of any abbreviations used in your work area?

3. Add them to the list.

Abbreviations and Symbols

____ 1. Good Manufacturing Procedures	a. MSDS
____ 2. Material Safety Data Sheet	b. OSHA
____ 3. Occupational Safety and Health Administration	c. GMP

Activity: 3 - Personal Word Bank

Objective(s):

1. Transfer information from a source to a document and proofread.
2. Compile and maintain personal word bank of terms, abbreviations and acronyms.

Materials Required:

1. Completed workplace vocabulary list
2. Personal word bank sheets

Directions:

1. Put a check by all the words on your vocabulary list that you need to learn more about.

2. Write the words and their abbreviation (if they have one) in your personal word bank on the page. You can get more sheets as you need them.

3. Proofread (check) the words to be sure you spelled them correctly.

4. Read the headings for each of the columns in the word bank.

5. Fill in the spaces with as much as you now know about each of your words.

6. Each day, add more information to your word bank as you learn more about your words.

7. Each day, add words that you need to learn more about to your word bank. Talk to your facilitator about how many words you should add to your word bank each day.

PERSONAL WORD BANK

WORD	ABBREVIATION OR ACRONYM	WHERE SEEN? (LABEL,FORM,SIGN)	WHERE HEARD? JOB OR DEPT. USED IN	WHAT IS IT?

Activity: 4 - Reading Safety Guidelines

Objective(s):

1. To recognize key words in safety rules.
2. To use logic in completing the meaning of safety rules.
3. To transfer information and proofread.

Materials Required:

1. Nabisco Safety Guidelines Sheet
2. Word List

You need to know:

1. To do any kind of job or task right, you have to know what the terms mean that are being used in the job.
2. You can understand many terms just by the context (the setting in which a word is used).
3. When you come across a new word, underline it or write it down. But don't think about the meaning of the word yet.
4. Read the sentence and understand the idea that is presented.
5. Once you understand the context, guess at the meaning of the new word. Many times you'll be right!

Activity: 4 - Reading Safety Guidelines (continued)

Directions:

1. Read the word list below. Ask for help with words you don't know.

2. Read the rules on the opposite page carefully. Think about the clues you get in each rule. Ask for help with words you don't know.

3. Think about the meaning of each of the rules and then fill in the spaces with a word from the list. Use each word only once.

4. Read the completed rules.

5. Do the rules make complete sense now? Ask for help if you need it.

6. Add any words you had trouble with to your word bank.

Word List

clogs	lounges	medical	extinguisher
minor	qualified	non-skid	fork lifts
spills	littering	production	recommend
posted	prohibited	equipment	open-toed
unsafe	operating	supervision	transporters
smoking	committee	training	safety signs
jewelry	emergency	evacuation	operate

Activity: 4 - Reading Safety Guidelines (continued)

In addition to the key essential safety rules, the following safety guidelines also apply to the Richmond Facility:

1. Observe all _____ and/or restrictions.
2. _____ is only permitted in the following areas: cafeteria, lounges and offices where posted.
3. Only _____ operators are permitted to _____ transporters, forklifts, etc., for their intended use.
4. High-heels, _____, moccasins, sandals, and _____ shoes are _____ while at work. Safe, _____ soles in good condition are _____ for all employees.
5. Report and/or clean up _____ immediately to prevent falls. _____ is prohibited.
6. _____ may not be worn in _____ areas. The only exception is wedding bands.
7. Stop and check for _____ and other moving equipment prior to entering all walkways.
8. Broken/damaged _____ (stools, ladders, etc.) must not be used and must be reported to _ _____ at once for corrective action.
9. All "Safe _____ Procedures" (chemical handling, confined space entry, machine/equipment operation, etc.), as covered in a _____ class or as _____, must be followed.
10. Always be alert to _____ conditions and practices. Notify supervision or a member of the safety _____ of any unsafe condition and/or unsafe act immediately.
11. Know the location of the nearest _____ phone, fire _____, fire exit, and know the facility _____ procedure
12. Report all injuries, regardless of how _____, to your immediate supervisor and/or the _____ department.

The above safety rules and expectations apply to the Richmond Facility and are not all inclusive.

Activity: 4 - Reading Safety Guidelines (continued)

In addition to the key essential safety rules, the following safety guidelines also apply to the Richmond Facility:

1. Observe all **safety signs** and/or restrictions.
2. **Smoking** is only permitted in the following areas: cafeteria, lounges and offices where posted.
3. Only **qualified** operators are permitted to **operate** transporters, forklifts, etc., for their intended use.
4. High-heels, **clogs**, moccasins, sandals, and **open-toed** shoes are **prohibited** while at work. Safe, **non-skid** soles in good condition are **recommended** for all employees.
5. Report and/or clean up **spills** immediately to prevent falls. **Littering** is prohibited.
6. **Jewelry** may not be worn in **production** areas. The only exception is wedding bands.
7. Stop and check for **fork lifts** and other moving equipment prior to entering all walkways.
8. Broken/damaged **equipment** (stools, ladders, etc.) must not be used and must be reported to **supervision** at once for corrective action.
9. All "Safe **Operating** Procedures" (chemical handling, confined space entry, machine/equipment operation, etc.), as covered in a **training** class or as **posted**, must be followed.
10. Always be alert to **unsafe** conditions and practices. Notify supervision or a member of the safety **committee** of any unsafe condition and/or unsafe act immediately.
11. Know the location of the nearest **emergency** phone, fire **extinguisher**, fire exit, and know the facility **evacuation** procedure.
12. Report all injuries, regardless of how **minor**, to your immediate supervisor and/or the **medical** department.

The above safety rules and expectations apply to the Richmond Facility and are not all inclusive.

Activity: 5 - Reading Safety Rules

Richmond Bakery/Distribution Center
Safety Rules and Expectations

The Richmond Facility makes every effort to provide you with working condi-tions that are pleasant and safe. However, you have a personal responsibility as well by following established safety rules and expectations in order to protect yourself and your co-workers from bodily injury. Neglect of your responsibility towards safety and violation of company safety rules cannot be allowed. This is the only way to make our facility a safer and healthier place to live.

The following are KEY ESSENTIAL Safety rules which must be strictly followed. Failure to do so will result in disciplinary action, up to and including discharge.

1. Safety devices and guards may not be removed or bypassed without proper authorization.
2. Compliance with Richmond's Lockout Program is expected of all employees.
3. No one shall at any time, without proper authorization, clean operating equipment within arm's length of any pinch point, conveyor roller or unguarded pulley, chain or sprocket.
4. Only authorized, trained personnel may operate machinery or mechanical equipment. No one shall activate powered equipment without confirming visually or audibly that no one is within arm's length of any moving machinery parts and that all existing guards are in place.
5. Personal protective equipment issued by the company must be worn at all times in areas or jobs where required.
6. No one shall work on or maintain any electrical panel, switch, light fixture, or outlet without de-energizing and locking and tagging out such equipment. No employee shall at any time work on electrical systems above 480V.
7. Air hoses are to be used only for equipment cleaning and not for personal cleaning.
8. No one shall work at heights above six (6) feet (except on a ladder) without some sort of fall restraint.

Activity: 5 - Richmond Bakery Safety Rules - Part I

Objective(s):

1. Read and interpret safety rules.

Materials Required:
Safety Rules and Expectations Handout

Directions:
1. Read the safety handout on the opposite page.

2. Underline any words that you don't know and add those words to your word bank.

3. Ask for help on words that you do not recognize and cannot sound out by yourself.

4. The sentences below are a summary of the rules on the opposite page. Read them carefully.

5. Put the number of the rule by its summary below.

6. Turn this page and check your answers.

_____a. Don't work on electrical current that is more than 480V.
_____b. Be sure no one is close enough to touch any moving parts of a machine before turning the machine on.
_____c. Don't climb higher than six (6) feet above the floor without a railing around you unless you're on a ladder.
_____d. Use air hoses only to clean equipment; not to clean you.
_____e. Get approval to take safety guards off.
_____f. Only approved employees may use machinery.
_____g. Get approval to clean equipment that is within arm's length to a pinch point, conveyor roller or unguarded pulley, chain or sprocket.
_____h. Know and keep the lockout rules.
_____i. Always use your safety equipment while on the job.

Activity 5: Answers
a-6, b-4, c-8, d-7, e-1, f-4, g-3, h-2, i-5

Activity: 6 - Reading to Interpret Richmond Bakery Safety Rules - Part 1

Objective(s):

1. Read and interpret safety rules.
2. Summarize safety rules in the form of a sign.
3. Assign an appropriate color to each safety sign.

Materials Required:

1. Completed Activity 5 materials
2. Blank signs
3. Sign words

Directions:

1. Read the signs on the opposite page.

2. Review the bakery safety rules from Activity 5.

Activity: 6 - Reading to Interpret Richmond Bakery Safety Rules - Part 2

Directions: (continued)

3. Use the blank spaces below to create a safety sign for each of the bakery rules.

4. Choose from the signs and words on the opposite page or use your own words.

5. Be sure the sign you make for each rule is a good summary of that rule.

6. After you make the signs, think about the best color for each sign to be. Write the name of the color on the sign.

7. Discuss with your group where you think the signs should be placed in the bakery. Refer to the rules.

Rule 1			Rule 6
Rule 2			Rule 7
Rule 3			Rule 8
Rule 4			Bonus Rule ☺
Rule 5			Bonus Rule☺

Actvity: 6 - Reading to Interpret Richmond Bakery Safety Rules - Part 2 - Signs

HOLD	CAUTION RESTRAINT NEEDED	AUTHORIZED PERSONNEL ONLY
THINK	STOP HIGH VOLTAGE - 480V	HIGH VOLTAGE
DANGER	STOP ! VOLTAGE > 480V	DO NOT ENTER
KEEP OUT	OBEY LOCKOUT	LOOK OUT FOR TRUCKS
LUNCH BREAK	AUTHORIZED USE ONLY	HANDLE WITH CARE
MACHINE #	APPROVED CLEANING ONLY	LOAD LIMITS _____LBS.
MISSION	NO SMOKING	RETURN TO STORAGE
TARE 575	REJECTED	CAUTION - HIGH VOLTAGE
FRAGILE	STAY AWAY - MOVING PARTS	EQUIPMENT USE ONLY
FIRE EXIT	KEEP HANDS CLEAR	SAFETY GEAR REQUIRED
DANGER - HOT	QUALITY FIRST	STOP - LOOK - LISTEN •ON
DO NOT SHIP	NO. _____ SHIPPERS	DO NOT REMOVE
DO NOT USE	KEEP GUARD IN PLACE	STOP HIGH VOLTAGE LOCKOUT

BLUE

READING

Activity - Oreo Story

Objective - To have participants practice reading comprehension skills.

Directions - 1. Read the newspaper article on the next page.

2. Answer the following questions about the article.

True or False

_____ 1. The most popular way to eat Oreos is with milk.

_____ 2. The second most popular way to eat Oreos is with coffee.

_____ 3. Generally, most women prefer to twist their Oreos while most of the dunkers are men.

_____ 4. Many Oreos eaters eat the cookies with peanut butter.

_____ 5. A majority of people who twist their Oreos eat the frosted side first.

_____ 6. After twisting, dumking and nibbling Oreos, the other most popular way to eat Oreos is whole.

_____ 7. Fewer than 100,000 people participated in this survey.

_____ 8. The people who participated in this survey filled out a post card and sent it in.

_____ 9. Which of the graphs on the following page best illustrates the way Americans prefer to eat their Oreos. (Put the letter in the blank.)

FLAVOR

Callers tell of twisting, dunking, nibbling Oreos

BY KAREN SHIDELER
KNIGHT-RIDDER NEWSPAPERS

DO WE KNOW how to eat our Oreos or what?

Well, OK, a third of us know you're supposed to twist.

Hey, it's a fact.

More than 174,000 people called a toll-free telephone number to register their opinions on the way to eat Oreos, obviously making the poll highly scientific. "Plus or minus some decimal point," agreed John Barrows, who is on the Nabisco public relations team. "Pinpoint accuracy."

Those who called were asked to choose among twisting, dunking, nibbling or "other." If they chose "other," their comments were recorded. Some, you don't want to know about (Oreos and horseradish).

"We discovered that Americans as a whole prefer to twist by 35 percent, followed by dunking at 30 percent. Nibbling came in last at 16 percent. And 'other' methods actually came in third at 19 percent," Barrows said.

Women twist; men dunk. Except in El Paso, Texas, and Springfield, Mo., where it's the other way around. "We don't know what to make of that," Barrows said.

In Chicago, they dunk. And "every significant city in Pennsylvania registers as a dunking city."

The nibblers are Norfolk; Oklahoma City; Savannah, Ga.; and Kingsport-Johnson City, Tenn.

Denver and Salt Lake City are among the places people prefer those "other" methods.

"The most popular 'other' was probably eating them whole. One pop," Barrows said.

And lots of people have to have their Oreos with something, Barrows found in reading the 28,000 transcribed "other" replies. "Of course, the No. 1 combination obviously was Oreos and milk." Obviously. The second most popular was Oreos and peanut butter.

Peanut butter?

"That's what I said, and I never in a million years would have tried it," said Barrows, who – in the name of job dedication – did. "And you know, it's actually quite good."

The peanut butter group fell into two subspecies: Those who use the Oreo like a chip and the peanut butter like a dip, and those who crack open the cookie, spread a precise amount on one side and put the cookie back together.

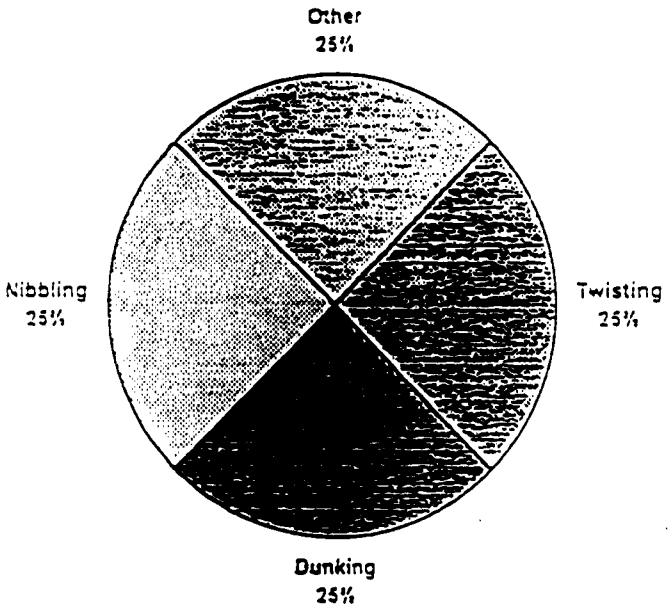
Also among the other combinations: Oreos with salsa. Oreos with beer. Oreos with coffee. And the aforementioned horseradish. "I think we had a list of 60 different things. . . . And no, I haven't tried hardly any of them." Barrows eats his Oreos "the good, old-fashioned way: three bites. Three even bites. No twisting, no dunking."

Nabisco didn't bother to ask twisters which side of the cookie should be eaten first – the plain side or the frosting side. "We figured this was enough information to compile this year," Barrows said. "We are thinking about doing further study next year."

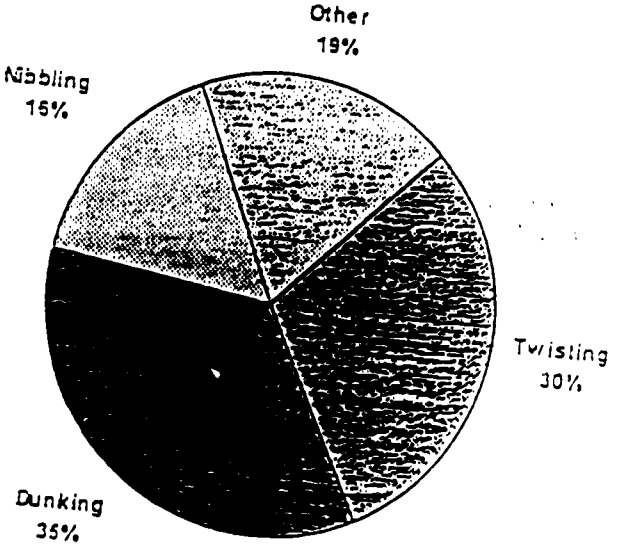
In the informal poll, dunking was the second-most popular method of eating Oreos.

In Chicago, they dunk. The nibblers are Norfolk; Oklahoma City; Savannah, Ga.; and Kingsport-Johnson City, Tenn.

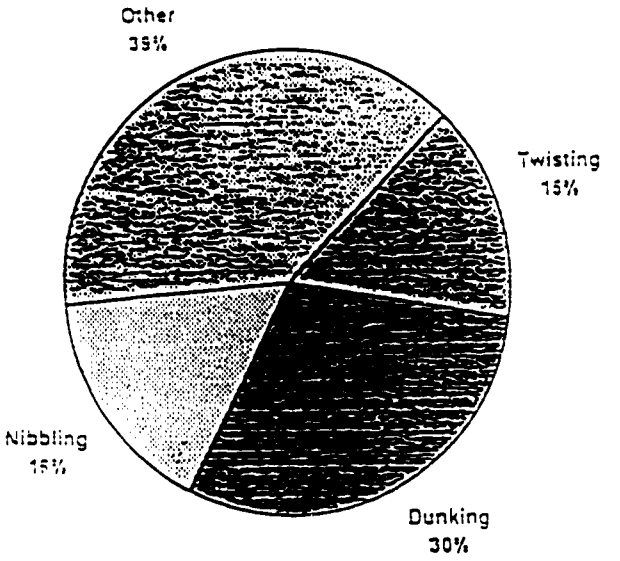
A.


Other
25%
Nibbling
25%
Twisting
25%
Dunking
25%

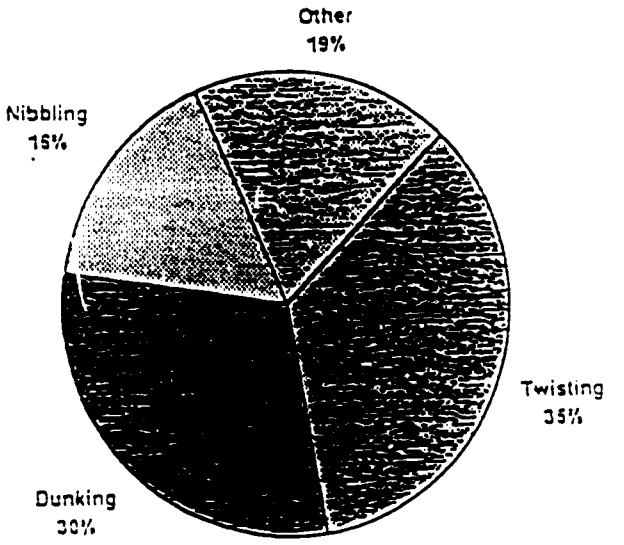
B.


Other
19%
Nibbling
16%
Twisting
30%
Dunking
35%

C.


Other
35%
Twisting
15%
Nibbling
15%
Dunking
30%

D.


Other
19%
Nibbling
15%
Twisting
35%
Dunking
30%

PINK

Reading Comprehension - Reading MSDS

Activity 1- Becoming Familiar with a Material Data Safety Sheet (MSDS)

Objective (s): This activity will enable participants

1. To understand the importance of a MSDS sheet.

2. To become familiar with a MSDS sheet.

Material Needed: pencil

Directions: Read the paragraph below. Think about the information you are reading. Consider what important points are presented. Then answer the questions. You may refer back to the paragraph, if you missed some details in reading.

Material Data Sheets are Important

In some work environments it is necessary for employees to handle or use hazardous chemicals. For example, at Nabisco the Environmental Health & Safety Department's Sanitation and Utility Technicians use various chemicals to sanitize areas and equipment. To succeed in doing a good and safe job, the technicians must understand how to use chemicals in a safe way. That's why the hazardous chemicals have their very own Material Safety Data Sheet (MSDS). MSDS are very important to Nabisco employees because they provide written information (or data) about how to use, handle, and store the chemical safely. Each MSDS may look a little different, but they all give the same basic information. If a sanitation employee has questions about a MSDS sheet, he/she should ask a supervisor. The sheet has the following sections:

1. Chemical Identification
2. Hazardous Ingredients
3. Physical Data
4. Fire & Explosion Data
5. Health Hazards
6. Reactivity Data
7. Spill or Leak Procedures
8. Special Protection
9. Special Precautions

Questions: Please fill in the blank or check the correct answer.

1. After reading the paragraph, what is your definition of a MSDS sheet?_____

2. What are the major sections of a MSDS sheet?_____
_____
_____

3. Why are MSDS sheets important?_____
_____
_____

4. If an employee has a question about a MSDS sheet, who should he/she ask?_____

5. Why do you think it is important to read a MSDS sheet?
_____

6. Every hazardous chemical used at Nabisco has a MSDS sheet that is organized in the same way? True____ False____

7. The MSDS sheet tells you how to use_____, _____ and _____the chemical safely.

8. What can you find out by reading a MSDS Sheet?_____
_____

9. Most MSDS sheets have nine basic sections of information.
True____ False____

Activity 2 - Understanding the Contents of the MSDS Sheets

Objective (s): This activity will enable participants

1. The become familiar with the contents of MSDS.

2. To understand how most material data sheets are organized.

Materials Needed: MSDS sheet contents handout, MSDS with missing section names, pencils

Directions: Read the handout about the sections of a MSDS sheet. Notice the names of the sections in **BOLD face type**.

Contents of a Material Safety Data Sheet

The MSDS for each hazardous chemical in your work area tells you how to use, handle, and store the chemical safely. Each MSDS may look a little different, but all give you the same basic information. Read the information below to learn more about what's included in the different sections of a MSDS sheet. If you have any specific questions, you can check with your supervisor.

Chemical Identification. The first section of the MSDS helps you identify the chemical. It lists the name of the chemical, any trade names, and the chemical manufacturer's name and address. This section may also list an emergency telephone number.

Hazardous ingredients. This section lists what's in the chemical that can harm you. It also lists the concentration of the chemical to which you an safely be exposed, often listed as the ***permissible exposure limit (PEL)*** or the *threshold limit value (TLV)*. These safe exposure limits are usually figured for average exposures over a typical work shift.

Physical Data. This section describes the chemical's appearance, odor, and other characteristics, ***percent volatile***, for instance, is how much of the chemical evaporates at room temperature. It can be harmful if inhaled. Respiratory protection or extra ventilation may be needed.

Contents of a Material Safety Data Sheet

Fire & Explosion Data. Here you can find at what temperature the chemical ignites called the ***flash point***. If a chemical is **flammable**, it ignites below 100°F. If it's ***combustible*** it ignites at 100°F or above. This section also lists **extinguishing media** - what will put out the fire safely- such as water spray, foam, or other type fire extinguisher.

Health Hazards. This section lists symptoms of overexposure, such as skin rash, burn, headache, or dizziness. It also tells you first aid and emergency procedures in case of overexposure, such as flushing your exposed skin running water for 15 minutes. It may also list any medical conditions that can be aggravated by exposure to the chemical.

Reactivity Data. Here you'll find whether the chemical "reacts" with materials or conditions. ***Incompatibility*** lists the materials, such as water or other chemicals, that cause the chemical to burn, explode, or release dangerous gases. ***Instability*** lists the environmental conditions, such as heat or direct sunlight, that cause a dangerous reaction.

Spill or Leak Procedures. This section tells you what to use to clean up an accidental spill or leak. No matter what the chemical is, always notify your supervisor right away. Before cleaning up a chemical spill, you may need to wear respiratory protection, gloves, safety goggles, or protective clothing. This section may also include notes on how to dispose of the chemical safely.

Contents of a Material Safety Data Sheet

Special Protection. Here you'll find a listing of any personal protective equipment (respiratory protection, gloves, eye protection) you need to work safely with the chemical. If protective equipment is needed, this section may list the specific types that are recommended, such as full-face mask respirator, rubber gloves, and chemical safety goggles.

Special Precautions. This section lists any other special precautions to follow when handling the chemical. This may include what to have nearby to clean up a spill or put out a fire, and what safety signs to post near the chemical. This section also lists any other health and safety information not covered in other parts of the MSDS.

Activity 3 - Identifying & Understanding the Contents of a MSDS Sheet

Objective (s): This activity will enable particpants

1. To become familiar with the contents of a MSDS.

2. To understand how most material data sheets are organized.

Material Needed: Sheets with missing section names, pencils

Directions: Use the handout you just READ from Activity 2 about the contents of MSDS sheets. Now, fill in the missing section names on the MSDS sheets provided.

Material Safety Data Sheet

Haarmann & Reimer
A MILES INC. COMPANY
77 Diamond Road
Springfield, New Jersey 07

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

Hazard Present: 1 Hazard I
Health: 1 0 = Insign
Flammability: 0 1 = Slight
Reactivity: 0 2 = Moder
3 = Seriou
4 = Severe

I.

A. PRODUCT NAME : 263??? DARITEEN NOF-247H(COLORED)

B. CHEMICAL NAME : ENZYME MODIFIED CHEDDAR CHEESE (PROCESSED CHEESE TY

C. CLASSIFICATION : FLAVOR MATERIAL

D. CAS NO. : NA

II.

A. FLASH POINT (CC / DEG F) : NF

B. EXTINGUISHING MEDIA : (Y) H2O FOG; (Y) FOAM; (Y) CO2; (Y) DRY CHEM

C. SPECIAL PROCEDURES/UNUSUAL HAZARDS : USE SELF CONTAINED BREATHING APPARATUS. FIRE WILL GENERATE CO, CO2, AND SMOKE.

D. STABILITY : STABLE UNDER NORMAL CONDITIONS OF STORAGE AND USE.

E. CONDITIONS/MATERIALS TO AVOID : AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

F. HAZARDOUS POLYMERIZATION POTENTIAL : NONE.

III.

A. EYE : SAFETY GLASSES

B. SKIN : OIL/SOLVENT RESISTENT GLOVES.

C. RESPIRATORY : RESPIRATORY : NOT REQUIRED

D. OTHER : USE IN A WELL VENTILATED AREA.

E. EXPOSURE LIMITS : NOT ESTABLISHED.

Material Safety Data Sheet

Haarmann & Reimer
A MILES INC. COMPANY
[illegible]

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1555

PRODUCT : 263092

Hazard Present:
Health: 1
Flammability: 0
Reactivity: 0

Hazard
0 = [illegible]
1 = Slig
2 = Mod
3 = Ser
4 = Sev

IV.

A. INHALATION EXPOSURE : REMOVE TO FRESH AIR.

B. EYE CONTACT : FLUSH WITH WATER FOR 15 MINUTES. CONSULT PHYSICIAN IRRITATION CONTINUES.

C. SKIN CONTACT : WASH WITH SOAP AND WATER.

D. OTHER : NONE.

V.

A. INGREDIENTS(S) POSING HAZARD : NOT APPLICABLE.

B. ROUTE OF EXPOSURE AND EFFECTS OF OVEREXPOSURE : PROLONGED OR REPEA CONTACT MAY CAUSE SKIN IRRITATION. MAY CAUSE EYE IRRITATION.

VI.

A. APPEARANCE AND ODOR : CREAM COLORED PASTE

B. PHYSICAL PROPERTIES : NP

VII.

A. SPILLS AND LEAKS : COLLECT ONTO INERT ABSORBENT. PLACE INTO A SUITABLE CONTAINER.

B. DISPOSAL : DISPOSE OF IN ACCORDANCE WITH LOCAL REGULATIONS.

VIII.

KEEP CONTAINERS TIGHTLY CLOSED, STORE IN A COOL DRY AREA AWAY FROM HEAT AND DIRECT SUNLIGHT.

Material Safety Data Sheet
May be used to comply with
OSHA's Hazard Communication Standard,
29 CFR 1910.1200. Standard must be
consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name AJINOMOTO CO., INC.	Emergency Telephone Number NJ OFFICE : 201-455-1212
Address (Number, Street, City, State, and ZIP Code) TOKYO, JAPAN	Telephone Number for Information NJ OFFICE : 201-455-1212
	Date Prepared 3-28-91
	Signature of Preparer (optional)

Section II —

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
MONOSODIUM L-GLUTAMATE MONOHYDRATE (MONOSODIUM GLUTAMATE)				

Section III — Physical/Chemical Characteristics

Boiling Point	SOLID	Specific Gravity (H_2O = 1)	1.62
Vapor Pressure (mm Hg.)	28.1825*	Melting Point	450 F 232 C
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	NONE

Solubility in Water
17g/100g H_2O at 25°C

Appearance and Odor
WHITE OR ALMOST WHITE NEEDLES OR POWDER WITH A SLIGHT PEPTONE ODOR

Section IV —

Flash Point (Method Used) NOT ESTABLISHED	Flammable Limits NON-FLAMMABLE	LEL	UEL

Extinguishing Media
IF INVOLVED IN FIRE, WATER OR CO_2 MAY BE USED

Special Fire Fighting Procedures
NONE SPECIAL, NONE NORMALLY REQUIRED

Unusual Fire and Explosion Hazards

Section V —

Stability	Unstable		Conditions to Avoid
	Stable X		DECOMPOSES AT TEMPERATURES ABOVE 375°

Incompatibility (Materials to Avoid) NONE REPORTED

Hazardous Decomposition or Byproducts NONE

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	NONE

Section VI —

Route(s) of Entry: Inhalation? Skin? Ingestion? X

Health Hazards (Acute and Chronic)

GENERALLY RECOGNIZED AS SAFE

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated? NO

Signs and Symptoms of Exposure

NONE. EXCESSIVE CONTACT MAY CAUSE EYE IRRITATION.

Medical Conditions Generally Aggravated by Exposure

NONE

Emergency and First Aid Procedures NON-TOXIC SUBSTANCE. FLUSH EYE WITH PLENTY OF WATER---

AND GET MEDICAL ATTENTION IF LARGE AMOUNT IS INGESTED

Section VII —

Steps to Be Taken in Case Material Is Released or Spilled

ORDINARY. NO HAZARD RESULTS FROM SPILLAGE.

Waste Disposal Method SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR

RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH INTO SEWER

Precautions to Be Taken in Handling and Storing

STORE UNDER NORMAL CONDITIONS OF TEMPERATURE AND HUMIDITY IN CLOSED

Other Precautions CONTAINERS.

Section VIII —

Respiratory Protection (Specify Type) UNNECESSARY OR APPROVED NUISANCE MASK

Ventilation	Local Exhaust DUST EXHAUST SYSTEM		Special
ORDINARY	Mechanical (General)		Other

Protective Gloves UNECESSARY. NOT REQUIRED Eye Protection NON_SPECIFY (CHEM. GOGGLE

Other Protective Clothing or Equipment NONE

Work Hygienic Practices NONE

Activity 4 - Becoming Familiar with the Contents of a MSDS Sheets

Objective (s): This activity will enable participants

1. To practice reading different MSDS Sheets.

2. To practice indentifying the sections of the MSDS Sheets.

Materials Needed: MSDS sheets, color highlighters

Directions: Read through the MSDS sheets provided. Pay close attention to the section names. Use different color highlighters to mark the sections of the sheet as directed by the chart below. You may recognize two of the sheets from Activity 3. However, this time all of the section names are on the sheets.

MSDS Sheet Section		Highlighter Color
1.	Chemical Identification	Red
2.	Hazardous Ingredients	Green
3.	Physical Data	Blue
4.	Fire & Explosion Data	Red
5.	Health Hazards	Green
6.	Reactivity Data	Blue
7.	Spill or Leak Procedures	Red
8.	Special Protection	Green
9.	Special Precautions	Blue

Material Safety Data Sheet

Haarmann & Reimer
A MILES INC. COMPANY
70 Diamond Road
Springfield, New Jersey 07081

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

Hazard Present
Hazard Ra
0 = Insignific
1 = Slight
2 = Moderat
3 = Serious
4 = Severe

I. IDENTIFICATION

A. PRODUCT NAME : 263092 DAIRITEEN NCF-247M(COLORED)

B. CHEMICAL NAME : ENZYME MODIFIED CHEDDAR CHEESE (PROCESSED CHEESE TYP

C. CLASSIFICATION : FLAVOR MATERIAL

D. CAS NO. : NA

II. FIRE, EXPLOSION, AND REACTIVITY DATA

A. FLASH POINT (CC-/-DEG-F) : NF

B. EXTINGUISHING MEDIA : (Y) H2O FOG; (Y) FOAM; (Y) CO2; (Y) DRY CHEMIC

C. SPECIAL PROCEDURES/UNUSUAL HAZARDS : USE SELF CONTAINED BREATHING APPARATUS. FIRE WILL GENERATE CO, CO2, AND SMOKE.

D. STABILITY : STABLE UNDER NORMAL CONDITIONS OF STORAGE AND USE.

E. CONDITIONS/MATERIALS TO AVOID : AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

F. HAZARDOUS POLYMERIZATION POTENTIAL : NONE.

III. PROTECTION INFORMATION AND EQUIPMENT

A. EYE : SAFETY GLASSES

B. SKIN : OIL/SOLVENT RESISTENT GLOVES.

C. RESPIRATORY : RESPIRATORY : NOT REQUIRED

D. OTHER : USE IN A WELL VENTILATED AREA.

E. EXPOSURE LIMITS : NOT ESTABLISHED.

H&R

Material Safety Data Sheet

Haarmann & Reimer
A MILES INC. COMPANY
70 Diamond Road
Springfield, New Jersey 07081

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

PAGE : 2

PRODUCT : 263092

Hazard Present
Health: 1
Flammability: 0
Reactivity: 0

Hazard Rating
0 = Insignificant
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

IV. EMERGENCY FIRST AID

A. INHALATION EXPOSURE : REMOVE TO FRESH AIR.

B. EYE CONTACT : FLUSH WITH WATER FOR 15 MINUTES. CONSULT PHYSICIAN IF IRRITATION CONTINUES.

C. SKIN CONTACT : WASH WITH SOAP AND WATER.

D. OTHER : NONE.

V. HEALTH HAZARD DATA

A. INGREDIENTS(S) POSING HAZARD : NOT APPLICABLE.

B. ROUTE OF EXPOSURE AND EFFECTS OF OVEREXPOSURE : PROLONGED OR REPEATED CONTACT MAY CAUSE SKIN IRRITATION. MAY CAUSE EYE IRRITATION.

VI. PHYSICAL DATA

A. APPEARANCE AND ODOR : CREAM COLORED PASTE

B. PHYSICAL PROPERTIES : NF

VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

A. SPILLS AND LEAKS : COLLECT ONTO INERT ABSORBENT. PLACE INTO A SUITABLE CONTAINER.

B. DISPOSAL : DISPOSE OF IN ACCORDANCE WITH LOCAL REGULATIONS.

VIII. HANDLING AND STORAGE PROCEDURES

KEEP CONTAINERS TIGHTLY CLOSED. STORE IN A COOL DRY AREA AWAY FROM HEAT AND DIRECT SUNLIGHT.

Material Safety Data Sheet

Haarmann & Reimer C
A MILES INC. COMPANY
70 Diamond Road
Springfield, New Jersey 07081

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

PAGE : 3

PRODUCT : 263092

Hazard Present	Hazard Rati
Health: 1	0 = Insignificar
Flammability: 0	1 = Slight
Reactivity: 0	2 = Moderate
	3 = Serious
	4 = Severe

THIS INFORMATION IS ACCURATE TO THE BEST KNOWLEDGE OF HAARMANN & REIMER CORPORATION. IT IS THE USER'S RESPONSIBILITY TO DETERMINE SAFE CONDITIONS FOR USE OF THIS PRODUCT.

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name AJINOMOTO CO., INC.	Emergency Telephone Number NJ OFFICE : 201-488-1212
Address (Number, Street, City, State, and ZIP Code) TOKYO, JAPAN	Telephone Number for Information NJ OFFICE : 201-488-1212
	Date Prepared 3-28-91
	Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
MONOSODIUM L-GLUTAMATE MONOHYDRATE (MONOSODIUM GLUTAMATE)				

Section III — Physical/Chemical Characteristics

Boiling Point	SOLID	Specific Gravity (H_2O = 1)	1.62
Vapor Pressure (mm Hg.)	26 @ 25°	Melting Point	450°F
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	NONE

Solubility in Water
17g/100g H_2O at 25°C

Appearance and Odor
WHITE OR ALMOST WHITE NEEDLES OR POWDER WITH A SLIGHT PEPTONE ODOR

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used) NOT ESTABLISHED	Flammable Limits NON-FLAMMABLE	LEL	UEL

Extinguishing Media
IF INVOLVED IN FIRE, WATER OR CO_2 MAY BE USED

Special Fire Fighting Procedures
NONE SPECIAL, NONE NORMALLY REQUIRED

Unusual Fire and Explosion Hazards
NONE REPORTED

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		
	Stable	X	DECOMPOSES AT TEMPERATURES ABOVE 375°

Incompatibility (*Materials to Avoid*) NONE REPORTED

Hazardous Decomposition or Byproducts NONE

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	X	NONE

Section VI — Health Hazard Data

Route(s) of Entry:	Inhalation?	Skin?	Ingestion?
			X

Health Hazards (*Acute and Chronic*)

GENERALLY RECOGNIZED AS SAFE

Carcinogenicity:	NTP?	IARC Monographs?	OSHA Regulated?
			NO

Signs and Symptoms of Exposure

NONE. EXCESSIVE CONTACT MAY CAUSE EYE IRRITATION.

Medical Conditions Generally Aggravated by Exposure

NONE

Emergency and First Aid Procedures NON-TOXIC SUBSTANCE. FLUSH EYE WITH PLENTY OF WATER--

AND GET MEDICAL ATTENTION IF LARGE AMOUNT IS INGESTED

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

ORDINARY. NO HAZARD RESULTS FROM SPILLAGE.

Waste Disposal Method

SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH INTO SEWER

Precautions to Be Taken in Handling and Storing

STORE UNDER NORMAL CONDITIONS OF TEMPERATURE AND HUMIDITY IN CLOSED CONTAINERS

Other Precautions

Section VIII — Control Measures

Respiratory Protection (*Specify Type*) UNNECESSARY OR APPROVED NUISANCE MASK

Ventilation			
	Local Exhaust	DUST EXHAUST SYSTEM	Special
ORDINARY	Mechanical (General)		Other

Protective Gloves	UNECESSARY, NOT REQUIRED	Eye Protection	NON SPECIFY (CHEM. GOGGLE

Other Protective Clothing or Equipment NONE

Work/Hygienic Practices NONE

Material Safety Data Sheet

Required under USDL Safety and Health Regulations for Shipyard Employment (29 CFR 1915)

U.S. Department of Labor

Occupational Safety and Health Administration

OMB No. 1218-00
Expiration Date 05/31/

Section I

Manufacturer's Name: Lyofem, Inc.

Emergency Telephone Number: (317) 330-9578

Address (Number, Street, City, State, and ZIP Code): 3362 E. Washington St. Indianapolis, IN 46201

Chemical Name and Synonyms:

Trade Name and Synonyms: "Sour Start"

Chemical Family: Carbohydrate and Protein

Formula: Cultur

Section II - Hazardous Ingredients: None

Pigments, Preservatives, and Solvents	%	TLV (Units)	Alloys and Metallic Coatings	%	TLV (Units)
Pigments			Base Metal		
Catalyst			Alloys		
Vehicle			Metallic Coatings		
Solvents			Filler Metal Plus Coating or Core Flux		
Additives			Others		
Others					

Hazardous Mixtures of Other Liquids, Solids or Gases

N/A

	%	TLV (Units)

Section III - Physical Data

Boiling Point (°F)		Specific Gravity (H2O=1)	
N/A		N/A	
Vapor Pressure (mm Hg.)		Percent Volatile by Volume (%)	
N/A		(% Moisture)	7%
Vapor Density (Air=1)		Evaporation Rate	
N/A		_____ (=1)	

Solubility in Water

Complete

Appearance and Odor

Off-white powder with typical flour odor

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
N/A	N/A		

Extinguishing Media

Water CO2 Dry chemical

Special Fire Fighting Procedures

N/A

Unusual Fire and Explosion Hazards

None

601

Section V - Health Hazard Data

Threshold Limit Value

N/A

Effects of Overexposure

N/A

Emergency First Aid Procedures

None relating to this product

Section VI - Reactivity Data

Stability	Unstable		Conditions to Avoid N/A
	Stable	x	

Incompatability (Materials to Avoid)

N/A

Hazardous Decomposition Products

N/A

Hazardous Polymerization	May Occur		Conditions to Avoid N/A
	Will Not Occur	x	

Section VII - Spill or Leak Procedures

Steps to be Taken in Case Material is Released or Spilled

Wipe, sweep, vacuum

Waste Disposal Method

Normal dry waste disposal

Section VIII - Special Protection Information

Respiratory Protection (Specify Type)

Ventilation	Local Exhaust: Not needed	Special
	Mechanical (General)	Other

Protective Gloves: Not needed

Eye Protection: Not needed

Other Protective Equipment

Section IX - Special Precautions

Precautions to be Taken in Handling and Storing

No special precautions

Other Precautions

N/A

Activity 5 - Identifying the Contents of a Material Safety Data Sheet (MSDS)

Objective (s): This activity will enable particpants

1. To practice identifying the sections of MSDS Sheets.

Materials Needed: MSDS Sheets

Directions: Answer these questions noting what section of a MSDS Sheet you would find the information. Remember that most MSDS sheets have nine sections. Some information such as regulatory information or how to transport the mateiral maybe included in the special precautions or a separate section. Put the letter that corresponds to the correct section of the MSDS in the space provided.

a. Chemical Identification (General Information)
b. Hazardous Ingredients
c. Physical Data
d. Fire & Explosion Data
e. Health Hazards (Toxicity Information)
f. Reactivity Data
g. Spill or Leak Procedures
h. Special Protection
i. Special Precautions (Regulatory & Transport Information)

1.____What special protection should be worn when handling chemicals?

2.____How to clean up a chemical spill?

3.____What conditions may make a chemcical explode?

4.____Where and how to store a particular chemical?

5.____Is the chemical hazardous to may health?

6.____Who is the manufacturer of the chemical?

7.____What kind of a chemcial am I working with?

8.____What extra precautions should I take when handling a chemical?

9.____What other kind of name the chemical may be called on the market?

10.____What is the make-up or ingredients of a particular chemical?

Activity 6 - Working with MSDS Sheets

Objective (s): This activity will enable participants

1. To practice reading MSDS Sheets.

Materials Needed: Pencil, MSDS Sheet for Limonene, Sodium Chloride and Solution S0636, PA-2.

Directions: Read and MSDS sheets provided. Notice the names of the sections as you read these sheets. Then answer the questions below for each of the products below.

Limonene

1. What is the this product's boiling point?_____

2. In what section did you find the boiling point information?_____
   _____

3. What precautions should be takens when handling and storing this product?_____
   _____
   _____

4. What is the extinguishing media for this product?_____

5. In what section did you find information about theextinguishing media?_____

Sodium Chloride

1. Is this product regulated under OSHA Hazard Communication Standard?_____ _____

2. This product can be described as a white crystalline solid with slight halogen odor? Yes____ No_____

3. What kind of medical conditions can be aggravated by exposure to this product?_____

4. What steps should be taken if this product is released or spilled?_____

_____

_____

5. Gloves, goggles, and protective clothing must be worn when handling this chemical? True____ False____

Solution S0636, PA,2

1. What is the precautionary label on this solution?_____

_____

2. Does this solution have color? Yes____ No____

3. This solution is regulated by OSHA. True____ False____

4. What is the spill control or recovery for this solution?_____

_____

MATERIAL SAFETY DATA SHEET : FRESH FORCE PAGE : 01

(073480-0110P -30114135-1740)	DATE OF ISSUE 01/15/85	SUPERSEDES 12/05/84

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS
N/A

TRADE NAME & SYNONYMS
FRESH FORCE

CHEMICAL FAMILY
ORANGE TERPENE SOLUTION

FORMULA
X<--MIXTURE

MANUFACTURERS NAME:
MANTEK, DIVISION OF NCH CORP.

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
BOX 152170
IRVING, TEXAS 75015

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
C KERINS/CHEMIST	1740	214-438-1331

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS.

CHEMICAL NAME (INGREDIENTS) :
D-LIMONENE

HAZARD----->COMB/IRR. STEL(TWA)- ->N/E	TLV--->50 PPM CAS#-->5989-27-5	PEL-->N/E	2.

CHEMICAL NAME (INGREDIENTS) :
HEXYLENE GLYCOL

HAZARD----->IRR. STEL(TWA)- ->N/E	TLV--->25 PPM CAS#-->107-41-5	PEL-->N/E	2.

CHEMICAL NAME (INGREDIENTS) :
DIETHANOLAMINE SALT OF TALL OIL FATTY ACID

HAZARD----->IRR. STEL(TWA)- ->N/E	TLV--->N/E CAS#-->61790-69-7	PEL-->N/E	2.

CHEMICAL NAME (INGREDIENTS) :
TRIETHANOLAMINE SALT OF TALL OIL FATTY ACID

HAZARD----->IRR. STEL(TWA)- ->N/E	TLV--->N/E CAS#-->68132-46-7	PEL-->N/E	2.

FRESH FORCE

(CONTINUED) SECTION II- HAZARDOUS INGREDIENTS PAGE : 02

SECTION IIA - NON-HAZARDOUS INGREDIENTS

NON-HAZARDOUS INGREDIENT NAMES AND CAS NUMBERS ARE PROTECTED UNDER NJ TRADE SECRET REGISTRY # --409350-5009P

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	375:F	SPEC GRAVITY (H2O=1)	0.85
VAPOR PRESSURE (MM HG).	5	COLOR	ORANGE
VAPOR DENSITY (AIR=1)	5	ODOR	ORANGE
PH + 100%	@10%=8.5	CLARITY	TRANSPARENT
PERCENT, VOLATILE BY VOLUME (%)	80	EVAPORATION RATE (BU AC = 1)	0.01
SOLUBILITY IN WATER	EMULSION		
VISCOSITY	SEMI-VISCOUS		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS	LEL	UEL
119:F T.C.C.	D-LIMONENE	0.7	6.1

EXTINGUISHING MEDIA
X<--FOAM X<--ALCOHOL FOAM X<--CO2 X<--DRY CHEMICAL <--WATER SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE IN THE POSITIVE PRESSURE MODE.

UNUSUAL FIRE & EXPLOSION HAZARDS
BURNING MAY PRODUCE OXIDES OF CARBON, SULFUR AND NITROGEN. VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL TO DISTANT IGNITION SOURCES AND FLASHBACK. DO NOT SPRAY A DIRECT STREAM OF WATER INTO PRODUCT AS FROTHING MAY OCCUR.

NFPA HAZARD RATING (0=INSIGNIFICANT;1=SLIGHT;2=MODERATE;3=HIGH;4=EXTREME):
1 <--HEALTH 2 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

THRESHOLD LIMIT VALUE :

NOT ESTABLISHED FOR MIXTURE. SEE SECTION II.

EFFECTS OF OVEREXPOSURE

- ACUTE - (SHORT TERM EXPOSURE)

<>EYE CONTACT: CAUSES IRRITATION, REDNESS, TEARING, SEVERE DISCOMFORT, AND POSSIBLE CORNEAL INJURY <>

-SKIN CONTACT: MAY CAUSE IRRITATION, SKIN AS REDNESS, ITCHING, AND SWELLING. MAY CAUSE AN ALLERGIC SKIN REACTION.

- INGESTION: MAY CAUSE IRRITATION OF MOUTH AND THROAT. ABDOMINAL PAIN, NAUSEA, DIZZINESS, AND LOSS OF CONSCIOUSNESS. INGESTION OF THIS PRODUCT CAN LEAD TO ASPIRATION SUCH THAT VOMITING OR SWALLOWING THIS PRODUCT CAN LEAD CHEMICAL PNEUMONITIS, AND MAY BE FATAL.

INHALATION: MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT SEEN AS COUGHING AND SNEEZING. MAY CAUSE ALLERGIC RESPIRATORY REACTION IF INHALED.

- CHRONIC - (LONG TERM EXPOSURE)

#MAY AGGRAVATE EXISTING SKIN AND RESPIRATORY CONDITIONS.#

#TARGET ORGANS: NONE KNOWN.

#REPEATED EXPOSURE TO THIS PRODUCT MAY PRODUCE SKIN AND RESPIRATORY SENSITIZATION.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION X<-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :

REMOVE FROM THE AREA TO FRESH AIR. SEEK MEDICAL ATTENTION IF RESPIRATORY IRRITATION DEVELOPS OR IF BREATHING BECOMES DIFFICULT.

EYE CONTACT:

IMMEDIATELY RINSE THE EYES WITH WATER. REMOVE ANY CONTACT LENSES AND CONTINUE FLUSHING FOR AT LEAST 15 MINUTES. HOLD THE EYELIDS APART TO ENSURE RINSING OF THE ENTIRE SURFACE OF THE EYES AND LIDS WITH WATER. GET IMMEDIATE MEDICAL ATTENTION.

SKIN CONTACT:

WASH AFFECTED AREAS WITH PLENTY OF SOAP AND WATER FOR SEVERAL MINUTES. REMOVE AND CLEAN CONTAMINATED CLOTHING AND SHOES. SEEK MEDICAL ATTENTION IF IRRITATION DEVELOPS.

INGESTION :

GIVE 3 TO 4 GLASSES OF WATER, BUT DO NOT INDUCE VOMITING. IF VOMITING OCCURS, GIVE FLUIDS AGAIN. GET IMMEDIATE MEDICAL ATTENTION IF DISCOMFORT.

NOTES TO PHYSICIAN :

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	CSHA	ACGIH	OTHER
<--YES	<--YES	<--YES	<--YES	<--YES
X<--NO	X<--NO	X<--NO	X<--NO	X<--NO

D-LIMONENE :
ORL-RAT LD50: 4400 MG/KG 3.
SKN-RBT LD50: 5000 MG/KG 3.
IPR-RAT LD50: 3600 MG/KG 3.
IVN-RAT LD50: 110 MG/KG 3.
DIETHANOLAMINE SALT OF TALL OIL FATTY ACID; NO DATA FOUND.
TRIETHANOLAMINE SALT OF TALL OIL FATTY ACID; NO DATA FOUND.
-EXYLENE GLYCOL:
SKN-RBT LD50: 9550 MG/KG 3.
ORL-RAT LD50: 3700 MG/KG 3.
IPR-RAT LD50: 1500 MG/KG 3.
EYE-RBT 90 MG SEV 3.
SKN-RBT 500 MG/24H MODERATE 3.
SKN-RBT 485 MG OPEN MILD 3.

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL	CONDITIONS TO AVOID
STABILITY			AVOID HEAT, HOT SURFACES, SPARKS AND OPEN FLAMES.

INCOMPATIBILITY (MATERIALS TO AVOID)
OXIDIZING AGENTS, REDUCING AGENTS, STRONG ACIDS AND BASES.
IODINE PENTAFLUORIDE/ETHYLENE CONTACT CAN BE EXPLOSIVE.

HAZARDOUS DECOMPOSITION PRODUCTS
OXIDES OF CARBON AND NITROGEN.

	WILL NOT	MAY	CONDITIONS TO AVOID
HAZARDOUS	X <--OCCUR	<--OCCUR	
POLYMERIZATION	NONE KNOWN.		

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
REMOVE ALL SOURCES OF IGNITION. DIKE AND CONTAIN SPILL. ABSORB WITH AN INERT MATERIAL AND SWEEP SCOOP, OR SHOVEL MATERIAL INTO A PROPERLY LABELED CONTAINER FOR DISPOSAL. CAUTION: SPILL CAN MAKE FLOOR SLIPPERY.

WASTE DISPOSAL METHOD
DISPOSE OF IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.

NEUTRALIZING AGENT
NONE KNOWN.

REQUIRED VENTILATION
GENERAL EXHAUST IS USUALLY ADEQUATE TO PREVENT AIRBORNE CONCENTRATIONS FROM EXCEEDING THE RECOMMENDED EXPOSURE LIMITS. IF THESE RECOMMENDED LIMITS ARE OR MAY BE EXCEEDED WHEN GENERAL EXHAUST IS USED, THEN LOCAL MECHANICAL EXHAUST WILL BE NECESSARY.

RESPIRATORY PROTECTION
A NIOSH/MSHA APPROVED RESPIRATOR IN POORLY VENTILATED AREAS AND/OR FOR EXPOSURE ABOVE THE ACGIH TLV OR OSHA PEL.

PROTECTIVE GLOVES
NEOPRENE FOR REPEATED OR PROLONGED CONTACT.

EYE PROTECTION
WEAR SAFETY GLASSES IF THE METHOD OF APPLICATION PRESENTS THE LIKELIHOOD OF EYE CONTACT.

OTHER PROTECTION
WEAR GENERAL DUTY WORK CLOTHING AND SHOES.
HAVE A SAFETY SHOWER AND EYE STATION IN WORK AREA

SECTION X - STORAGE AND HANDLING INFORMATION

STORAGE TEMPERATURE 100: F<--MAX 05: F<--MIN	INDOOR X	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
KEEP AWAY FROM HEAT AND FLAME.
KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE.
ALL HANDLING EQUIPMENT AND DRUM SHOULD BE PROPERLY GROUNDED. DO NOT CUT WELD, BRAZE, OR SOLDER EVEN EMPTY CONTAINERS AS THEY MAY CONTAIN PRODUCT RESIDUE WHICH IS COMBUSTIBLE.

OTHER PRECAUTIONS
FOLLOW LABEL DIRECTIONS.
KEEP OUT OF REACH OF CHILDREN.
READ ENTIRE LABEL BEFORE USING PRODUCT.
AVOID EYE CONTACT AND EXCESSIVE BREATHING OF VAPORS.

SECTION XI - REGULATORY INFORMATION

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
N/A		

THOSE INGREDIENTS LISTED ABOVE ARE SUBJECT TO THE REPORTING REQUIREMENTS OF 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.
IF UE (USE EXEMPTION) APPEARS UNDER UPPER % LIMIT, END USERS ARE EXEMPT FROM NOTIFICATION BECAUSE THE PRODUCT IS USED AND LABELED FOR ROUTINE JANITORIAL WORK, OR THE PRODUCT IS USED AND LABELED FOR FACILITY GROUNDS MAINTENANCE (SUCH AS FERTILIZERS AND HERBICIDES), OR THE PRODUCT IS USED AND LABELED FOR MAINTAINING MOTOR VEHICLES.

CALIFORNIA PROPOSITION 65
WARNING: THIS PRODUCT CONTAINS THE FOLLOWING CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE (1) CANCER OR (2) BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM: NITRILOTRIACETIC ACID (1) AND ETHANOL (2) AS TRACE CONTAMINANTS.

SECTION XII - TRANSPORTATION - (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

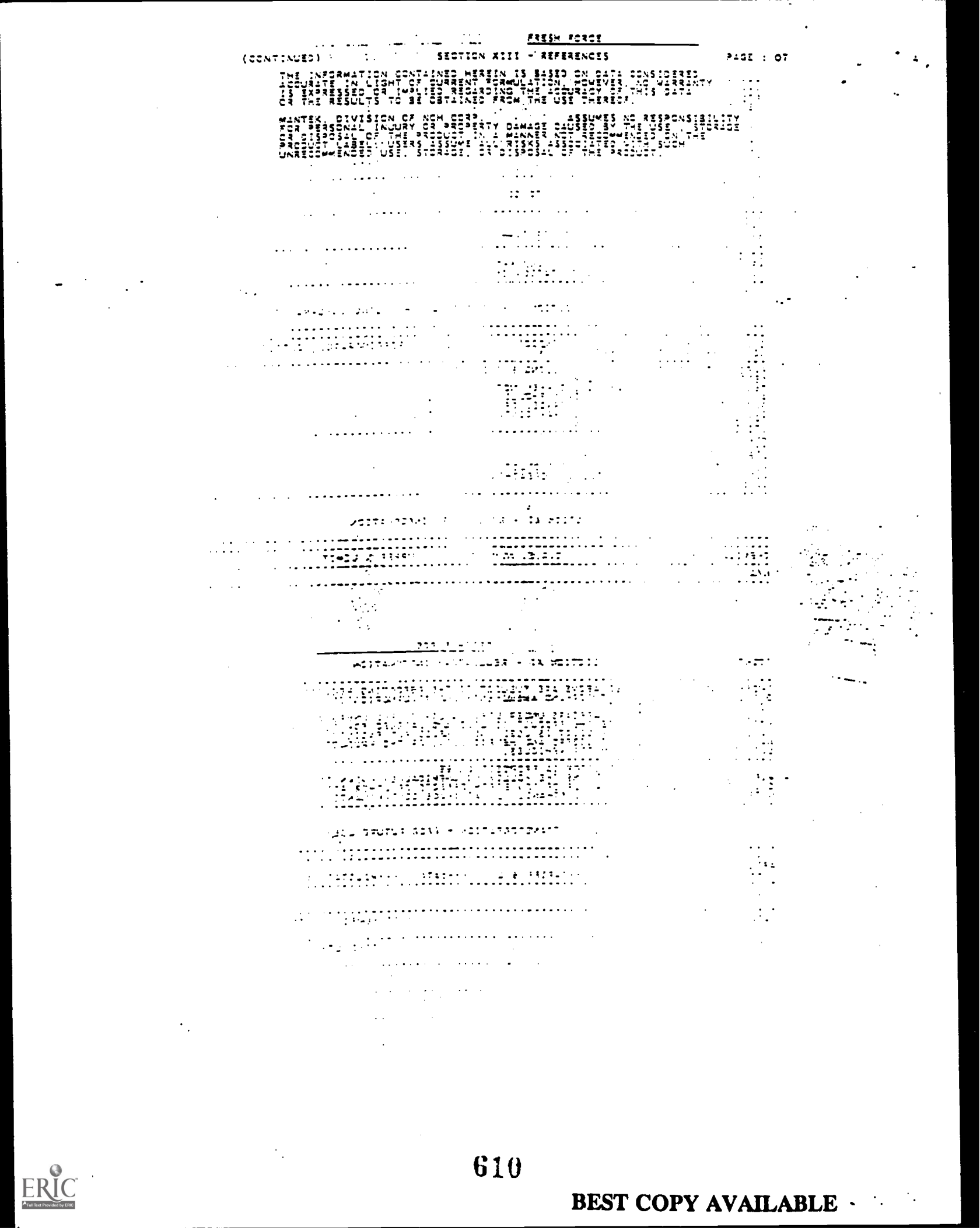
SHIPPING NAME

HAZARD CLASS	ID NUMBER	REPORT QTY
LABELS	LIMITED QTY	
UNIT CONTAINER		
DOT SPS CONTAINER	NET EXPLOSIVE QT.	
AEROSOL PROPELLANT(S)		

SECTION XIII - REFERENCES

1. THRESHOLD LIMIT VALUES FOR CHEMICAL SUBSTANCES AND PHYSICAL AGENTS AND BIOLOGICAL EXPOSURE INDICES, ACGIH, 1994-1995
2. OSHA PEL
3. SAX'S DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS, 8TH EDITION, RICHARD J. LEWIS, SR.

*SHORT TERM EXPOSURE LIMIT (TWA) LISTED AS FINAL RULE LIMITS PUBLISHED IN THE FEDERAL REGISTER/VOL.54/NO.12, 1-19-89



CARGILL SALT

MATERIAL SAFETY DATA SHEET

I. GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)		C.A.S. NO(S)
Salt		7647-14-5
CHEMICAL NAME(S)	FORMULA	MOLECULAR WEIGHT
Sodium Chloride	NaCl	58.44
MANUFACTURER(S) NAME AND ADDRESS		GSA National Stock Number (General Services Admin.)
Cargill Incorporated - Salt Division P.O. Box 5621 Minneapolis, MN 55440		6810-00-227-0437
CONTACT	PHONE NO.	DATE ISSUED / DATE REVISED
Director-Quality Admin.	(612) 742-6581	3/1/85 / 4/28/93

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components (Specific Chemical Identity; and/or Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	Percent (Optional)
None				

THIS PRODUCT IS NOT REGULATED UNDER:
- OSHA Hazard Communication Standard 29 CFR 1910.1200
- S.A.R.A. Title III

III. PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT (760mm Hg) (°C)	1465	SPECIFIC GRAVITY (H_2O=1)	2.16
VAPOR PRESSURE (mm Hg/747°C)	2.4	MELTING POINT (°C)	801
VAPOR DENSITY (Air=1)	NA	EVAPORATION RATE (Butyl Acetate=1)	NA
SOLUBILITY IN WATER (g/cc,%)	26.4		

APPEARANCE AND ODOR White crystalline solid with slight halogen odor.

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	
Not Applicable.	LEL NA	UEL NA

EXTINGUISHING MEDIA:
Not Applicable. This product is nonflammable.

SPECIAL FIRE-FIGHTING PROCEDURES/EQUIPMENT
Not Applicable.

UNUSUAL FIRE AND EXPLOSION HAZARDS
None

V. REACTIVITY DATA

STABILITY

Stable	X	Conditions To Avoid: Contact with strong acids.
Unstable		

INCOMPATABILITY (Materials to Avoid):
Becomes corrosive to metals when wet.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS:
May evolve chlorine gas when in contact with strong acids.

HAZARDOUS POLYMERIZATION

May Occur		Conditions To Avoid: Not Applicable.
Will Not Occur	X	

VI. HEALTH HAZARD DATA

ROUTE(S) OF ENTRY

Inhalation? May cause mild irritation of nose and throat.

Skin? Dust may cause mild irritation.

Ingestion? Ingestion of large amounts may cause gastrointestinal upset.

HEALTH HAZARDS (Acute And Chronic)
Ingestion of large amounts (greater than 0.1 pound) can cause gastrointestinal upset and irritation of the stomach.
No applicable information found for chronic systemic effects.

VI. HEALTH HAZARD DATA (Continued)

CARCINOGENICITY
NTP? Not listed as a carcinogen or mutagen.
IARC Monographs? Not listed as a carcinogen or mutagen.
OSHA Regulated? Not listed as a carcinogen or mutagen.
SIGNS AND SYMPTOMS OF EXPOSURE
Inhalation: Slight irritation of the nose; sneezing.
Skin Contact: Irritation; inflammation.
Ingestion: Nausea; vomiting.
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
In some cases of confirmed hypertension, ingestion may result in elevated
blood pressure. (This applies only to salt-sensitive individuals.)
EMERGENCY AND FIRST AID PROCEDURES
Inhalation: If person breathes large quantities, remove to fresh air at
once. If breathing stops, apply artificial respiration immediately.
Skin Contact: Remove clothing from affected area. Wash skin thoroughly.
Rinse carefully. For eye contact, flush with water immediately, lifting
eyelids occasionally.
Ingestion: Less than a few grams would not be harmful. For larger
quantities, drink large amounts of water or milk.
EMERGENCY TELEPHONE NUMBERS: Daytime (612) 742-6581 Evenings (612) 476-1127

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Contain spills to prevent contamination of water supply or sanitary sewer system. Vacuum or sweep into containers for proper disposal.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE (Continued)

WASTE DISPOSAL METHOD For disposal of this material as a waste, act in accordance with all applicable Federal, state, and local waste management regulations.
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE Avoid humid or wet conditions as product will cake and become hard.
OTHER PRECAUTIONS Not Applicable.

VIII. CONTROL MEASURES

RESPIRATORY PROTECTION (Specify Type) NIOSH/MSHA approved respirator for particulates.	
VENTILATION	Local Exhaust Ventilate as required to maintain airborne particulates below occupational exposure limits.
	Mechanical (General) Dust collection equipment may be employed.
	Special/Other not applicable.
PERSONAL PROTECTIVE EQUIPMENT	
Protective Gloves Normal work gloves are adequate.	
Eye Protection Eyeglasses or goggles should be worn in dusty areas.	
Other Protective Clothing Or Equipment Protective clothing may be worn in dusty areas, but is generally not required.	
Work/Hygiene Practices Warm water showering and handwashing is suggested after working in extremely dusty areas.	

All statements, technical information and recommendations contained herein are, to the best of our knowledge, reliable and accurate; however, no warranty, either express or implied, is made with respect thereto, nor will any liability be assumed for damages resultant from the use of the material described.

It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations. It is also the responsibility of the user to maintain a safe workplace. The user should consider the health hazards and safety information provided herein as a guide and should take the necessary steps to instruct employees and to develop work practice procedures to ensure a safe work environment.

This information is not intended as a license to operate under, or a recommendation to practice or infringe upon any patent of this Company or others covering any process, composition of matter or use.

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

SOLUTION 50636 PA-2

Emergency Telephone Number

Medical (800) 452-5378 (24 hours) (800) I-M-ALERT

SECTION 1 PRODUCT IDENTIFICATION

TRADE NAME: SOLUTION 50636 PA-2
DESCRIPTION: PA-2, very dilute aqueous solution of a quaternary amine

NFPA 704M/HMIS RATING: 0/0 HEALTH 0/0 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

SECTION 2 HAZARDOUS INGREDIENTS

Our hazard evaluation of the ingredient(s) under OSHA's Hazard Communication Rule, 29 CFR 1910.1200 has found none of the ingredient(s) hazardous.

SECTION 3 PRECAUTIONARY LABEL INFORMATION

Do not take internally.

SECTION 4 FIRST AID INFORMATION

Flush contacted area with water.

SECTION 5 HEALTH EFFECTS INFORMATION

PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin

EYE CONTACT: Non-irritating.
SKIN CONTACT: Non-irritating.

SYMPTOMS OF EXPOSURE: A review of available data does not identify any symptoms from exposure not previously mentioned.

SECTION 6 TOXICOLOGY INFORMATION

TOXICITY STUDIES: No toxicity studies have been conducted on this product.

SECTION 7 PHYSICAL AND CHEMICAL PROPERTIES

COLOR: Colorless	FORM: Liquid	ODOR: Odorless
SOLUBILITY IN WATER:	Completely	
SPECIFIC GRAVITY:	1.0	ASTM D-1298
pH (NEAT) =	Neutral	ASTM E-70
FLASH POINT:	None	

NOTE: These physical properties are typical values for this product.

NALCO

PRODUCT

SOLUTION 80636 PA-2

Emergency Telephone Number

Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 8 FIRE AND EXPLOSION INFORMATION

FLASH POINT: None

EXTINGUISHING MEDIA: Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARD: None

SECTION 9 REACTIVITY INFORMATION

INCOMPATIBILITY: None known

THERMAL DECOMPOSITION PRODUCTS: Not applicable

SECTION 10 PERSONAL PROTECTION EQUIPMENT

RESPIRATORY PROTECTION: Respiratory protection is not needed.

VENTILATION: General ventilation is recommended.

PROTECTIVE EQUIPMENT: Safety glasses should be worn when handling any liquid product.

SECTION 11 SPILL AND DISPOSAL INFORMATION

IN CASE OF TRANSPORTATION ACCIDENTS, CALL THE FOLLOWING 24-HOUR TELEPHONE NUMBER (800) I-M-ALERT or (800) 462-5378.

SPILL CONTROL AND RECOVERY:

Flush to laboratory drain or sewer with water.

DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Flush to laboratory drain or sanitary sewer with water.

SECTION 12 ENVIRONMENTAL INFORMATION

If released into the environment, see CERCLA in Section 14.

SECTION 13 TRANSPORTATION INFORMATION

PROPER SHIPPING NAME/HAZARD CLASS MAY VARY BY PACKAGING, PROPERTIES,

NALCO

PRODUCT

SOLUTION 50636 PA-2

Emergency Telephone Number

Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 14 REGULATORY INFORMATION (CONTINUED)

Consult Section 11 for RCRA classification.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 (formerly Sec. 307), 40 CFR 116 (formerly Sec. 311):
None of the ingredients are specifically listed.

CLEAN AIR ACT, Sec. 111 (40 CFR 60), Sec. 112 (40 CFR 61, 1990 Amendments), Sec. 611 (40 CFR 82, CLASS I and II Ozone depleting substances):
This product does not contain ingredients covered by the Clean Air Act.

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65:
This product does not contain any chemicals which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS:
This product does not contain ingredients listed on the Michigan Critical Materials Register.

STATE RIGHT TO KNOW LAWS:
This product does not contain ingredients listed by State Right To Know Laws.

SECTION 15 ADDITIONAL INFORMATION

None

SECTION 16 USER'S RESPONSIBILITY

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to ensure safe workplace operations. Please consult your local sales representative for any further information.

SECTION 17 BIBLIOGRAPHY

ANNUAL REPORT ON CARCINOGENS, U.S. Department of Health and Human Services, Public Health Service, PB 83-135855, 1983.

CASARETT AND DOULL'S TOXICOLOGY, THE BASIC SCIENCE OF POISONS, Doull, J.,

NALCO

PRODUCT
SOLUTION 80636 PA-2

Emergency Telephone Number
Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

SECTION 13 TRANSPORTATION INFORMATION (CONTINUED)

AND MODE OF TRANSPORTATION. TYPICAL PROPER SHIPPING NAMES FOR THIS PRODUCT ARE:

ALL TRANSPORTATION MODES : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

SECTION 14 REGULATORY INFORMATION

The following regulations apply to this product.

FEDERAL REGULATIONS:

OSHA'S HAZARD COMMUNICATION RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, none of the ingredients in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302:
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 and 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370):
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):
This product does not contain ingredients on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40 CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:

SECTION 17 BIBLIOGRAPHY (CONTINUED)

Klaassen, C. D., and Admur, M. O., eds., Macmillian Publishing Company, Inc., N. Y., 2nd edition, 1980.

CHEMICAL HAZARDS OF THE WORKPLACE, Proctor, N. H., and Hughes, J. P., eds., J. P. Lipincott Company, N.Y., 1981.

DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS, Sax, N. Irving, ed., Van Nostrand Reinhold Company, N.Y., 6th edition, 1984.

IARC MONOGRAPHS ON THE EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO MAN, Geneva: World Health Organization, International Agency for Research on Cancer, 1972-1977.

PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY, Clayton, G. D., Clayton, F. E., eds., John Wiley and Sons, N. Y., 3rd edition, Vol. 2 A-C, 1981.

REGISTRY OF TOXIC EFFECTS ON CHEMICAL SUBSTANCES, U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, 1983 supplement of 1981-1982 edition, Vol. 1-3, OH, 1984.

Title 29 Code of Federal Regulations Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

THRESHOLD LIMIT VALUES FOR CHEMICAL SUBSTANCES AND PHYSICAL AGENTS IN THE WORKROOM ENVIRONMENT WITH INTENDED CHANGES, American Conference of Governmental Industrial Hygienists, OH.

Information on this MSDS has changed. The changes are indicated by asterisks on the right side of only the changed sections. This is an updated MSDS as required by OHSA's Hazard Communication Rule 29 CFR 1910.1200.

PREPARED BY: Ricky A. Stackhouse PhD., Toxicologist
DATE CHANGED: 06/28/95 DATE PRINTED: 07/01/95

MATERIAL SAFETY DATA SHEET

NALCO

PRODUCT

Emergency Telephone Number

Medical (800) 462-5378 (24 hours) (800) I-M-ALERT

Activity 1 - Reading Comprehension

Objective (s): This activity will enable participants

1. To practice reading and applying information.

Directions: Read the paragraph below and answer the questions. You may refer back to the paragraph.

The Environmental Protection Agency has particular standards for pesticide application in and around food manufacturing plants. Specific employees are trained in the principles of applying pesticides safely for man and the environment. They are taught about application equipment, methods of application and the basic of insecticides, rodenticides, and avicides. Insecticides are used to kill insects. Rodenticides kill rodents such as field mice and avicides are pesticides used to control birds. These employees are required to be certified in compliance with EPA's Standards of Certification. The certification exam is administered by the Virginia Department of Agriculture and Consumer Services. At Nabisco, the employees who are certified to conduct pesticide application are called Utility Technicians.

Utility Technicians are aware of the pests that are associated with food manufacturing plants. Some of those pests include birds, weeds, rodents, and insects. The type and pests most likely to occur will depend on both the geographical location of the food manufacturing plant and the type of food being processed. These pests are able to damage, destroy, and contaminate. They must be controlled to protect the quality of the Nabisco's product. If quality is not maintained, federal and state agencies have authority to seize food products or take other action.

Questions:

1. What would you say would be an appropriate theme for the paragraph above?_____
_____

2. What are the three kinds of pests that plague food manufacturing facilities?_____

3. The kind of pests that are associated with a manufacturing plant depends upon the location of the plant and what country it is located in? Check one: True ____ False____

4. What action can the state or federal agency take if food products are contaminated?_____

5. What can pests do to food manufacturing plants products?
_____

6. The individuals at Nabsico that are certified to conduct pesticide control are called (circle one) : a. Pesticide Agents
b. Utility Technicians c. Pesticide Applicants

7. Name three areas of training for those who apply pesticides in food manufacturing plants_____
_____

8. What kind of pesticide is used to control birds in a pest situation?_____

9. Rodenticides are used to control insects? True____ False____

Activity 2 - Reading Comprehension - Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information

Directions: Read the paragraph below and answer the questions.

Understanding Pesticide Control for Birds

There are many species of birds in the United States, but only three are considered pests around food manufacturing plants. They are the English Sparrows (sometimes called the House Sparrows), Pigeons, and Starlings. Since these birds live in such close proximity to man, one would wonder how they can be such a pest.

They are considered pests in a manufacturing situation because their droppings can contaminate food products. Simply put, they can spread diseases. Their droppings have been known to plug gutters, cause roofs to leak, and they carry mites that can bite people.

Pesticide technicians can contain these birds in three ways: (1) setting traps (2) shooting them (3) using avicides or other pesticides to control them.

Questions:

1. What are three ways Utility Technicians can control birds?
   _____, _____, _____
2. What is a common name for the English Sparrow?_____
3. Why are birds considered pests?_____

Activity 3 - Reading Comprehension--Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the descriptions below and answer the questions. Identify the pests described in the statements by filling in the blank with the correct letter.

A. English Sparrow
Grayish in color
3-4 inches long
Male has a black throat and small conical beak
Has an non-musical chirp and a creamy white egg

B. Pigeons
Varied colors
6-10 inches long
Fan shaped tail on take-off and landing
Head bobs and beak pointed down when walking
Voice is long, soft coo-oo-o
White eggs

C. Starlings
Body and wings gold-flecked
Large spear-like bills that are yellow or olive
Compact, short bodies, 4-7 inches long
Bluish green eggs

D. House Mouse (Mus Muscualus)
Weighs 1/2 to 3/4 oz.
Small head an body
Fur, silky, dusky gray

E. Norway Rate (Rattus Norvegicus)
Weights 10-17 oz.
Blunt Muzzle head, heavy thick body
Fur, coarse, normally red-brown
to gray brown

F. Roof Rat (Rattus rattus)
Weighs 8-12 oz.
Pointed Muzzle head, slender body
Fur, black and slate gray, tawny above,
gray white-below, tawny above, white to
lemon belly

G. German Cockroach
Most common and widespread
Small, about 3/4" long
Yellowish brown with two dark-brown stripes
behind head

H. American Cockraoch
Largest in the U.S.
Adults grow to 2"
Adults color is brown, the young
pale brown

Questions:

1. Common name is a House Sparrow?____
2. Bobs head when walking?_____
3. Has bluish green eggs?____
4. Most common cockroach?____
5. Has silky, dusty gray fur?____
6. Weighs 10 to 17 oz. and is a rodent?____
7. Grows up to 2" as an adult insect?____
8. Has a pointed muzzle head and a slender body?____

Activity 4 - Following Directions Drawing

Objective - To have participants practice reading comprehension skills.

Directions - 1. Use a blank sheet of paper and follow the written directions below.

a. Draw a triangle with sides of equal length in the upper right corner.

b. In the center draw a square about an inch on each side.

c. Draw an arrow from the triangle to the square.

d. Below the square draw five lines, one below the other, each the same length as the side of the square.

e. Draw a circle in the lower left corner.

f. Make a dotted line from the circle to the second line below the square.

g. If the square is below the circle, color in the triangle.

h. If an even number of the lines below the square are not connected to any of the figures, place an X in the square.

Activity 5 - Reading Comprehension - Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the paragraph and answer the questions.

The First Step, Know Your Common Pests

The first step in investigating and solving your pest problem is to determine the species of the pests that is troubling your operation. We understand that there are different nationalities of people. Well, the same is true for pests. Pest control programs have to be designed to target specific pests. The rule of thumb is to fit the pesticide to the pest.

Questions:

1. What is the first step in solving your pest problem?_____
   _____

2. What is the rule of thumb in designing pest control programs?_____
   _____

3. General pest control programs are the most effective?
   True____ False_____

Activity 6 - Reading Comprehension - Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the pest descriptions below and answer the questions. Identify the pest described by the statement by filling in the blank with the correct letter.

A. **Ants**
Large head, elbowed antennae
Narrow waist, no wings

B. **Bed Bugs**
Small rounded, dark brown
No wings, may be engorged with blood

C. **Bees**
Light brown if honey bees
with a hairy body

D. **Booklice**
Minute, place colored body
No wings

E. **Boxelder Bugs**
Bright red and black
Long antennae
Narrow head with peak

F. **Carpet Beetles**
Adults, small rounded, brown
Larvae elongate, brown body with long brown hairs

G. **Centipedes**
One pair of legs per body
segment, long antennae

H. **Millipedes**
Two pair of legs per body segment
Short antennae

I. **Fleas**
Adults, very small, laterally compressed
No wings
Bloodsucking parasite of warm-blooded animals

J. **Clothes Moths**
Adults, very small, pale white
Wings pale white, without spots

K. **Silverfish**
Small, pale gray, elongate
Antennae long, tail with long spines

L. **Ticks**
Adults, brown to dark brown
Sometimes with white spots, eight legs
Blood sucking parasites of mammals

M. **Saw-Toothed Grain Beetle**
A pantry pest
Adults, small, dark brown
with small spines on body region behind
head, love to infest flour

N. **Indian Meal Moth**
A pantry pest
Adult, two colored wings, pale
gray and redish brown
Love all grain products

O. **House Mouse**
Adults have small eyes and small feet
Tail is as long as the body
Adults are 2 1/2 to 3 1/2 in head and
body length

P. Moth Flies

Adults, small,oval shaped
Wings pointed and covered with hairs,
body small and full of hair

Questions:

1. These pests love gain products of all kinds?____
2. They have small eyes and small feet, and long tails?____
3. They do not have wings, narrow waist, and large head?____
4. They are bright read and black, with narrow head and peak?____
5. They're light brown and produce honey?____
6. They have one pair of legs per body part?____
7. Their wings are pointed and they are covered with hairs?____
8. They are blood sucking parasites of mammals?____
9. They have three long spines?____
10. The adults are usually brown, small and rounded?____

Reading Comprehension - Fumigation

Activity 7 -Reading Comprehension

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the paragraph below about fumigation. Then answer the questions.

What and Why of Fumigation

Fumigation is the process of distributing the pesticide chemicals called fumigants as a gas through space and materials. Fumigants are in the gas phase at effective temperatures, as compared to smokes, fogs, and aerosols which are dispersions of very fine particles or droplets.

The fumigation process requires that safety precautions, special equipment and specific knowledge. That is why individuals who do fumigation are required to have special licenses or permits. Only experienced and certified applicators should conduct fumigation.

Many factors affect the use and effectiveness of fumigants. The developmental stage and activity of a targeted pest is important. For example, active adult insects are easier to kill than inactive hibernating adults. The amount of free and open space in the area to be fumigated, the temperature, and the proximity of the product, the kind of product, the location of the pest within the product, and the structures to be fumigated all affect dosage and exposure period.

Temperature is the most important factor influencing the action of a fumigant on a pest. The dosage and exposure periods vary for most fumigants with the temperature. A fumigant gas should be spread evenly and quickly throughout the space to be treated. Therefore, air movement and diffusion is important.

(continued next page)

Sorption of fumigants is the association of the fumigant with the material and/or the surface being fumigated thus removing part of the fumigant from the vapor state. Both absorption and adsorption are reduced at higher temperatures. Adsorption is usually greater with fumigants of higher molecular weights and low vapor pressures.

As the moisture content of a commodity increases, it becomes more difficult for the fumigant to penetrate it. Adequate moisture, is required for the generation of some fumigants, and with living plants may reduce injury.

The condition of the structure and type of construction must be considered. Fumigation in vacuum chambers provides increased efficiency. Other general characteristics of the fumigants are important such as molecular weight boiling point, water, solubility and flammability.

Questions:

1. What are the general characteristics of fumigants that must be considered?_____
   _____

2. Is it more efficient to spray in vacuumed chambers?
   Yes___ No____

4. The temperature is the most important element to consider when using fumigants. True____ False____

5. Fumigants are chemical gases. True____ False___

Reading Comprehension - Fumigation

Activity 8 -Reading Comprehension

Objective: This activity will enable participants

1. To practice reading and applying information.

Materials Needed: Pencil, Chart handout on Fumigants Properties

Directions: Read the chart about the essential properties of fumigants that are commonly used in insect control. Then answer the questions.

Questions:

1. Which formula is usually used as an ingredient of nonflammable mixtures?_____

2. Which fumigant may be phytotoxic. It is safe for use on seeds but not recommended for fresh fruit or vegetables?

   _____

3. What is the boiling point of Sulfuryl Fluoride?_____

4. Which fumigants a nonflammable?_____

   _____

   _____

5. What is the molecular weight of Chloropicrin?_____

6. Is Hydrocyanic acid gas soluble in water? Yes____ No____

ESSENTIAL PROPERTIES OF FUMIGANTS

Name and Formula	Molecular Weight	Boiling Point (°C. at 760 mm. pressure)	Solubility in Water (g./100 ml.)
Acrylonitrile	53.06	77.0	7.5 at 25° C.
Carbon disulphide	76.13	46.3	0.22 at 22° C.
Carbon tetrachloride	153.84	77.0	0.08 at 20° C.
Chloropicrin	164.39	112.0	Insoluble at 20° C.
Ethylene dibromide	187.88	131.0	0.43 at 30° C.
Ethylene dichloride	98.97	83.0	0.87 at 20° C.
Ethylene oxide	44.05	10.7	Very soluble at 20° C.
Hydrocyanic acid gas	27.03	26.0	Very soluble at 20° C.
Methyl bromide	94.95	3.6	1.3 at 25° C.
Phosphine	34.04	-87.4	Very slightly soluble
Sulfuryl fluoride	102.06	-55.2	0.075 at 25° C.

1/ From Monro, Manual of Fumigation for Insect Control.

IN COMMON USE FOR INSECT CONTROL[1/]

Flammability (% by volume in air)	Commodities Treated and Remarks (Check labels for specific uses)
3-17	Tobacco and plant products; also for "spot" treatment. Injures growing plants, fresh fruits, and vegetables. Marketed with carbon tetrachloride.
1.25-44	Grain. Usually as ingredient of nonflammable mixtures.
Nonflammable	Only weakly insecticidal. Used chiefly in mixture with flammable compounds in grain fumigation to reduce fire hazard and aid distribution.
Nonflammable	Grains and plant products. Safe with seeds; injurious to living plants, fruit, and vegetables. Highly irritating lachrymator. Bactericidal and fungicidal.
Nonflammable	General fumigant. Particularly useful for certain fruit; may injure growing plants.
6-16	Seeds and grains. Usually mixed with carbon tetrachloride.
3-80	Grains, cereals, and certain plant products. Toxic at practical concentrations to many bacteria, fungi, and viruses. Strongly phytotoxic and affects seed germination.
6-41	General fumigant, but may be phytotoxic. Safe on seeds but not recommended for fresh fruit and vegetables.
Nonflammable	General fumigant. May be used with caution for nursery stock, growing plants, some fruit, and seeds of low moisture content.
Highly flammable	Grain fumigant; gas generated from tablets of aluminum phosphide.
Nonflammable	Wood destroying and household insects, but not for food or drug products. Phytotoxic but little effect on seed germination.

Betty just arrived home late from work and has to prepare a dessert to take to a PTA function tonight. She has only one hour to prepare the dessert and get to the school.

These are the items Betty has available to her:

5 lb. bag sugar	pie crust mix	1/2 lb. margarine
1 box salt	1 bottle vanilla extract	lemon extract
1 dozen eggs	1 can cream of tartar	1/2 box of Nilla Wafers
1 qt. milk	one large lemon	1/3 box of Ritz crackers
2 lb. bag flour	1 can cinnamon	1/2 dozen bananas

Read the recipes and the labels on the following pages and answer the following questions.

1. Does Betty have all the ingredients she needs to make each one of these desserts?

2. Does Betty have the right quantity of the ingredients that she needs to make each of these desserts?

3. Which recipe would require the most time to prepare?

4. What ingredients do the two recipes have in common?

5. According to the label, how many cookies are in the Nilla Wafers box?

6. According to the label, how many crackers are in t e Ritz box ?

7. Which of the two desserts do you think Betty should make and why ?

Nilla WAFERS

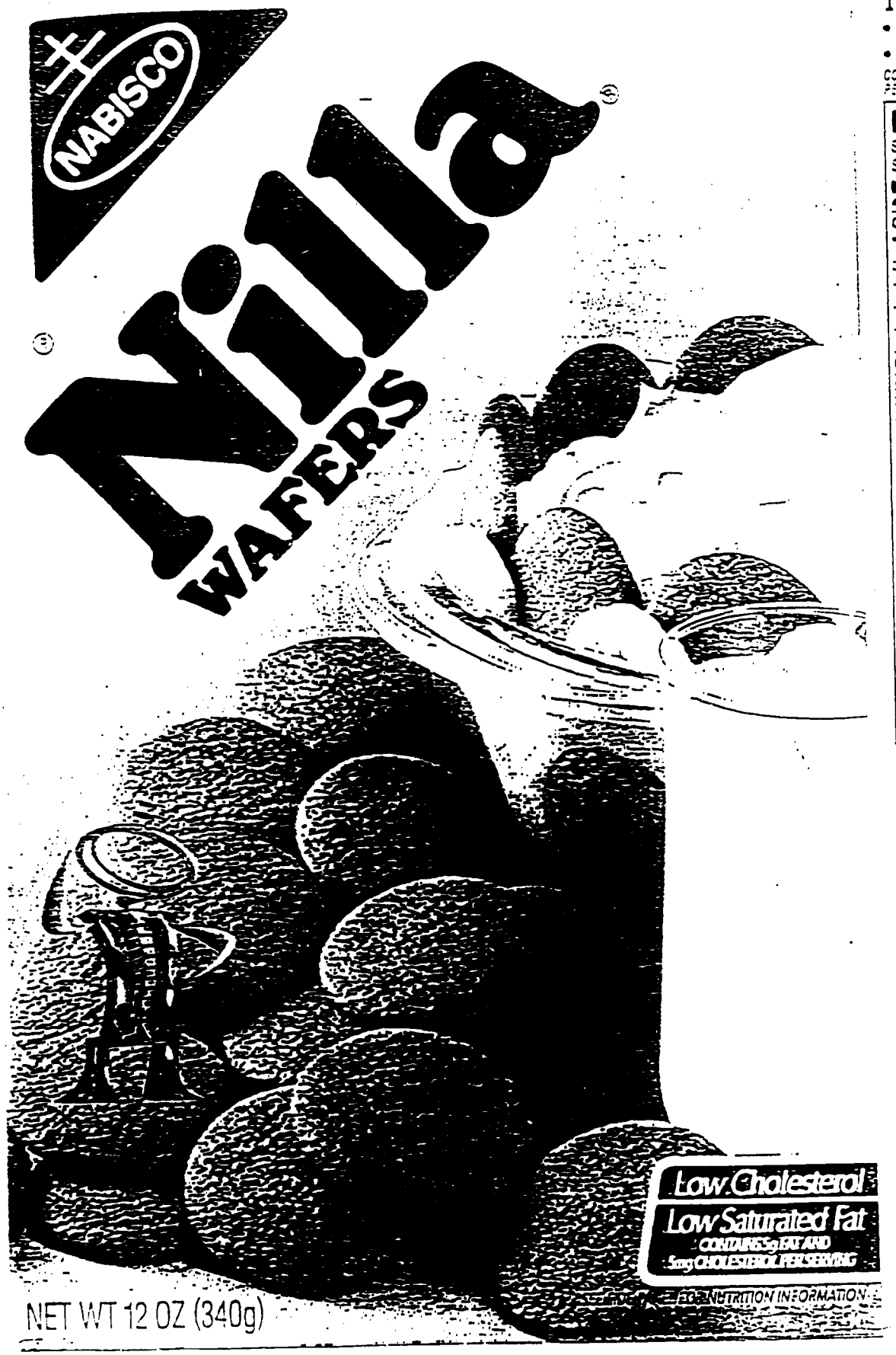
ORIGINAL BANANA PUDDING

MAKES 16 (1/2 CUP) SERVINGS

3/4 cup granulated sugar
1/3 cup all purpose flour
Dash of salt
4 eggs, separated, at room temperature
2 cups milk
1/2 teaspoon vanilla extract
35 to 45 NILLA Wafers
5 to 6 medium size fully ripe bananas, sliced
Reserve 1 banana and 10 to 12 NILLA Wafers for garnish.

Combine 1/2 cup sugar, flour and salt in top of double boiler. Stir in 4 egg yolks and milk; blend well. Cook, uncovered, over boiling water, stirring constantly until thickened. Reduce heat and cook, stirring occasionally, for 5 minutes. Remove from heat; add vanilla. Spread small amount on bottom of 1-1/2-quart casserole; cover with layer of NILLA Wafers. Top with layer of sliced bananas.

Pour about 1/3 of custard over bananas. Continue to layer wafers, bananas, and custard to make 3 layers of each, ending with custard. Beat egg whites until stiff but not dry; gradually add remaining 1/4 cup sugar and beat until stiff peaks form. Spoon on top of pudding, spreading to cover entire surface and sealing well to edges. Bake at 425°F. for 5 minutes or until delicately browned. Cool slightly or chill. Just before serving, garnish with banana slices, then NILLA Wafers upright around edge of dish, as pictured on package.



Nilla Wafers...

- Low Cholesterol
- Low Saturated Fat

CONTAINS 5g FAT AND 5mg CHOLESTEROL PER SERVING

Nutrition Facts

Serving Size 8 cookies (30 g)
Servings Per Container About 11

Amount Per Serving	
Calories 140	Calories from Fat 45
	% Daily Value*
Total Fat 5g	7%
Saturated Fat 1g	5%
Polyunsaturated Fat 0g	
Monounsaturated Fat 1.5g	
Cholesterol 5mg	2%
Sodium 105mg	4%
Total Carbohydrate 24g	8%
Dietary Fiber 0g	0%
Sugars 12g	
Protein 2g	
Vitamin A 0% •	Vitamin C 0%
Calcium 2% •	Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2400mg	2400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: ENRICHED WHEAT FLOUR (CONTAINS NIACIN, REDUCED IRON, THIAMIN MONONITRATE [VITAMIN B1], RIBOFLAVIN [VITAMIN B2]), SUGAR, VEGETABLE SHORTENING (PARTIALLY HYDROGENATED SOYBEAN OIL, HIGH FRUCTOSE CORN SYRUP, WHEY, BUTTER (PASTEURIZED CREAM, SALT, ANNATTO COLOR), EGGS, LEAVENING (BAKING SODA, CALCIUM PHOSPHATE), SALT, MONO-AND DIGLYCERIDES (EMULSIFIER), VANILLA EXTRACT, ARTIFICIAL FLAVOR.

This package is sold by weight, not by volume. Packed as full as practicable by modern automatic equipment, it contains full net weight indicated. If it does not appear full when opened, it is because contents have settled during shipping and handling.

NABISCO
EAST HANOVER, NJ 07936
MADE IN U.S.A.
LOCAL BAKERIES...COAST TO COAST
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WEEKDAYS 8:00 AM-4:30 PM EST

LD TIME
RITE

NABISCO

RITZ CRACKERS

Mock Apple Pie

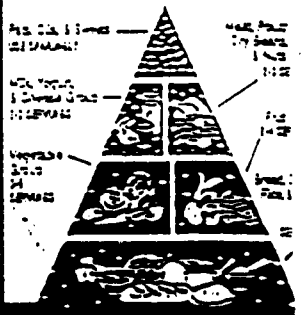
MAKES 8 SERVINGS

Pastry for two-crust 9-inch pie
36 RITZ Crackers, coarsely broken
(about 1 3/4 cups crumbs)
2 cups water
2 cups sugar
2 teaspoons cream of tartar
2 tablespoons lemon juice
Grated rind of one lemon
2 tablespoons BLUE BONNET
Vegetable Oil Spread
1/2 teaspoon ground cinnamon
(NO APPLES NEEDED)

Roll out half the pastry and line a 9-inch pie plate. Place crackers in prepared crust. In saucepan, over high heat, heat water, sugar and cream of tartar to a boil; simmer for 15 minutes. Add lemon juice and rind; cool. Pour syrup over crackers. Dot with spread; sprinkle with cinnamon. Roll out remaining pastry; place over pie. Trim, seal and flute edges. Slit top crust to allow steam to escape. Bake at 425°F for 30 to 35 minutes or until crust is crisp and golden. Cool completely.

Food Guide Pyramid

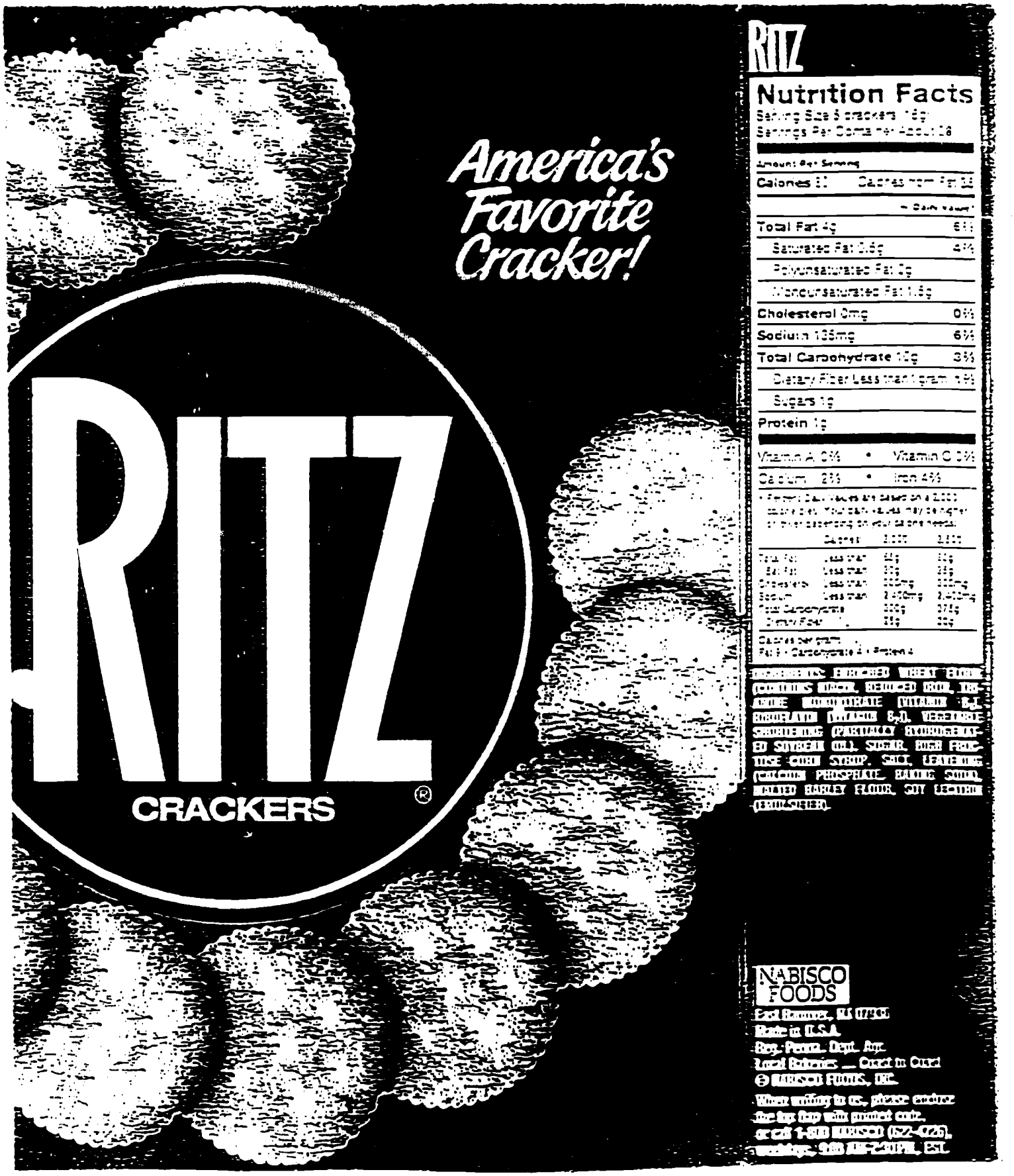
A Guide to Daily Food Choices



Source: U.S. Department of Agriculture/U.S. Department of Health and Human Services

- The Food Guide Pyramid sho... how to build a healthful die... eating a variety of foods each ...
- Ritz Crackers are part of t... "Bread, Cereal, Rice and Pa... Group." Nutrition experts rec... mend eating the most from t... important group—6-11 servi... daily.
- Grain foods supply carbohydr... —an excellent source of ene...

C51



NTROL CHART

DATE | PRODUCT | SHIFT | ATTRIBUTE | LINE NO | OPER

TIME

ANALYSIS

1
2
3
4
5
6

SUM Σ
AVERAGE X
RANGE R

UCL

AIM

LCL

UCL

ASSIGNABLE CAUSE LOG

ACTION | CAUSE

DECISION RULES

1 — IN RED

2 OF 3 — IN YELLOW
(ALL ON SAME SIDE OF AIM)

5 — IN A ROW
(ALL ON SAME SIDE OF AIM)

7 — IN A ROW IN AN UPWARD OR DOWNWARD TREND
(BETWEEN CONTROL LIMITS)

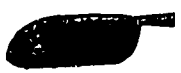
INVESTIGATE/REACT/DOCUMENT

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


BLACK HANDLED SCRAPER


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN REFUSE CONTAINER


GREEN PAPER/SALT RECEPTACLE


RED EH&S FLOOR WAX BUCKET


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLACK MOTOR OIL BUCKET


BROWN / BLUE DUST PAN


RED REFUSE B&R SHOVEL

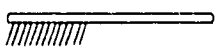

BLACK HANDLED BRUSH

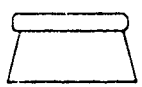

BLACK SCRAPER

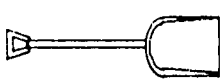

BLACK SCRUB BRUSH

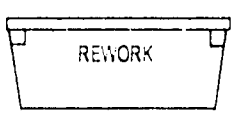

STAINLESS MINOR INGREDIENT BUCKET

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH

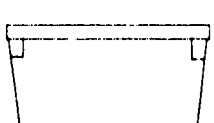

WHITE SCRAPER

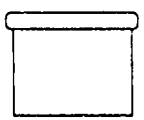

WHITE (USEABLE) B&R SHOVEL

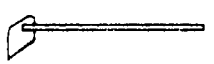


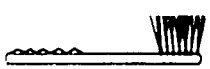
CLEAR REWORK BINS


WHIITE AND STAINLESS SCOOPS

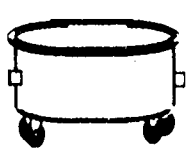

WHITE TUBS FOR BUTTER

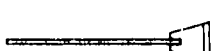

STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


WHITE SCRUB BRUSH


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

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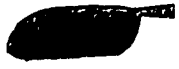
NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


BLUE HOT MELT SCOOP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BROWN REFUSE CONTAINER


GREEN PAPER/SALT RECEPTACLE


RED H&S FLOOR WAX BUCKET


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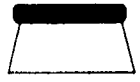
BLACK HANDLED BRUSH

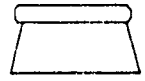

BLACK SCRAPER


BLACK SCRUB BRUSH


BLACK HANDLED SCRAPER

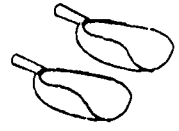
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

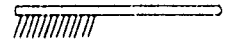

WHITE TUBS FOR BUTTER

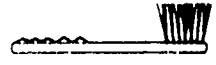

WHITE SCRAPER

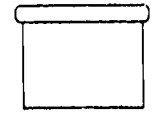

WHITE (USEABLE) B&R SHOVEL

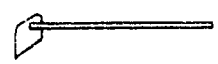
CLEAR REWORK BINS

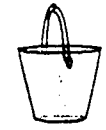

WHIITE AND STAINLESS SCOOPS


WHITE HANDLED BRUSH


WHITE SCRUB BRUSH

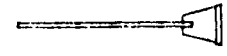

STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / METAL TROUGH


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN REFUSE CONTAINER


GREEN PAPER/SALT RECEPTACLE


RED EH&S FLOOR WAX BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLACK MOTOR OIL BUCKET


BROWN / BLUE DUST PAN


RED REFUSE B&R SHOVEL

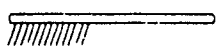

BLACK HANDLED BRUSH

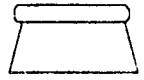

BLACK SCRAPER

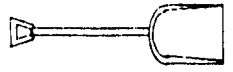

BLACK SCRUB BRUSH

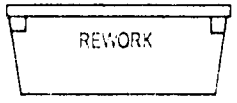

BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH

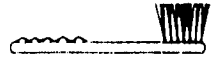

WHITE SCRAPER


WHITE (USEABLE) B&R SHOVEL



CLEAR REWORK BINS

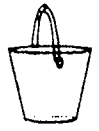

WHITE AND STAINLESS SCOOPS


WHITE SCRUB BRUSH


WHITE TUBS FOR BUTTER


STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


STAINLESS PROOF ROOM SCRAPER

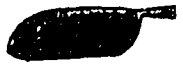

WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS



GREEN BRISTLED BAG BRUSH

GREY 30/50 GAL TRASH CAN

GREEN WASTE OIL BUCKET

BLACK MOTOR OIL BUCKET

BROWN / BLUE DUST PAN

RED REFUSE B&R SHOVEL

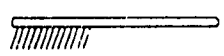
BLACK HANDLED BRUSH

BLACK SCRAPER

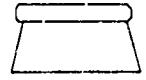
BLACK SCRUB BRUSH

BLACK HANDLED SCRAPER

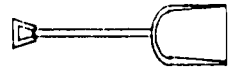
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS



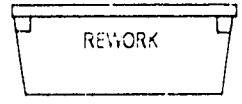
WHITE HANDLED BRUSH



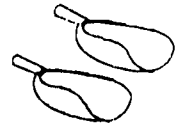
WHITE SCRAPER



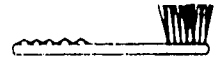
WHITE (USEABLE) B&R SHOVEL



CLEAR REWORK BINS



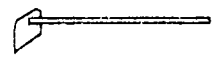
WHIITE AND STAINLESS SCOOPS



WHITE SCRUB BRUSH

WHITE TUBS FOR BUTTER

STAINLESS BUTTER CUTTER



STAINLESS SCRAP DOUGH RAKE

STAINLESS MINOR INGREDIENT BUCKET

STAINLESS WISP

STAINLESS DOUGH / MEAL TROUGH

STAINLESS PROOF ROOM SCRAPER

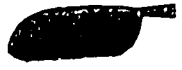
WHITE APRON WATER BUCKET

GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS



GREY 30/50 GAL TRASH CAN

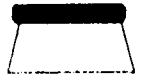
GREEN WASTE OIL BUCKET

BLACK MOTOR OIL BUCKET

BROWN / BLUE DUST PAN

RED REFUSE B&R SHOVEL

BLACK HANDLED BRUSH

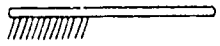


BLACK SCRAPER

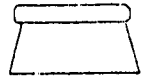
BLACK SCRUB BRUSH

BLACK HANDLED SCRAPER

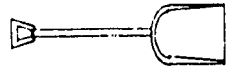
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS



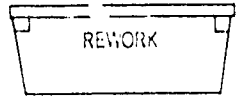
WHITE HANDLED BRUSH



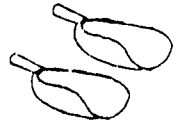
WHITE SCRAPER



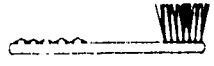
WHITE (USEABLE) B&R SHOVEL



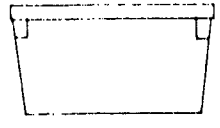
CLEAR REWORK BINS



WHITE AND STAINLESS SCOOPS

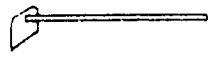


WHITE SCRUB BRUSH

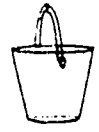


WHITE TUBS FOR BUTTER

STAINLESS BUTTER CUTTER



STAINLESS SCRAP DOUGH RAKE



STAINLESS MINOR INGREDIENT BUCKET

STAINLESS WISP

STAINLESS DOUGH / MEAL TROUGH

STAINLESS PROOF ROOM SCRAPER

WHITE APRON WATER BUCKET

GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

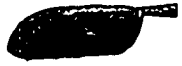
RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN

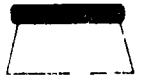

BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH

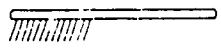

BLUE PAIL FOR DIRTY WATER BUCKET

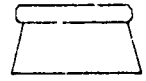

BLACK SCRAPER

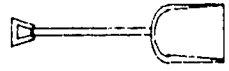

BLACK SCRUB BRUSH

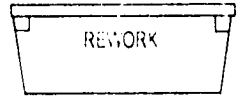

BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

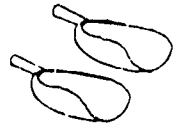

WHITE HANDLED BRUSH

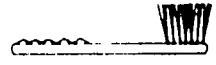

WHITE SCRAPER


WHITE (USEABLE) B&R SHOVEL



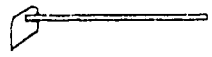
CLEAR REWORK BINS

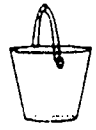

WHITE AND STAINLESS SCOOPS


WHITE SCRUB BRUSH


WHITE TUBS FOR BUTTER

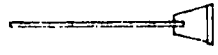

STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH

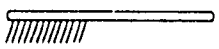

RED EH&S FLOOR WAX BUCKET

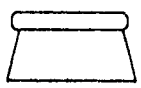

BLACK SCRAPER

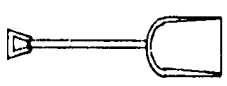

BLACK SCRUB BRUSH

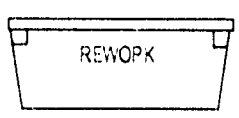

BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH


WHITE SCRAPER

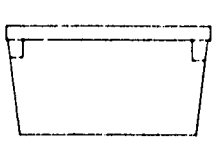

WHITE (USEABLE) B&R SHOVEL

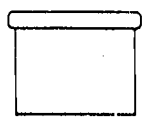


CLEAR REWORK BINS


WHITE AND STAINLESS SCOOPS


WHITE SCRUB BRUSH

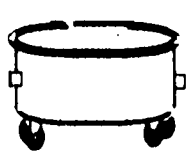

WHITE TUBS FOR BUTTER


STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

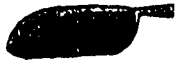
RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH

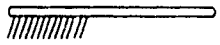

RED EH&S FLOOR WAX BUCKET


BLACK SCRAPER


BLACK SCRUB BRUSH

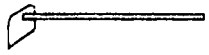

BLACK HANDLED SCRAPER

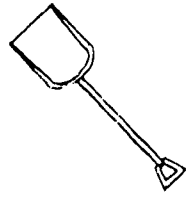
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH


STAINLESS BUTTER CUTTER


WHITE SCRAPER

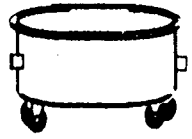

STAINLESS SCRAP DOUGH RAKE

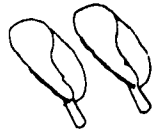

WHITE (USEABLE) B&R SHOVEL


STAINLESS MINOR INGREDIENT BUCKET

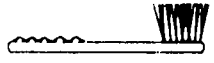

STAINLESS WISP

CLEAR REWORK BINS


STAINLESS DOUGH / MEAL TROUGH


WHITE AND STAINLESS SCOOPS


STAINLESS PROOF ROOM SCRAPER


WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH

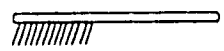

RED ERBS FLOOR WAX BUCKET


BLACK SCRAPER

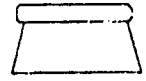

BLACK SCRUB BRUSH


BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH


STAINLESS BUTTER CUTTER

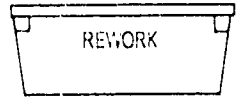

WHITE SCRAPER


STAINLESS SCRAP DOUGH RAKE


WHITE (USEABLE) B&R SHOVEL

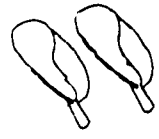

STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP

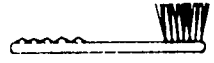


CLEAR REWORK BINS

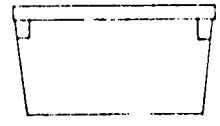

STAINLESS DOUGH / MEAL TROUGH


WHIITE AND STAINLESS SCOOPS


STAINLESS PROOF ROOM SCRAPER


WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GRLY USEABLE B&R TROUGH

NABISCO BRANDS

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


BLACK HANDLED SCRAPER


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN REFUSE CONTAINER


GREEN PAPER/SALT RECEPTACLE


RED TUBS FLOOR WAX BUCKET


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLACK MOTOR OIL BUCKET

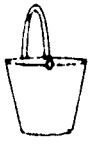

BROWN / BLUE DUST PAN


RED REFUSE B&R SHOVEL

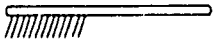

BLACK HANDLED BRUSH

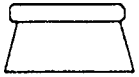

BLACK SCRAPER

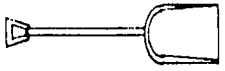

BLACK SCRUB BRUSH

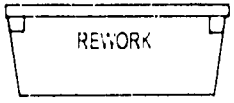

STAINLESS MINOR INGREDIENT BUCKET

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

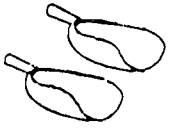

WHITE HANDLED BRUSH


WHITE SCRAPER


WHITE (USEABLE) B&R SHOVEL

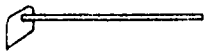


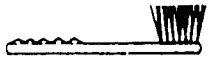
CLEAR REWORK BINS


WHITE AND STAINLESS SCOOPS

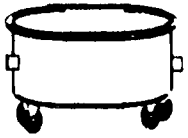

WHITE TUBS FOR BUTTER


STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


WHITE SCRUB BRUSH


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUG


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS

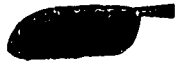
RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN

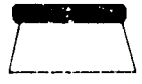

BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL

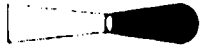

GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH


RED EMS FLOOR WAX BUCKET

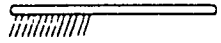

BLACK SCRAPER

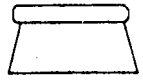

BLACK SCRUB BRUSH

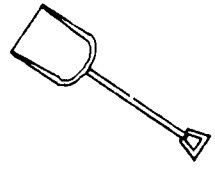

BLACK HANDLED SCRAPER

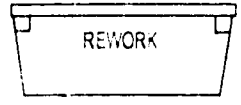

BLACK MOTOR OIL BUCKET

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

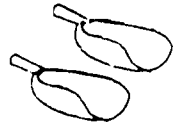

WHITE HANDLED BRUSH

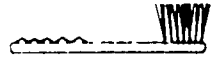

WHITE SCRAPER

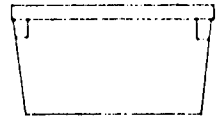

WHITE (USEABLE) B&R SHOVEL



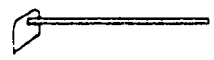
CLEAR REWORK BINS


WHITE AND STAINLESS SCOOPS


WHITE SCRUB BRUSH

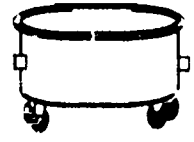

WHITE TUBS FOR BUTTER


STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL

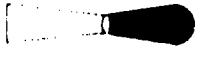

GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH


RED PLASTIC FLOOR WAX BUCKET

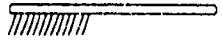

BLACK SCRAPER


BLACK SCRUB BRUSH

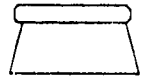

BLACK HANDLED SCRAPER

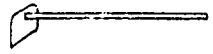

BLACK MOPBUCKET BUCKET

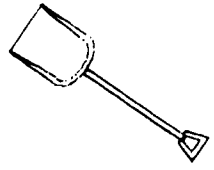
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

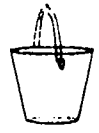

WHITE HANDLED BRUSH


STAINLESS BUTTER CUTTER

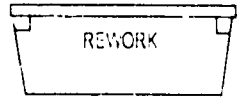

WHITE SCRAPER


STAINLESS SCRAP DOUGH RAKE


WHITE (USEABLE) B&R SHOVEL

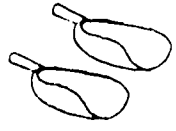

STAINLESS MINOR INGREDIENT BUCKET

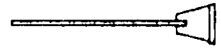

STAINLESS WISP

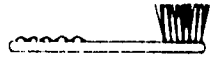


CLEAR REWORK BINS


STAINLESS DOUGH / MEAL TROUGH


WHITE AND STAINLESS SCOOPS


STAINLESS PROOF ROOM SCRAPER


WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

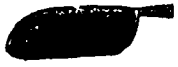
RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET

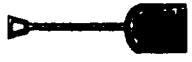

BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH


RED EMPTY FLOOR WAX BUCKET

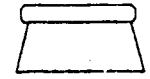

BLACK SCRAPER


BLACK SCRUB BRUSH

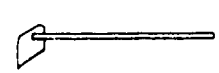

BLACK HANDLED SCRAPER

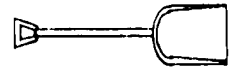
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


STAINLESS PROOF ROOM SCRAPER


WHITE SCRAPER

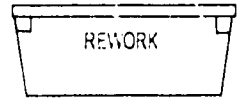

STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


WHITE (USEABLE) B&R SHOVEL

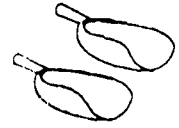

STAINLESS MINOR INGREDIENT BUCKET

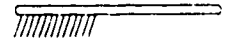

STAINLESS WISP

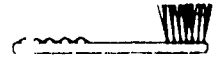


CLEAR REWORK BINS


STAINLESS DOUGH / MEAL TROUGH


WHITE AND STAINLESS SCOOPS


WHITE HANDLED BRUSH


WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN REFUSE CONTAINER


GREEN PAPER/SALT RECEPTACLE


RED EH&S FLOOR WAX BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLACK MOTOR OIL BUCKET


BROWN / BLUE DUST PAN


RED REFUSE B&R SHOVEL


BLACK HANDLED BRUSH


BLACK SCRAPER

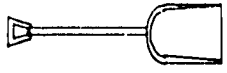

BLACK SCRUB BRUSH

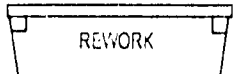

BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


STAINLESS PROOF ROOM SCRAPER

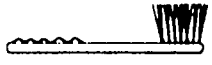

STAINLESS BUTTER CUTTER

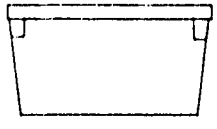

WHITE (USEABLE) B&R SHOVEL

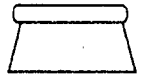


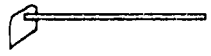
CLEAR REWORK BINS

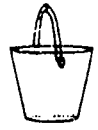

WHITE AND STAINLESS SCOOPS


WHITE SCRUB BRUSH


WHITE TUBS FOR BUTTER

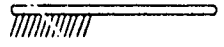

WHITE SCRAPER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


WHITE HANDLED BRUSH


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


BLACK HANDLED SCRAPER


BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN

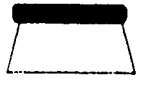

BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH

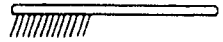

RED EH&S FLOOR WAX BUCKET

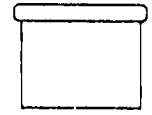

BLACK SCRAPER

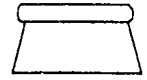

BLACK SCRUB BRUSH

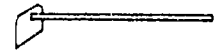

GREEN WASH OIL BUCKET

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH


STAINLESS BUTTER CUTTER

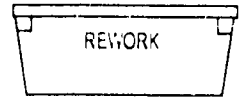

WHITE SCRAPER


STAINLESS SCRAP DOUGH RAKE

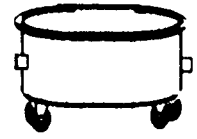

WHITE (USEABLE) B&R SHOVEL


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP

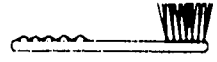


CLEAR REWORK BINS

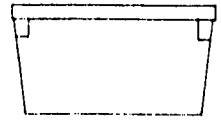

STAINLESS DOUGH / MEAL TROUGH


WHITE AND STAINLESS SCOOPS


STAINLESS PROOF ROOM SCRAPER


WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

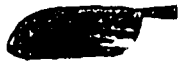
RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


BLACK HANDLED SCRAPER


BLUE HOT MELT SCOOP


BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH

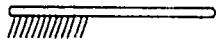

RED EMBS FLOOR WAX BUCKET


BLACK SCRAPER

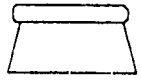

BLACK SCRUB BRUSH

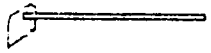

GREEN WASTE OIL BUCKET

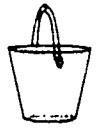
FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

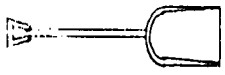

WHITE HANDLED BRUSH


STAINLESS BUTTER CUTTER

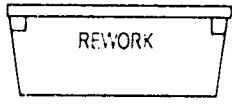

WHITE SCRAPER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET

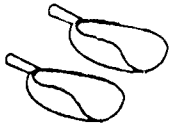

WHITE (USEABLE) B&R SHOVEL


STAINLESS WISP

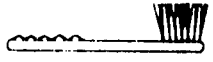


CLEAR REWORK BINS

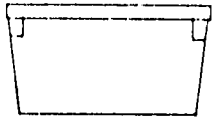

STAINLESS DOUGH / MEAL TROUGH


WHITE AND STAINLESS SCOOPS


STAINLESS PROOF ROOM SCRAPER


WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

RICHMOND, VA BAKERY CONTAINERS

NON- FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


BLUE HOT MELT SCOOP


GREEN BRISTLED BAG BRUSH


BROWN REFUSE CONTAINER


GREEN PAPER/SALT RECEPTACLE


RED BH&S FLOOR WAX BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET


BLACK MOTOR OIL BUCKET


BROWN / BLUE DUST PAN


RED REFUSE B&R SHOVEL

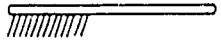

BLACK HANDLED BRUSH

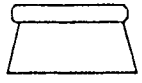

BLACK SCRAPER

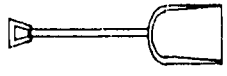

BLACK SCRUB BRUSH

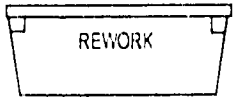

BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS

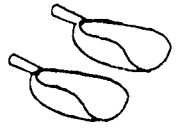

WHITE HANDLED BRUSH

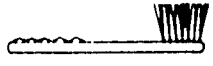

WHITE SCRAPER

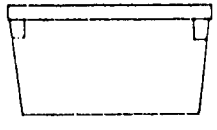

WHITE (USEABLE) B&R SHOVEL



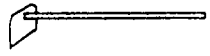
CLEAR REWORK BINS


WHITE AND STAINLESS SCOOPS


WHITE SCRUB BRUSH


WHITE TUBS FOR BUTTER


STAINLESS BUTTER CUTTER


STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


STAINLESS WISP


STAINLESS DOUGH / MEAL TROUGH


STAINLESS PROOF ROOM SCRAPER


WHITE APRON WATER BUCKET


GREY USEABLE B&R TROUGH

NABISCO BRANDS INC

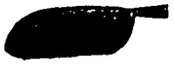
RICHMOND, VA BAKERY CONTAINERS

NON-FOOD CONTACT UTENSILS AND CONTAINERS


GREY CLEANING BUCKET


GREY 30/50 GAL TRASH CAN


GREEN WASTE OIL BUCKET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BLACK MOTOR OIL BUCKET


GREEN BRISTLED BAG BRUSH


BROWN / BLUE DUST PAN


BROWN REFUSE CONTAINER


RED REFUSE B&R SHOVEL


GREEN PAPER/SALT RECEPTACLE


BLACK HANDLED BRUSH


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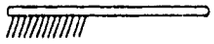
BLACK SCRAPER

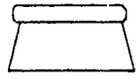

BLACK SCRUB BRUSH


BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


WHITE HANDLED BRUSH


STAINLESS BUTTER CUTTER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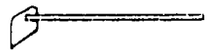
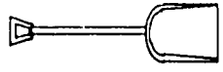
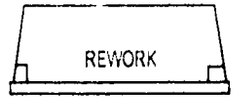

STAINLESS SCRAP DOUGH RAKE


STAINLESS MINOR INGREDIENT BUCKET


WHITE (USEABLE) B&R SHOVEL

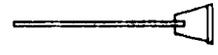

STAINLESS WISP

CLEAR REWORK BINS




STAINLESS DOUGH / MEAL TROUGH


WHITE AND STAINLESS SCOOPS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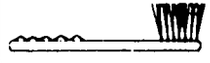
WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USEABLE B&R TROUGH

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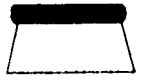
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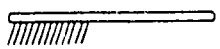
BLACK SCRUB BRUSH


BLACK HANDLED SCRAPER

FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS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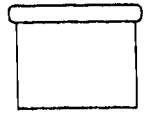
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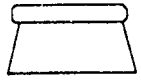
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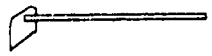
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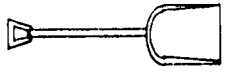
STAINLESS MINOR INGREDIENT BUCKET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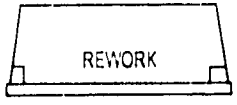


STAINLESS DOUGH / MEAL TROUGH


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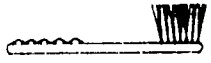
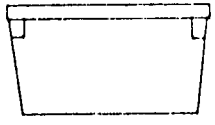

WHITE SCRUB BRUSH


WHITE APRON WATER BUCKET


WHITE TUBS FOR BUTTER


GREY USEABLE B&R TROUGH

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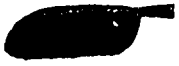
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FOOD CONTACT UTENSILS AND CONTAINERS WHITE AND STAINLESS


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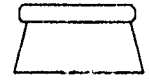
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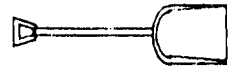
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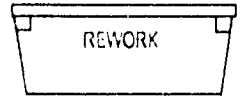

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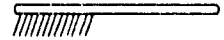
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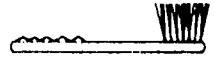
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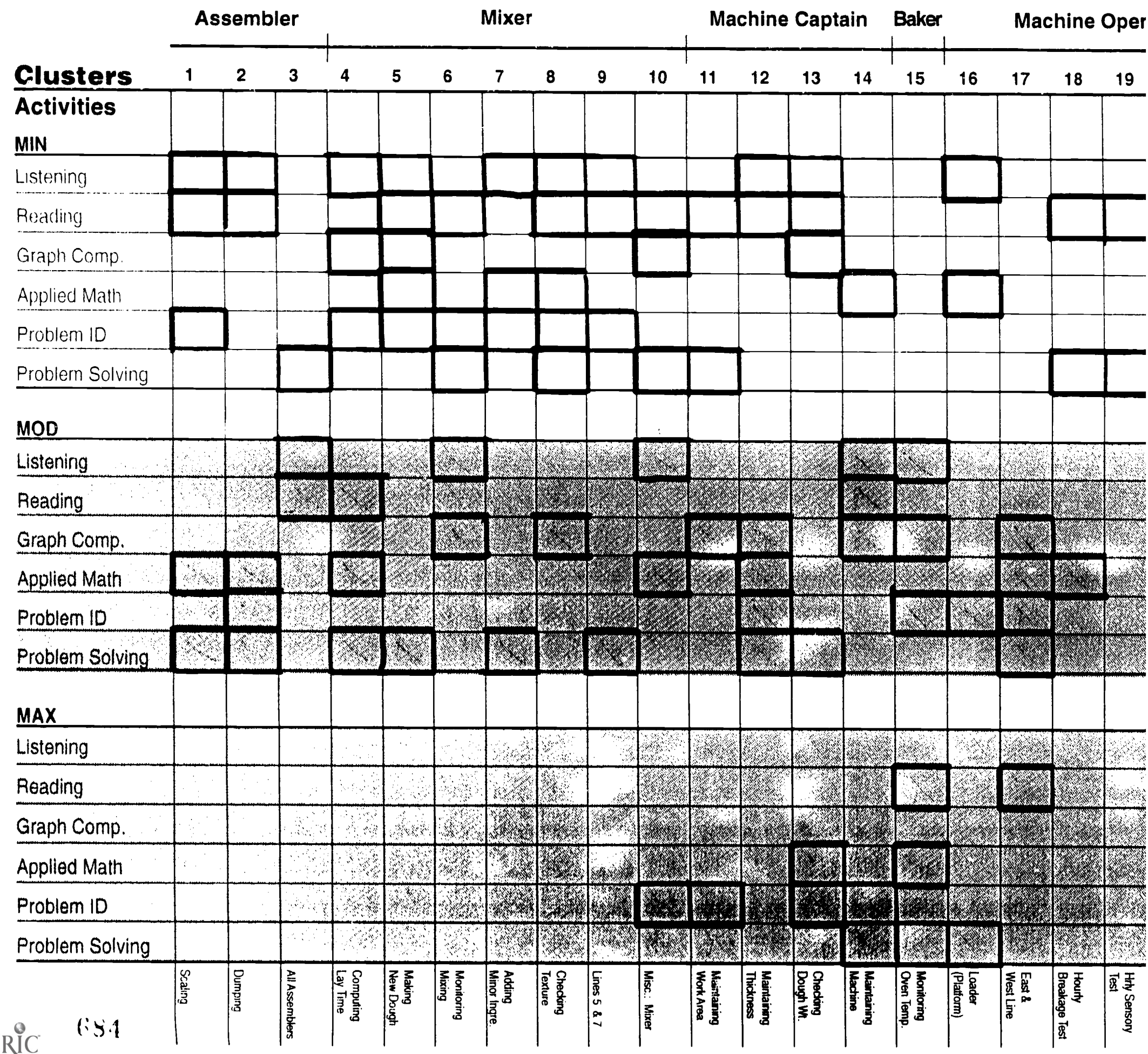
GREY USEABLE B&R TROUGH


Assembler
Mixer
Machine Captain
Baker
Machine Oper
Clusters
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
Activities
MIN
Listening
Reading
Graph Comp.
Applied Math
Problem ID
Problem Solving
MOD
Listening
Reading
Graph Comp.
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Problem ID
Problem Solving
MAX
Listening
Reading
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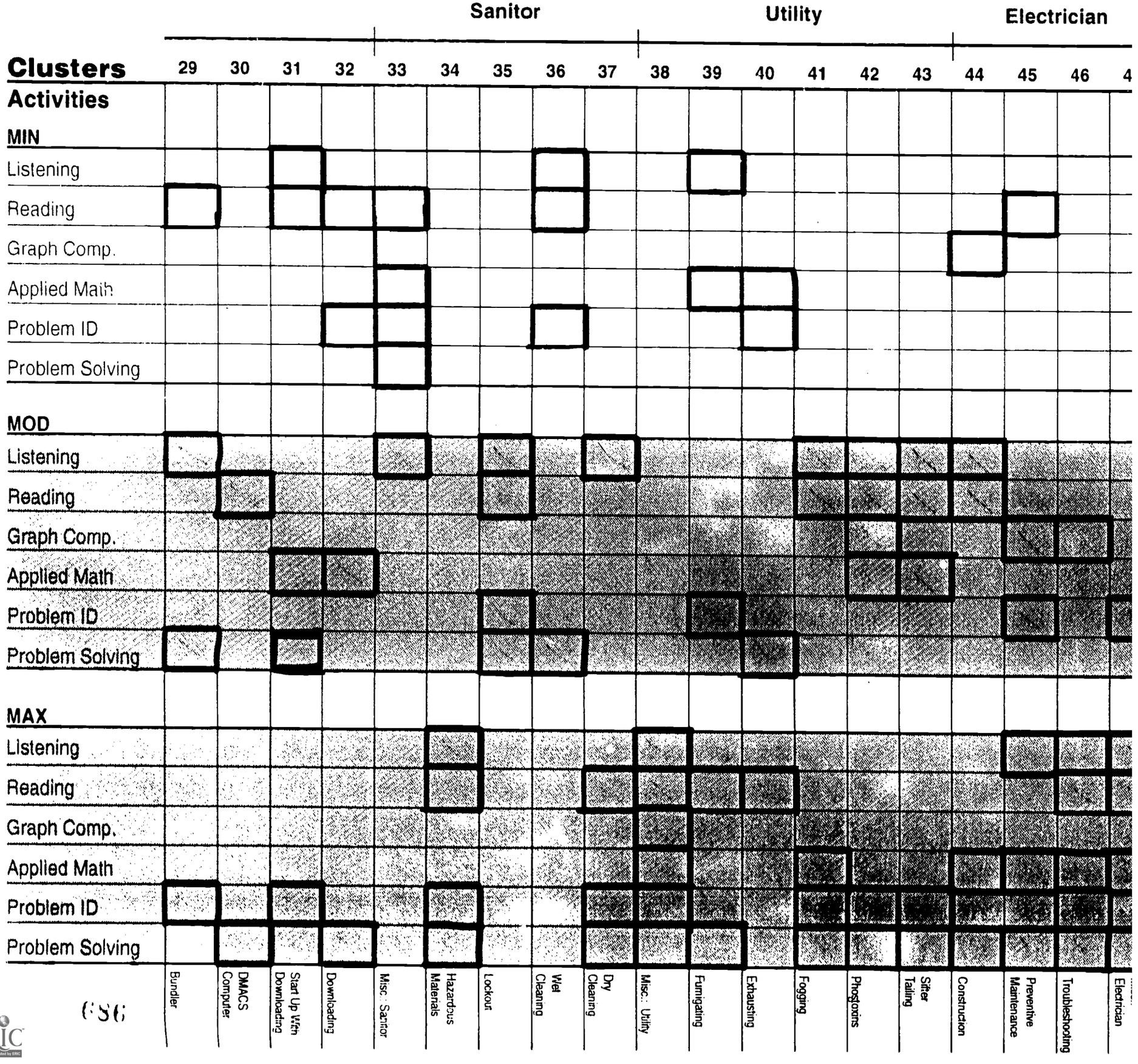
Scaling
Dumping
All Assemblers
Computing Lay Time
Making New Dough
Monitoring Mixing
Adding Minor Ingre.
Checking Texture
Lines 5 & 7
Misc.: Mixer
Maintaining Work Area
Maintaining Thickness
Checking Dough Wt.
Maintaining Machine
Monitoring Oven Temp.
Loader (Platform)
East & West Line
Hourly Breakage Test
Hrly Sensory Test


Sanitor
Utility
Electrician
Clusters
29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 4
Activities
MIN
Listening
Reading
Graph Comp.
Applied Math
Problem ID
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MOD
Listening
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Graph Comp.
Applied Math
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Problem Solving
MAX
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Graph Comp.
Applied Math
Problem ID
Problem Solving
Bundler
DMACS Computer
Start Up With Downloading
Downloading
Misc. Sanitor
Hazardous Materials
Lockout
Wet Cleaning
Dry Cleaning
Misc. Utility
Fumigating
Exhausting
Fogging
Phosfoxins
Sifter Tailing
Construction
Preventive Maintenance
Troubleshooting
Electrician

REACH

Richmond Enhanced Academics for Change

Nabisco Richmond Model

Skills Effectiveness Training for Workplace Literacy: The Non-Intrusive Determination of Workplace Literacy Skills Requirements in a Union Environment

Participant Copy

Foreword

To the participant:

"But What Does This Have To Do With My Job"

There's a popular song about "Ever Changing Times" which could well be one of the theme songs for this modern era.

But as rapidly as our world is changing, one constant remains true - everyone needs a solid foundation of core skills to be able to function well on the job and in a fast-paced society.

Core skills (reading, math, communication, reasoning, problem solving) are transferrable skills. That means, once you learn them, you can apply those skills to almost any situation that requires those skills and have a good outcome.

Once you learn how to listen actively and ask questions about your job, you'll be able to apply those skills to any job.

Once you learn how to read a graph, you'll be able to read almost any graph. At the very least, your core knowledge of the concept of a graph will enable you to reason and think through an unfamiliar kind of graph with a good outcome.

The purpose of the REACH program is to enhance or strengthen the core literacy skills of the people who choose to participate in the program.

You may be able to see that some of the activities you're about to do relate directly to your workplace. You may not see the job relationship in other activities, but all of the activities have been designed around core skills that, once developed, can be applied to many different tasks in your workplace.

So, what does this have to do with your job? It has to do with strengthening your core skills so that your job skills will be easier to develop and build. It has to do with keeping you "out front" in the pursuit of the best possible product in these ever changing times.

Content Outline

Minimum Level Listening

1. Communicating with Co-Workers
   a. Recording Spoken Information
   b. Receiving Calls
   c. Asking Questions
   d. Notifying Others of Needs/Problems

2. Communicating with Supervisors

3. Communicating within a Work Group

Moderate Level Listening

4. Receiving Directions and Details
   a. Safety Meetings
   b. Following Oral/Auditory Directions
      (1.) Supervisory Instructions
      *(2.) Computer/Mechanical Alarms

Maximum Level Listening

5. Problem Identification/Troubleshooting
   a. Listening to people/Understanding complaints
   *b. Listening to things/detecting abnormal noises in machinery or equipment

6. Problem Solving

*on the job training

NABISCO®

The *REACH* Program

***R**ichmond*
***E**nhanced*
***A**cademics for*
***C**hange*
H

Part I - Listening Skills
Curriculum Developer - Audrey L. Johnson
Capital Area Training Consortium
April 1995

Table of Contents
Listening Skills

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Activity: 1 - Find Your Twin

Objective(s): This activity will enable participants
1. To demonstrate ability to listen as distinguished from hearing.
2. To follow simple, oral directions.
3. To practice listening (especially interpretation and evaluation), speaking and analytical skills.
4. To practice observing detail in a simple schematic.
5. To practice translating observations into accurate descriptions.

Materials Required:
Ten sets of identical cards of a simple schematic (20 participants)

You need to know:

About Listening -
1. All jobs require good listening and speaking skills.
2. Hearing is sensing or receiving sound and recognizing it. It's physical!
3. Listening is hearing sound but also...
   Interpreting the meaning of the sound and
   Evaluating the sound and deciding how to use it and
   Reacting to the sound based on what you heard and how you evaluated the sound.
4. The average listener remembers only about 50% - one-half of what he has heard 20 minutes after he has heard it!
5. If 100 million people make a listening mistake on their jobs each week and it costs $10 to correct or redo their work, American companies would spend an additional one billion dollars per week!

Activity 1 - Find Your Twin (c tinued)

Directions:

1. You will each be given a card with a drawing of a GMP board (Good Manufacturing Procedure) on it.

2. One, and only one, other participant will have a GMP board that is identical to yours in every detail.

3. By carefully analyzing all the details of your board and then milling around asking and answering comparison questions about your board with other participants find the twin for your board.

4. The person who has the twin picture of your board is going to be your partner for the next activity and so the two of you should sit down together.

5. You cannot look at another person's card until you are sure you have found a match. Analyze, ask questions and listen!

Activity: 2 - Getting To Know You

Objective(s): This activity will enable participants
1. To follow simple, oral directions.
2. To practice listening and speaking skills.
3. To practice short term memory skills.
4. To become familiar with other program participants.
5. To provide insight and familiarity for the facilitator.

Materials Required:
1. List of topics

You need to know:

About Speaking - In this era of increasing diversity, it's very important to understand that a person's cultural background as well as their gender and position has a lot to do with their verbal and nonverbal communication styles.

1. Nonverbal Skills or What Do You Look Like?
   These nonverbal speaking skills make up more than one half of the meaning in any message that's being sent.
   (a) Appearance
   (b) Body Language-communicates even when you don't mean to
      1. positive gestures-open palms, body leaning forward, relaxed appearance
      2. negative gestures-arms crossed, hands hidden or clenched, tense appearance
      3. distance, space and touching

2. Vocal Skills and Tone or What Do You Sound Like?

3. Verbal or Language Skills or What Do You Say?

Activity: 2 - Getting To Know You (con ued)

Directions:

1. You and your partner will discuss the topics that will be read to you in a moment.

2. Use what you've learned about communicating through listening and speaking during this exchange.

3. Later, you and your partner will intrc e each other to the rest of the group using only the information you've ga d through this conversation.

4. No notes can be taken. Listen and stretch your memory! Mentally arrange the information about your partner in a way that will be easy for you to remember and retell.

5. The topics are:
   THE NAME THEY PREFER TO BE CALLED-ONE NAME ONLY
   THEIR FAVORITE NABISCO® PRODUCT - AS A CONSUMER
   THE MOST INTERESTING PART OF THEIR PRESENT JOB
   ONE OF THEIR JOB DUTIES THAT THEY KNOW THEY DO REALLY WELL
   FIVE OTHER DUTIES OR RESPONSIBILITIES OF THEIR CURRENT JOB
   ONE THING THEY WOULD CHANGE ABOUT THEIR PRESENT JOB IF THEY COULD.

Activity: 3 - The Communication Process

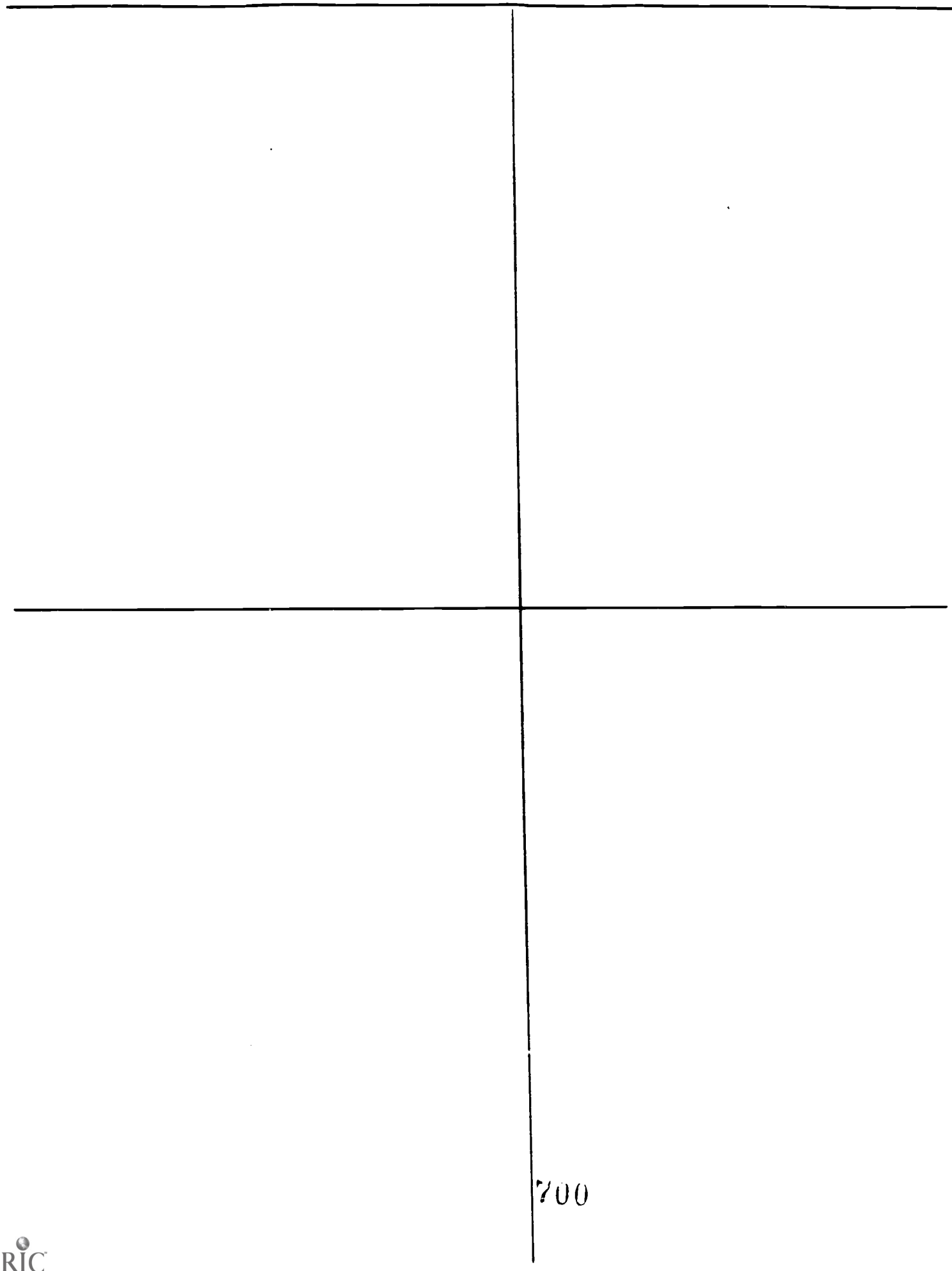
Objective(s): This activity will enable participants
1. To practice listening skills, as they draw according to simple, oral directions.
2. To learn communication concepts.
3. To develop their analytical skills.

Materials Required:
Pencil or Pen

You need to know:

About The Communication Process -
Everything we do is communication. And everything we do to communicate is done either to give or get information, to control, to follow social rules, or to share feelings. The complete communication process is a closed loop which starts when a sender wants to send a message to a receiver using whatever means is appropriate and available to him. The process ends with the positive feedback that the message was received and understood.

1. Sender - the person who has information to communicate to another person.
2. Message - the actual facts or information that are communicated.
3. Receiver - the person who receives the message and responds with feedback.
4. Feedback - everything that is sent back to the sender of the message that indicates that the message was received.
5. Channel or means - the method of communication. For example, the telephone, a meeting, smoke signals, body language, etc.



Activity: 3 - The Communication Process (continued)

Directions:

1. On the opposite page, in the middle of the first blank space, draw a circle about 3 inches wide. It's okay that the circle is not perfectly round.

2. Outside the circle at the 12 o'clock position, write the word Sender.

3. Outside the circle at the 3 o'clock position, write the word Message.

4. Outside the circle at the 6 o'clock position, write the word Receiver.

5. Outside the circle at the 9 o'clock position, write the word Feedback.

6. Now, you have a closed loop model to use as you proceed with breaking down recent communications you've had into their parts.

7. Draw another circle in the next blank space and fill in this model with the names and one of the messages from a conversation you had today with your partner.

8. Now, in the last two spaces, draw a model for two recent work situations. One model should be of you sending a message and one model should be of you receiving a message. It's okay to use non-verbal messages. Just tel us what the communication channel was.

9. We'll discuss some of these later.

Activity: 4 - Workplace Communication Problems

Objective(s): This activity will enable participants
1. To gain and practice communication barrier concept skills.
2. To develop minimum level reading and writing skills.
3. To develop and practice analytical skills.

Materials Required:
Pencil or pen

You need to know:

About Barriers in Effective Workplace Communication

1. Sender Barriers
   -Deadlines
   -Personal biases - expressing an opinion as if it were fact
   -Faulty assumptions - assuming that the receiver knows more than he actually does know
   -Ignoring or misinterpreting the receiver's feedback

2. Receiver Barriers
   -Deadlines
   -Attitudes
   -Personal Biases or Perceptions
   The attitudes and perceptions of people have a lot to do with communication. Perception refers to how you see things and what your senses tell you so that what you see and hear makes sense to you. Sometimes people hear what they want to hear rather than what was really said. How you perceive or see or hear other people and their communications is a result of many factors:
   1. the physical differences between you and the person.
   2. the differences in your past experiences and backgrounds.
   3. the differences in the language used.
   4. the setting in which you're communicating.
   5. how you feel at the time of the communication.

Activity: 4 - Workplace Communication Problems (continued)

You need to know: (continued)

3. Message Barriers
   -Inaccurate or incomplete information
   -Inappropriate words
   -Environmental noise
   -Sloppy handwriting or typing
   -Torn or dirty pages of printed material

You need to know:

Ways to Overcome Workplace Communication Barriers

If you are a sender	If you are a receiver
1. Organize your thoughts and the information before sending the message. 2. Send complete and accurate information. 3. Use clear language. 4. Stay calm and, if possible, get away from noise and distractions. 5. Set realistic deadlines. 6. Ask for and listen to the receiver's feedback.	1. Listen carefully for key words. 2. Ask questions if you don't understand completely. 3. Set realistic deadlines. 4. Listen with an open mind.

Activity: 4 - Workplace Communication Problems

Problem 1	Problem 2
Sender-	
Message-	
Receiver-	
Barriers-	
Problems-	
Solutions-	

Activity: 4 - Workplace Communication Problems (continued)

Directions:

1. As a group, we will analyze a workplace communication problem about notifying others of the needs, problems or current status of an assignment station.

2. We will follow the order of the chart on the opposite page as we discuss this problem (Problem 1). You make take notes if you'd like.

3. Afterwards, think about a workplace communication problem that you have been a part of or have witnessed.

4. Fill in Problem 2 on the chart with your workplace communication problem.

Activity: 5 - Active Listening and Removing Barriers Role Play

Objective(s): This activity will enable participants
1. To practice all the listening and speaking skills learned at this point.
2. To demonstrate an understanding of the consequences of ineffective communication (e.g. lost time, sub-standard product, etc.).
3. To demonstrate an understanding of the basic elements of effective communication.

Materials Required:
None

You need to know:

About Active Listening v. Passive Listening

Active Listening is a way of getting the sender of a message more involved with the receiver of a message. It helps everyone get the feedback and the answers they need. It is necessary for good two-way communication and for problem solving.

To get the right message, the receiver feeds the message back to the sender without adding anything to the message. It shows that the receiver has heard the message that is intended whether he agrees with the message or not. The sender will usually agree with the feedback or will send a new message that clarifies what he meant. Active listening is useful for decoding messages or getting at the hidden meanings in messages.

Activity: 5 - Active Listening and Removing Barriers Role Play (continued)

You need to know: (continued)

Steps in Active Listening

1. The sender sends a coded message.
2. The receiver receives the message.
3. The receiver decodes the message.
4. The receiver feeds back what the message is - nothing more or less - with no evaluations.
5. The sender either agrees with the receiver's interpretation or, if not, starts the message over again, clarifying the message and most likely revealing at least some of the hidden meanings in the message.

Passive Listening is the process of quietly taking in the statements and questions of the sender of a message. There is no feedback indicating that the message was received or understood.

Techniques for Listening Effectively

1. Prepare to listen by minimizing distractions and making eye contact with the sender when possible.
2. Know why and what you're listening for. What is the central idea being expressed and what are the important details?
3. Learn to recognize the ways most senders organize the information they're communicating -
   a. Chronological order - first, next, then
   b. Order of importance - most important, least significant, highest priority
   c. Comparison and contrast - like, different, in contrast, same
   d. Cause and effect - because, so, therefore
4. Look for nonverbal signals and try to determine what they mean.
5. Try to listen with an open mind even when the ideas are new and/or you don't agree with them.
6. Know yourself and your listening style. Make your style work for you or improve your listening style where necessary.

Activity: 5 - Active Listening and Removing Barriers Role Play (continued)

Directions:

1. You and your partner will develop a role play situation for a workplace communication problem that each of you has been a part of or witnessed.

2. Take turns being yourself in one role play and being the other person for your partner in another role play.

3. Nothing has to be written down.

4. Develop a "before" effective communication version of the role play and an "after" effective communication version of the same situation. In between the two versions, briefly discuss what you think were the reasons for and the consequences of the miscommunication.

5. You and your partner should be prepared to present your role plays (no more than 3 minutes each) to the entire group.

Activity: 6 - Listening Practice

Objective(s): This activity will enable participants
1. To develop listening skills through practice.
2. To practice recording spoken information.
3. To practice remembering oral details.

Materials Required:
1. Teacher-dictated listening practice materials
2. Participant worksheets and pencil

Directions:

1. This is a practice exercise, not a test. RELAX!

2. Do your best.

3. We'll discuss problem areas when we're done.

4. Listen carefully to the directions for each exercise.

Activity: 6 - Listening Practice Worksheet

a. Make a ✓ on the number you hear.

a.	10	11	100	b.	12	20	22	c.	3	13	30
d.	4	14	40	e.	5	15	50	f.	6	16	60
g.	7	17	70	h.	8	18	80	i.	9	19	90

b. Make a ✓ when you hear **like**.
Make an **x** when you hear **don't like**.

	Overtime	**Computers**	**Saturday Clean-Up**	**Monday Start-Up**
Ann				
Bob				
John				
Mary				

c. Listen and circle the number you hear:

555-4212	555-4202
311-9762	311-9752
254-8976	254-9976
778-2056	778-2046
626-5339	636-5339
255-9509	251-9509
782-8886	872-8886
874-0402	874-0482

Activity: 6 - Listening Practice Worksheet

d. Listen and write the missing numbers.

7_____ _____-8524

928-_____ _____34

413-25_____ _____

_____ _____5-7160

753-_____ _____42

835-27_____ _____

6_____ _____-7045

591-_____ _____38

e. Listen and write the lot ID number you hear.

_____

_____

_____

_____

_____

_____

_____

_____

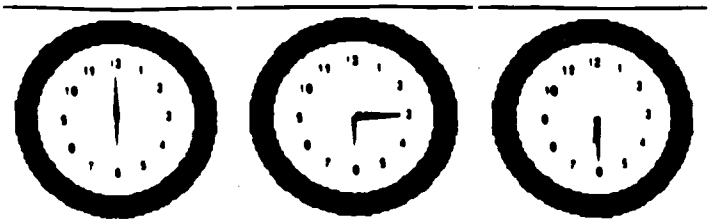
Activity: 6 - Listening Practice Worksheet

f. Listen and circle the number you hear:

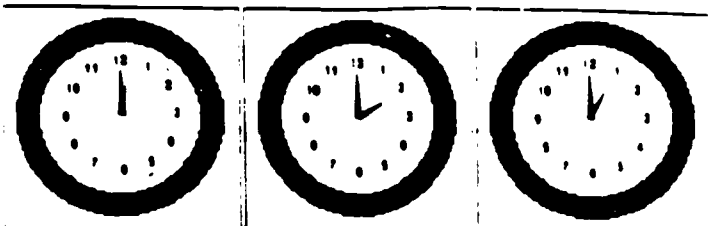
1%	.1%	.01%	10%
2%	20%	.2%	.02%
3%	30%	.3%	.03%
40%	4%	.4%	.04%
50%	5%	.5%	.05%
60%	6%	.6%	.06%
70%	7%	.7%	.07%
80%	8%	.8%	.08%
90%	9%	.9%	.09%

Activity: 6 - Listening Practice Worksheet

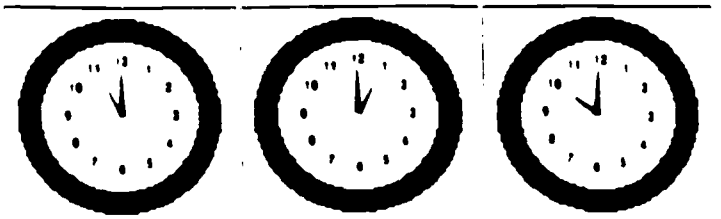
g. Listen and identify the time you hear.



1. a 1. b 1. c

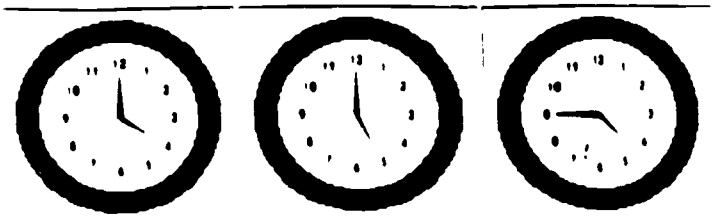


2. a 2. b 2. c

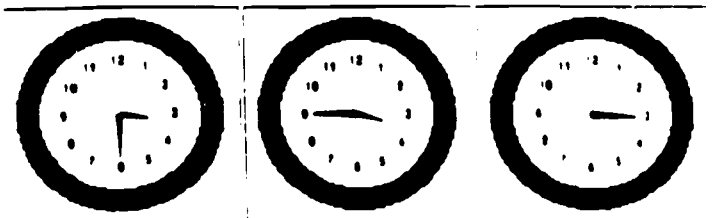


3. a 3. b 3. c

4. a 4. b 4. c



5. a 5. b 5. c



6. a 6. b 6 c

Activity: 6 - Listening Practice Worksheet

h. Listen and circle the address you hear.

1.	655 Broad Street	665 Broad Street
2.	82 East Avenue	83 East Avenue
3.	428 Pine Street	448 Pine Street
4.	144 Brook Road	1404 Brook Road
5.	139 Lake Avenue	129 Lake Avenue
6.	5206 Main Street	5026 Main Street
7.	5790 Plum Street	5719 Plum Street
8.	4304 Laburnum Avenue	434 Laburnum Avenue

i. Listen and write the missing numbers.

1. 3 ___ ___ Franklin Street

2. 12 ___ ___ Carolina Avenue

3. ___ ___1 Bay Road

4. ___ ___68 Grand Avenue

5. 76 ___ ___ First Street

6. 5 ___ ___ River Road

7. ___ ___ 92 Madison Avenue

8. 2 ___ ___ Penny Lane

Activity: 6 - Listening Practice Worksheet

j. Listen and write the number you hear.

1. **work order number** _____
2. **lot ID** _____
3. **extension** _____
4. **assignment stations** _____
5. **a salt reading of** _____
6. **a dough temperature of** _____

k. Food Order Dictation

Take notes as needed to help you remember the items. Visualize each item as you hear it.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Activity: 6 - Listening Practice Worksheet

I. Granola Recipe

Take notes as needed to help you remember the recipe accurately.

Activity: 6 - Listening Practice Worksheet

m. Listen carefully to the dictation on hearing protection.
Later, you will answer questions by filling in the blanks below with the letter o: the correct type of hearing protection.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

a. Disposable Plugs

b. Reusable Plugs

c. Muffs

Activity: 6 - Listening Practice Worksheet

n. Directions for Surviving a Hotel Room Fire

Jot down only the key words you need to remember the directions you'll hear. Try to group the items in a way that makes sense to you - similar topics (using the phone), order of importance, etc. Try to picture these directions in your minds eye.

Activity: 6 - Listening Practice Worksheet

o. **Directions for Emergency Medical Care at Nabisco.®**
Again, jot down only the key words you need to remember the directions you'll hear. Try to group the items in a way that makes sense to you and that will be easy for you to remember.

Activity: 6 - Listening Practice Worksheet

p. **Listen carefully to the newspaper article about a bakery.** Try to remember as many facts as you can. Also, listen for the main ideas and for the order of the production process. Be prepared to answer questions on the article. You may take notes as you'd like.

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Activity: 6 - Listening Just For Fun

q. "Once upon a time there were four people named Everybody, Somebody, Nobody and Anybody. When there was an important job to be done, Everybody was sure that Somebody would do it. Anybody could have done it, but Nobody did it.

"When Nobody did it, Everybody got angry because it was Everybody's job. Everybody thought that Somebody would do it, but Nobody realized that Nobody would do it.

"So it ended up that Everybody blamed Somebody when Nobody did what Anybody could have done in the first place."

Activity: 7 - Giving and Following Oral Directions

Objective(s): This activity will enable participants
1. To develop an appreciation for the skills involved in giving and following oral directions.
2. To practice giving and following oral directions.
3. To develop analytical skills.
4. To reinforce listening and speaking skills.

Materials Required:
1. Two different graphic designs
2. Blank paper, pencils

You need to know:

About Following Oral Directions

1. Use active listening to follow directions. To listen actively, you must
   - Give the sender your full attention and plan what you are going to do.
   - Check to be sure that you understand the directions.
   - Clarify the task that you are to do by getting more information if needed.

2. Plan the task
   - Pay attention to key words in the directions.
   - Pay attention to the order or sequence of the directions.
   - Picture yourself carrying out the directions as they are told to you.
   - Think as the sender is talking and recreate the directions in your mind.

3. Check your understanding
   When the directions have been given, check your understanding by
   - summarizing the directions
   - asking questions if necessary

Activity: 7 - Giving and Following Oral Directions (continued)

You need to know: (continued)

About Giving Oral Directions

1. Know the correct process for completing a task yourself. The people who know what they are talking about are the people who are best able to give good directions.

2. Plan exactly what you're going to say as you give the directions. Put the steps in order.

3. Think about what materials or equipment are needed to complete the task accurately.

4. Think about the receivers of your directions. Don't talk down to the receivers but don't assume that they know more than they do.

5. If completing the task involves any personal safety issues or risk of equipment damage, it's important to include precautions in your directions.

6. Check the receiver's understanding of your directions by asking him to repeat the directions or whether he has any questions.

7. Clarify your directions if the receiver is confused and unsure of what to do. Try to understand what might be leading to the confusion.

Activity: 7 - Giving and Following Oral Directions (continued)

Directions:

1. You and your partner will take turns giving and following oral directions from each other.

2. One of you should sit down with a blank sheet of paper. Your job is to draw the picture that your partner directs you to draw.

3. The other one of you will be given the picture. Your task is to explain to your partner how to draw this picture.

4. You may not rehearse.

5. You may not show the picture.

6. You may not use any visual aids.

7. You must keep your hands at your sides.

   The object is for your partner to have a picture exactly like yours when the exercise is completed.

   When you are through, discuss the experience with your partner. Analyze what made the task so difficult. What would the two of you suggest to make the task easier and to achieve a better result?

8. Now, switch roles. You will be given another picture to direct.

Task: how to _____

Words to explain: _____

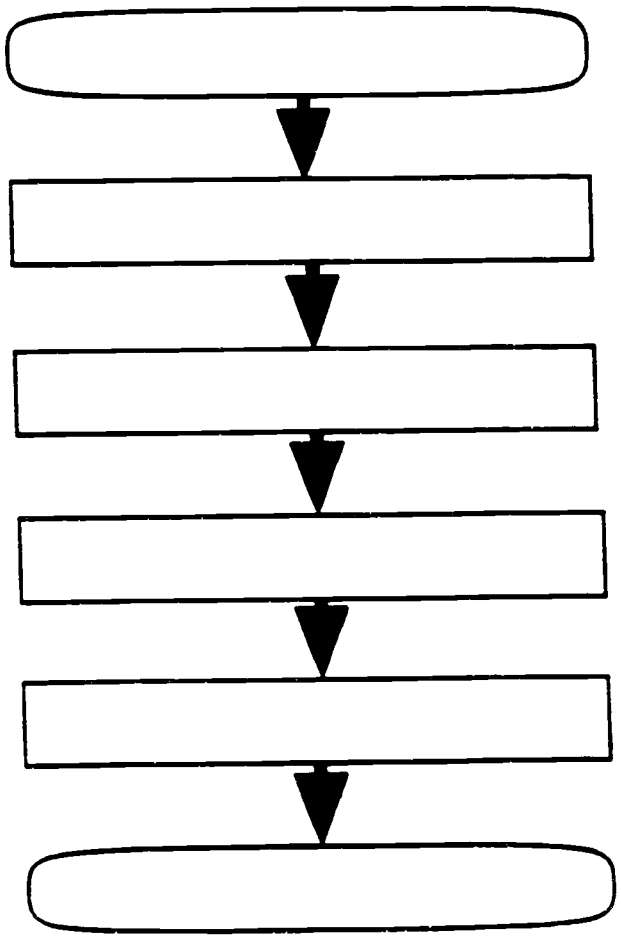
_____

_____

Materials needed: _____

_____

Main steps in performing the task:



Safety Warnings:

_____

_____

_____

Task: how to _____

Words to explain: _____

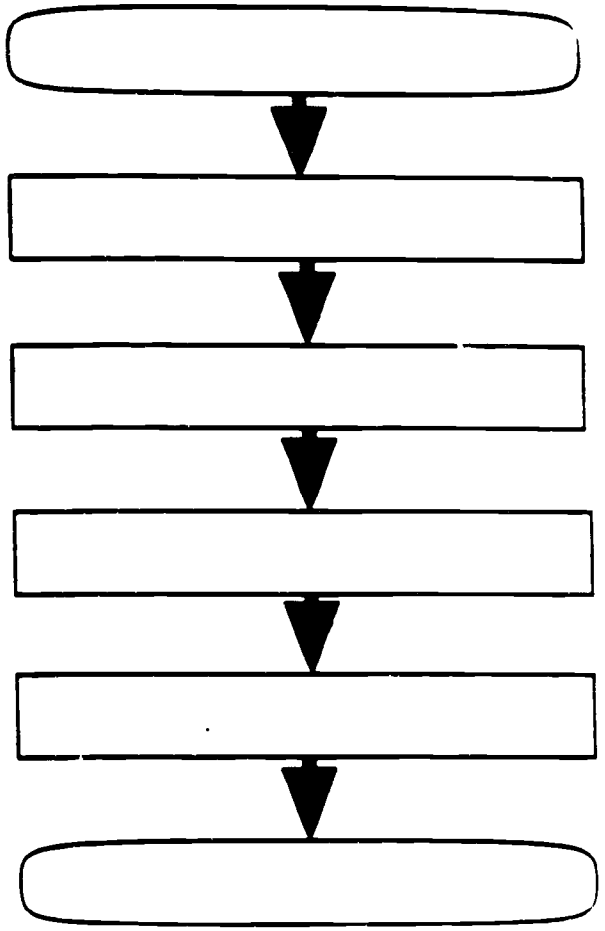
_____

_____

Materials needed: _____

_____

Main steps in performing the task:



Safety Warnings:

_____

_____

_____

Activity: 8 - Planning for and Giving Oral Directions

Objective(s): This activity will enable participants
1. To develop analytical skills.
2. To reinforce all of the communication concepts to date through practice.
3. To develop minimum level reading and writing skills.
4. To develop skill in sequencing instructions.
5. To practice giving and following oral directions.

Materials Required:
1. Planning forms
2. Pencil
3. Any task materials brought by participants

Directions:

1. You and your partner were previously asked to come prepared to direct each other on a simple task from your everyday life and from your work life.

2. Use the planning form on the opposite page to help you organize your thoughts as you prepare to teach your partner these tasks.

3. When both of you are ready, take turns with your partner giving and listening to oral directions.

Activity: 9 - Sequencing Oral Directions

Objective(s): This activity will enable participants
1. To develop skill in sequencing instructions.
2. To develop analytical skills.

Materials Required:
1. Set of emergency evacuation diagrams of Nabisco facility.

Directions:

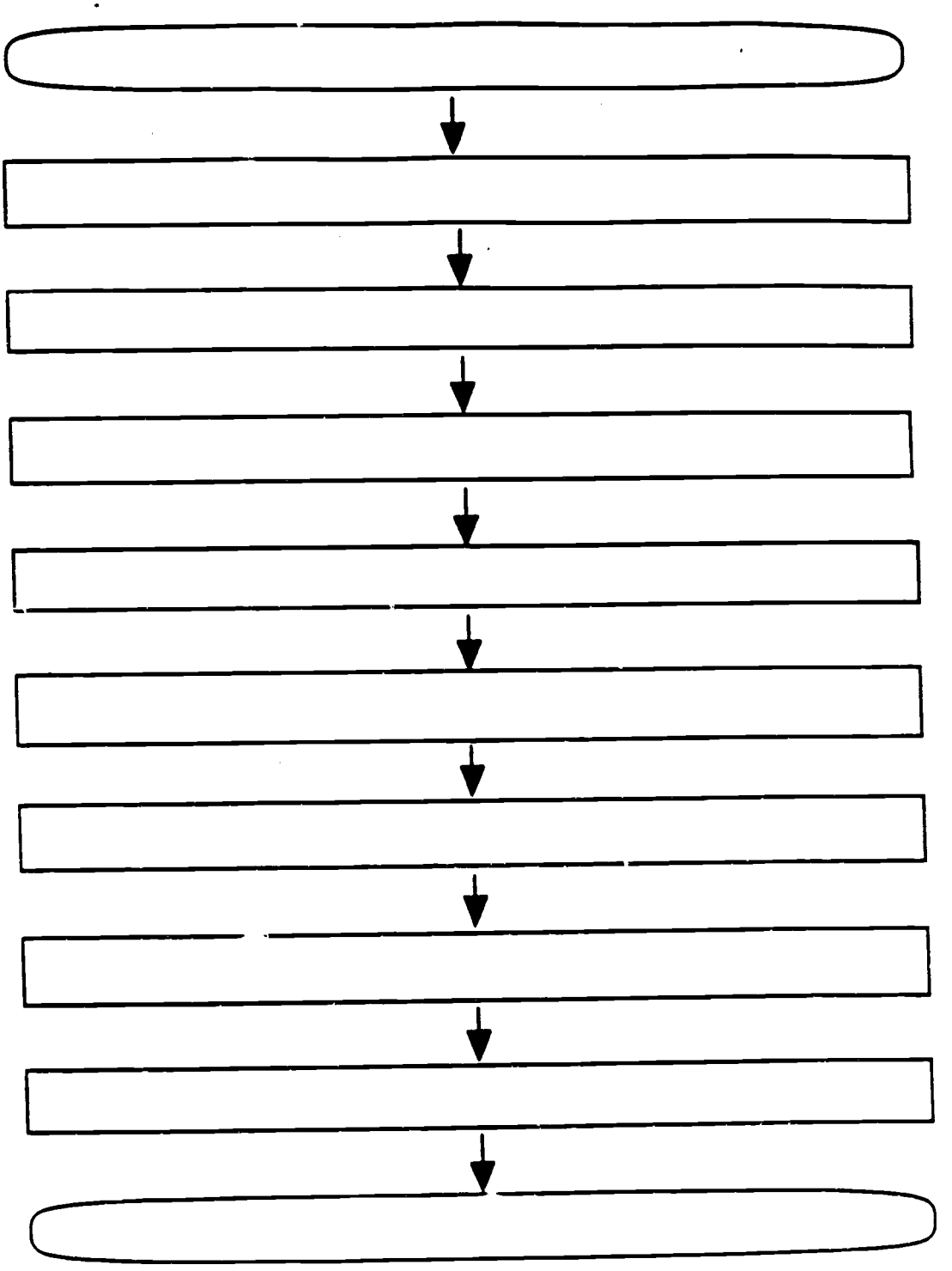
1. Study the set of diagrams on the following pages and find your work station at Nabisco.

2. Mentally plan how to give directions for evacuating the plant from your work station. Try to envision the route you should take.

3. Fill in the flow chart on the next page with directions for evacuating your work station in an emergency.

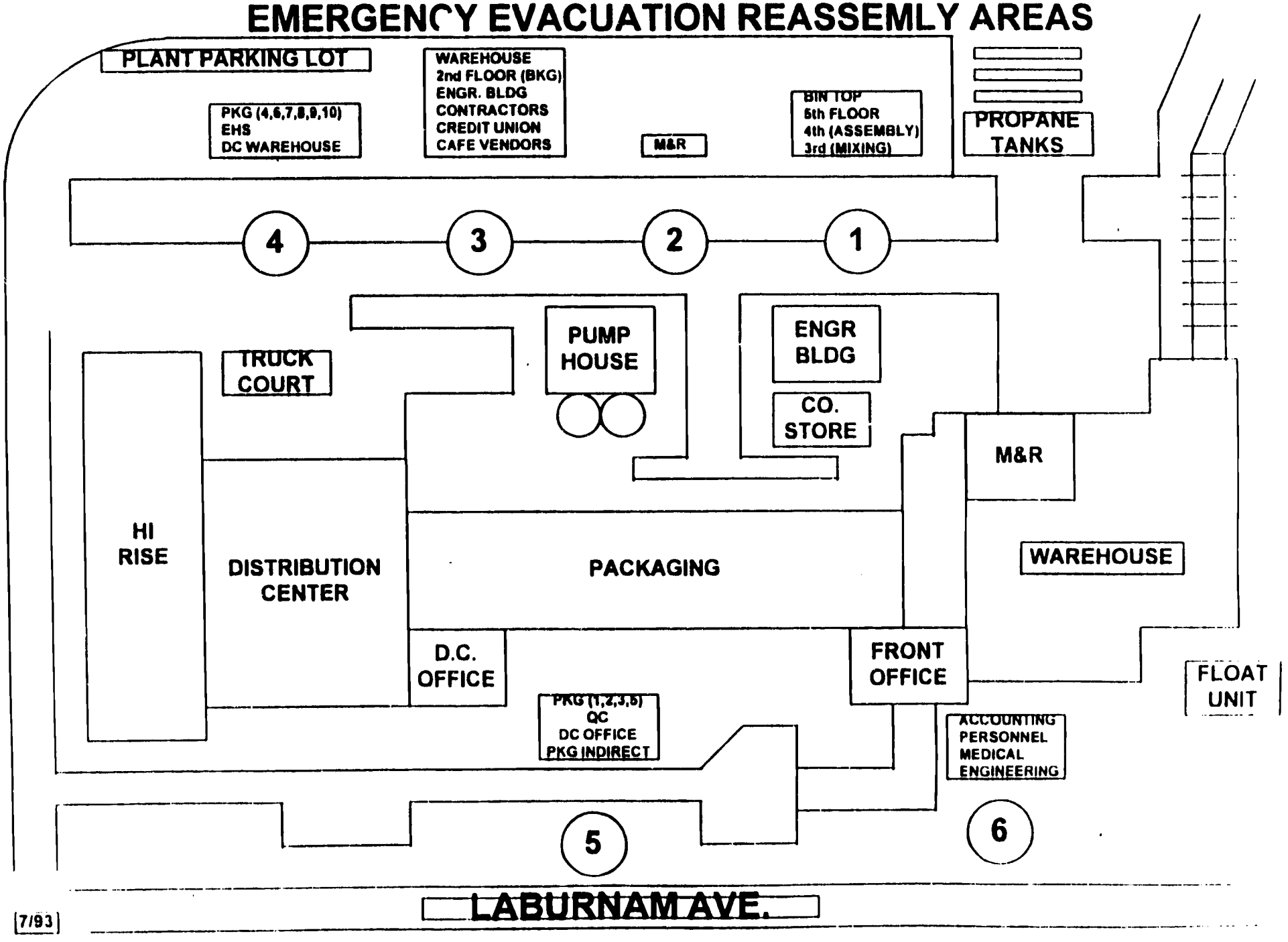
4. Be prepared to give your directions orally to other participants.

Activity: 9 - Sequencing Oral Directions
Flow Chart



NABISCO, INC. RICHMOND BAKERY / D.C.

EMERGENCY EVACUATION REASSEMLY AREAS



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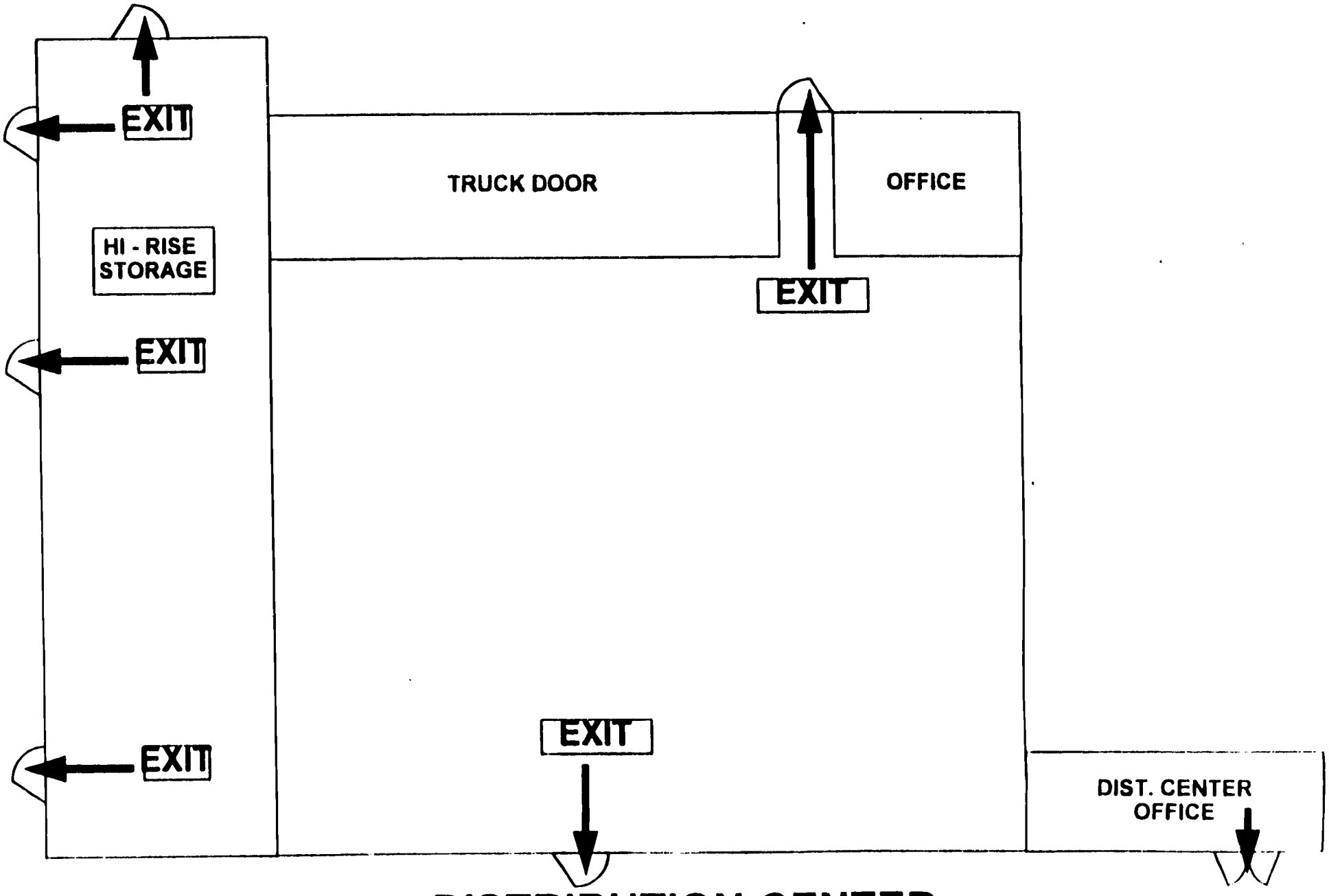

DISTRIBUTION CENTER

NABISCO, BRANDS RICHMOND BAKERY / D.C.

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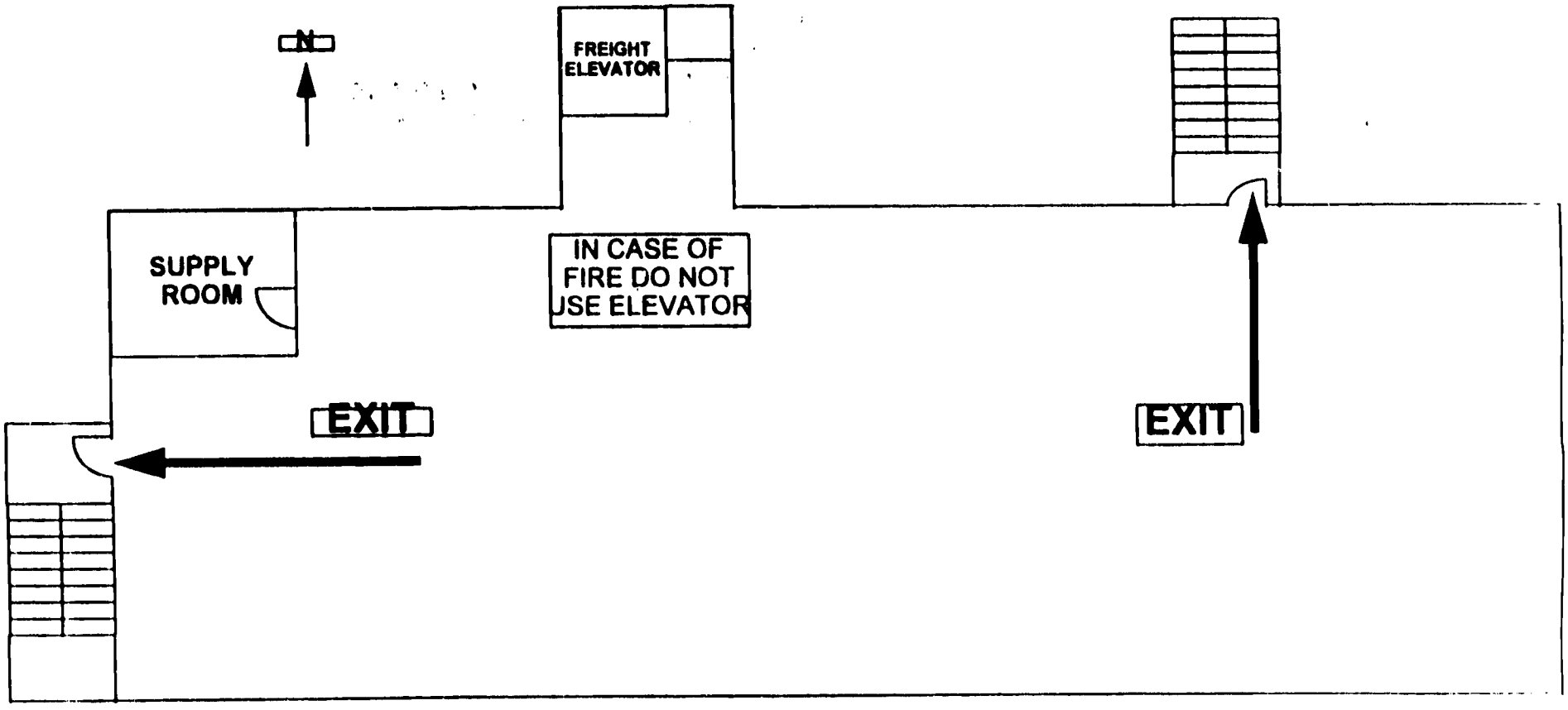
731

732



5TH FLOOR - USE BIN AREA

NABISCO, INC. RICHMOND BAKERY / D C

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733

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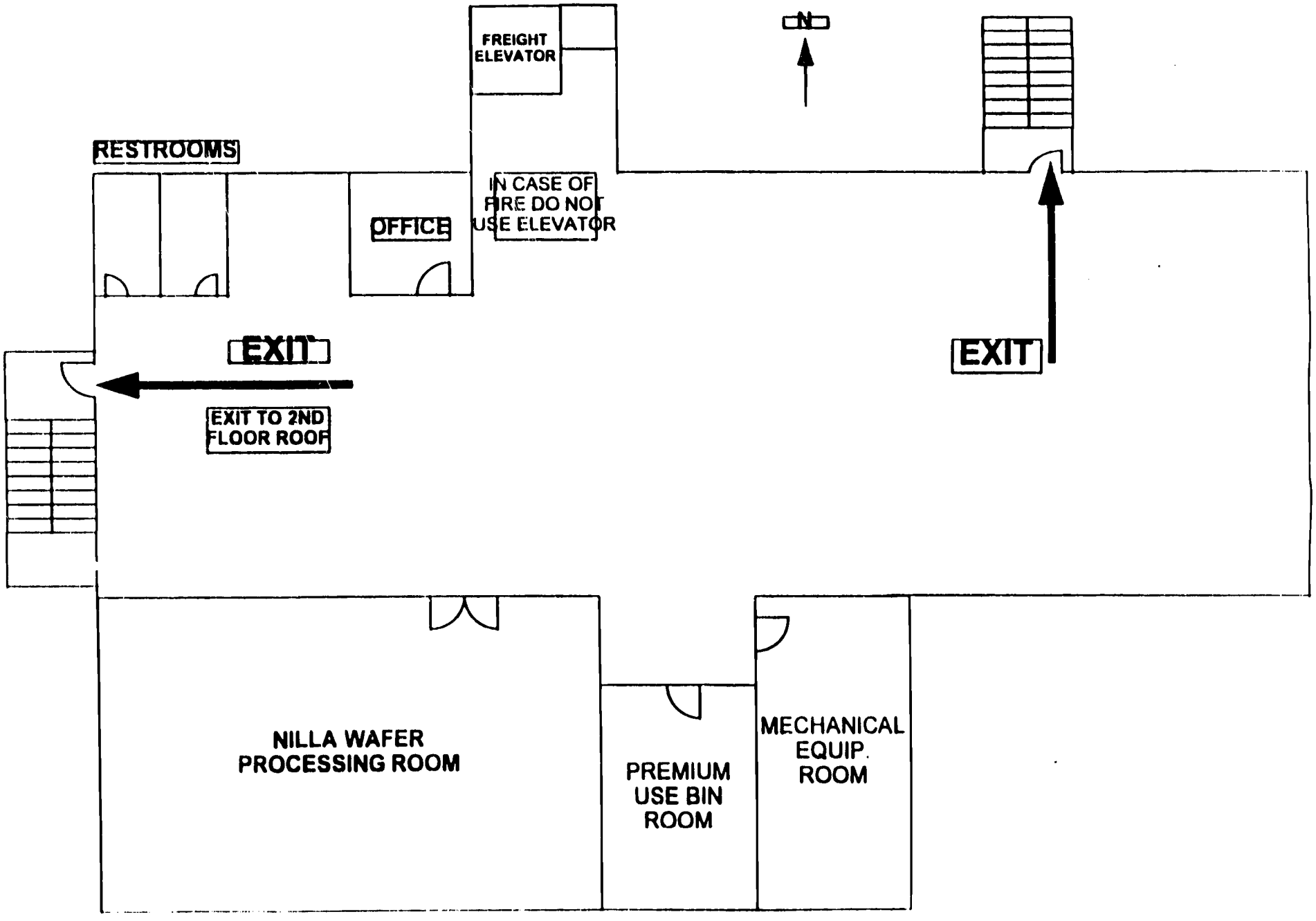
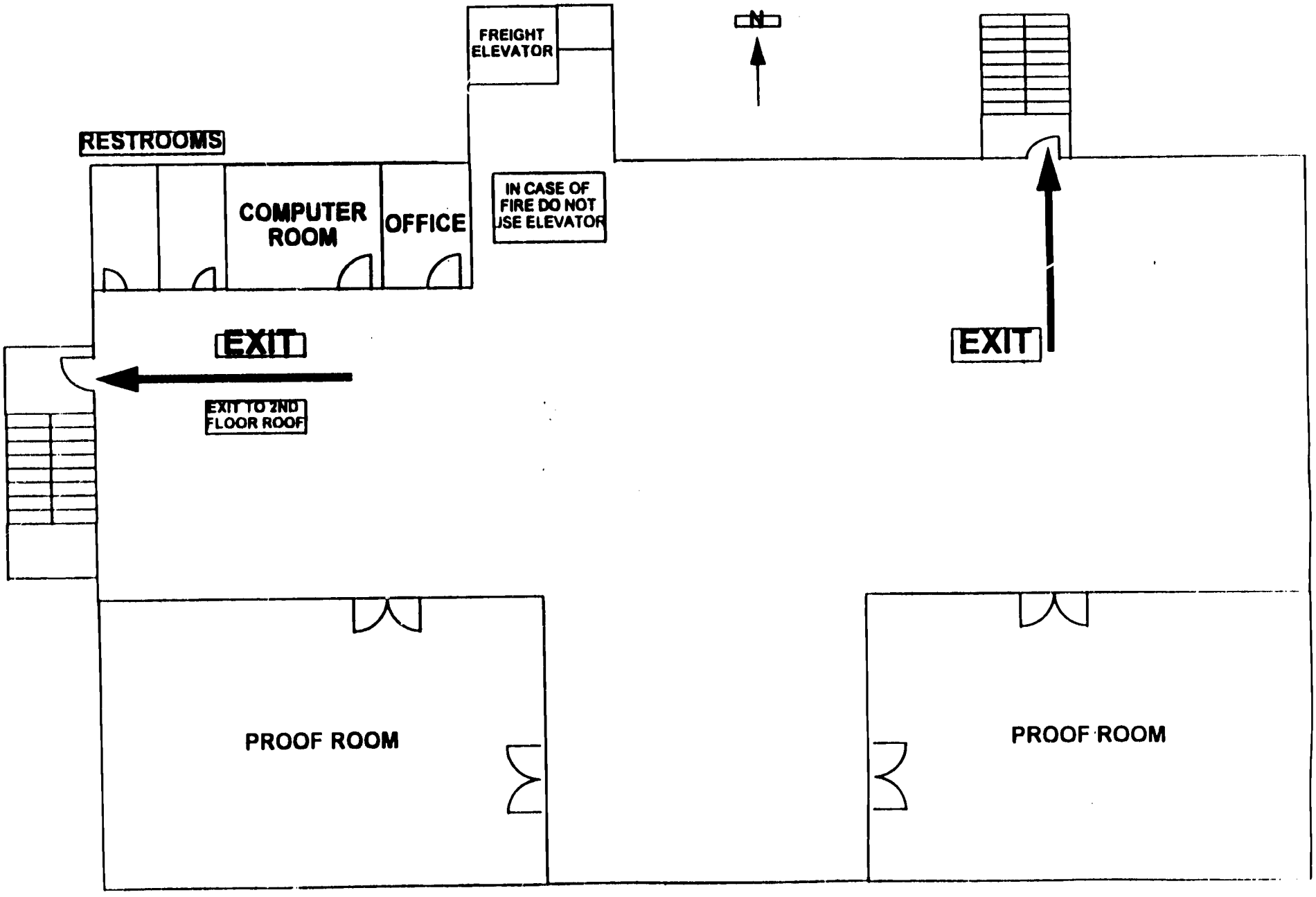


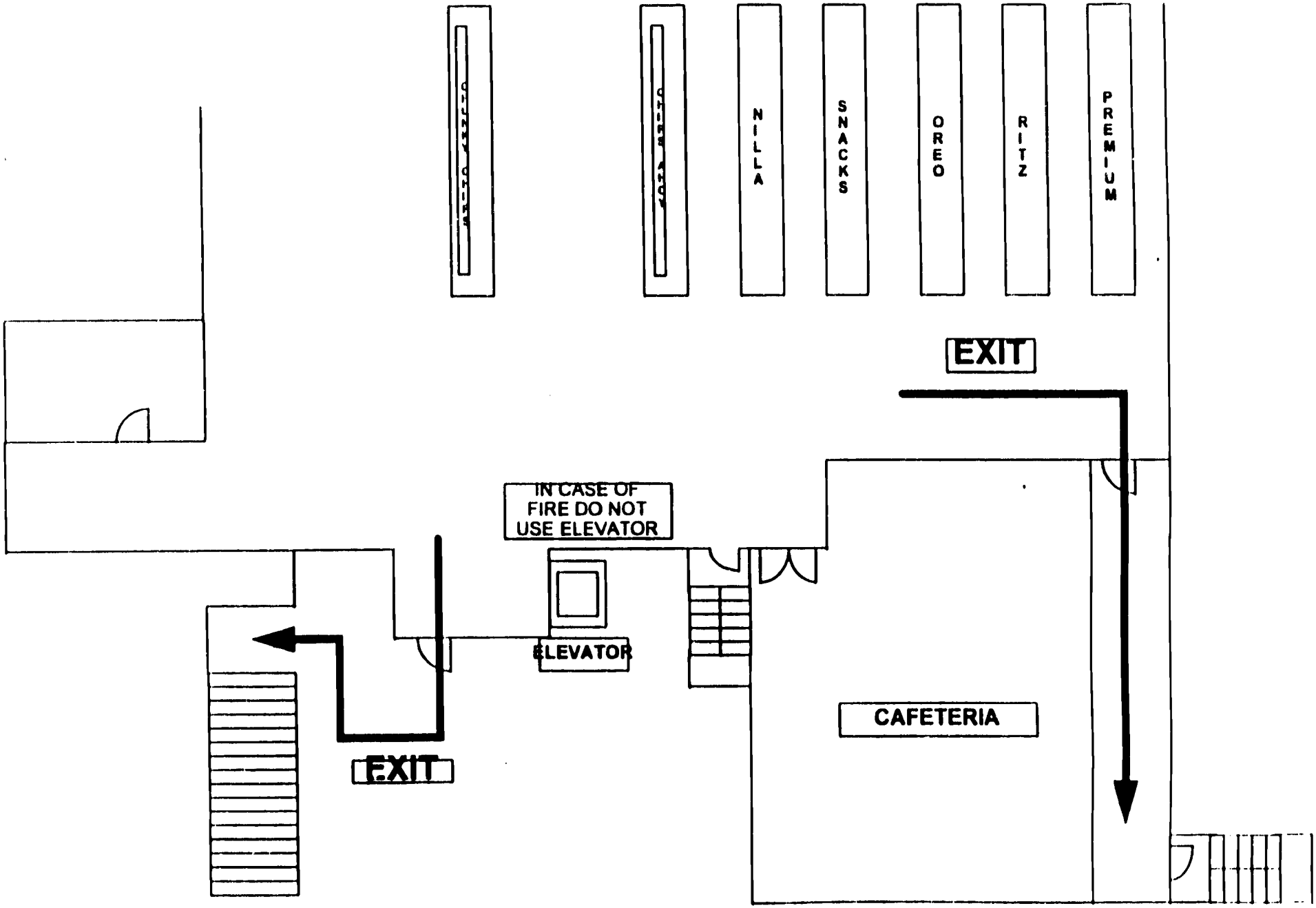
4TH FLOOR - ASSEMBLY

NABISCO, INC. RICHMOND BAKERY / D.C



3RD FLOOR - MIXING

NABISCO, INC. RICHMOND BAKERY / D.C.



2ND FLOOR - SOUTH BAKE SHOP

NABISCO, INC. RICHMOND BAKERY/D.C.

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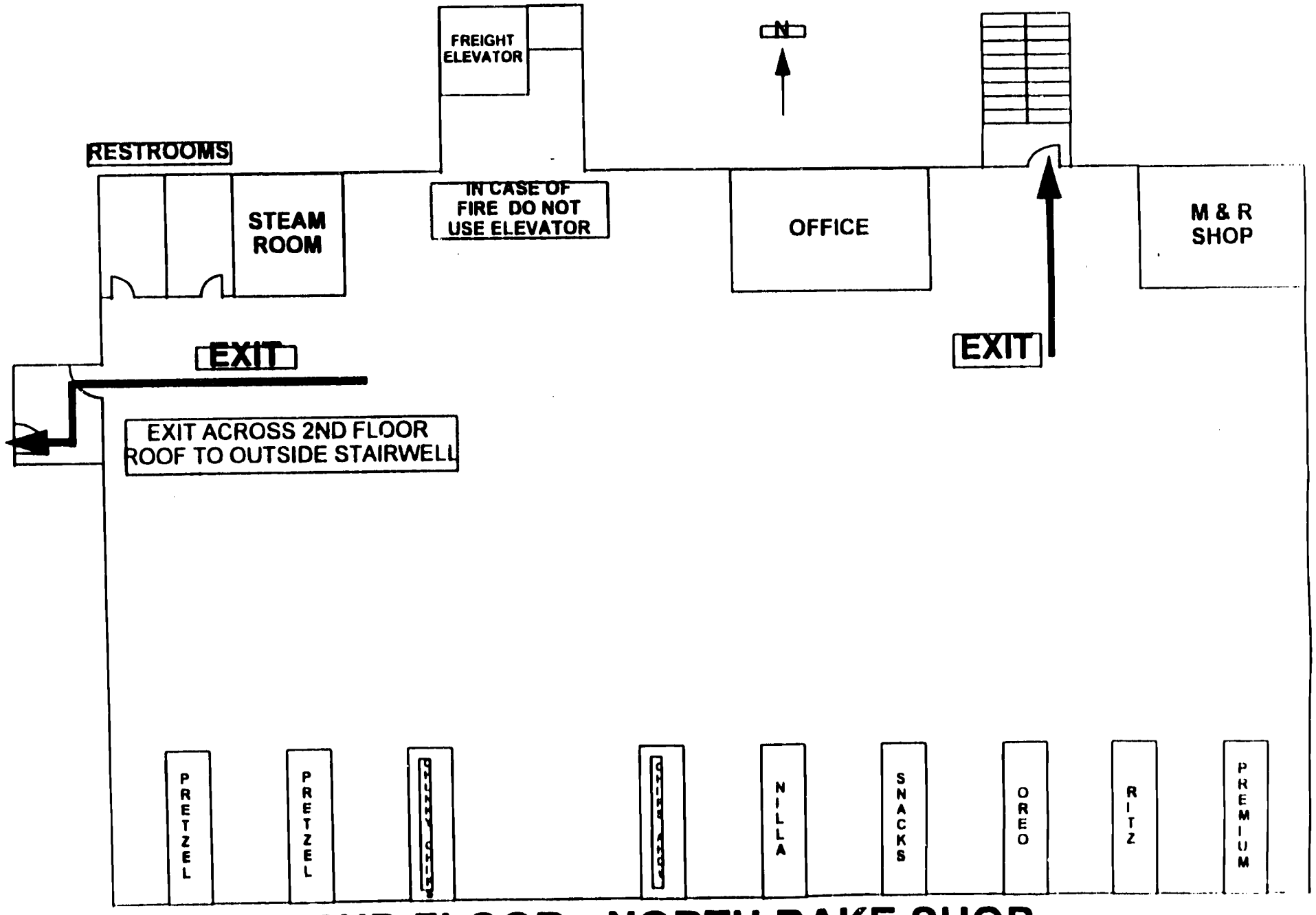
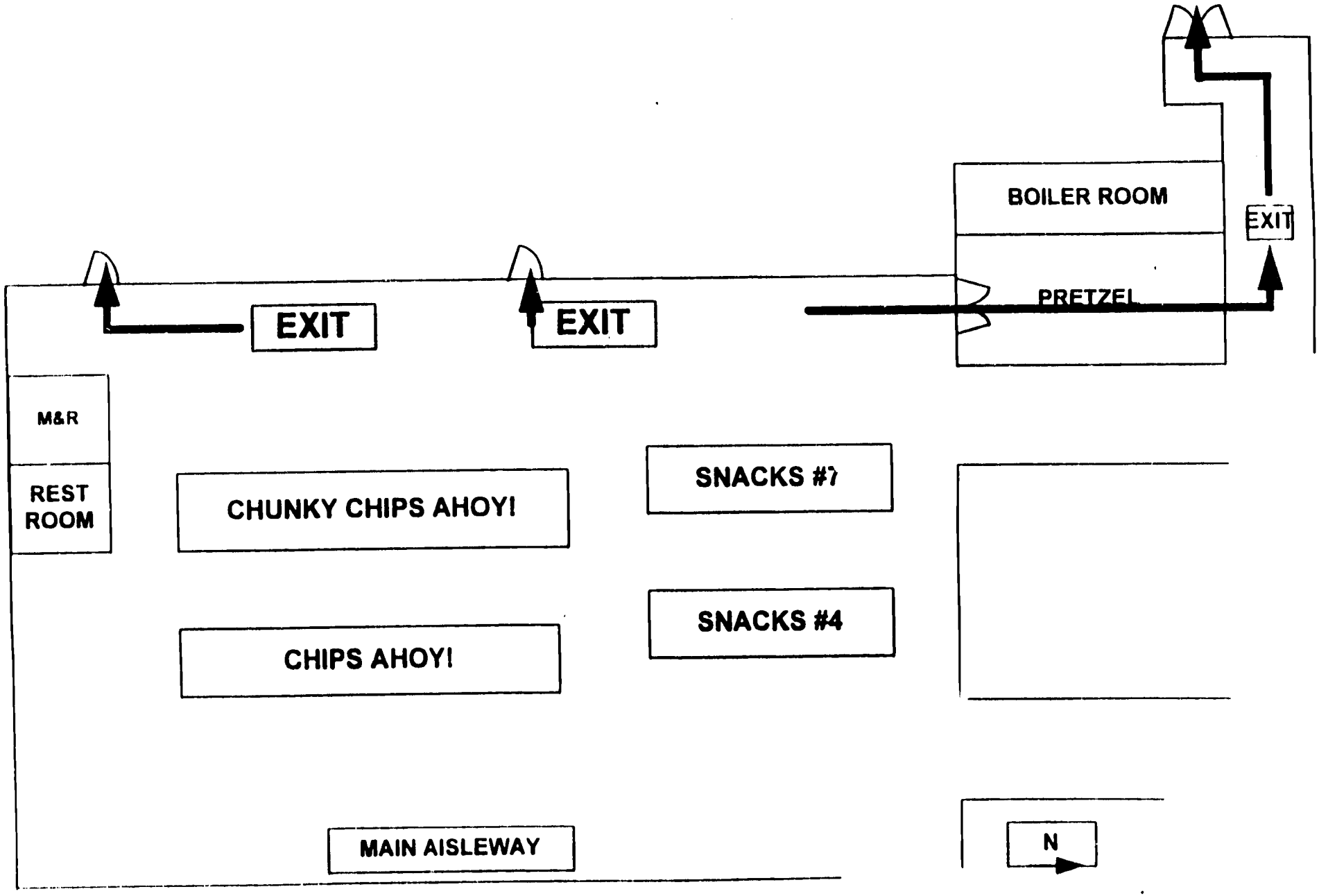


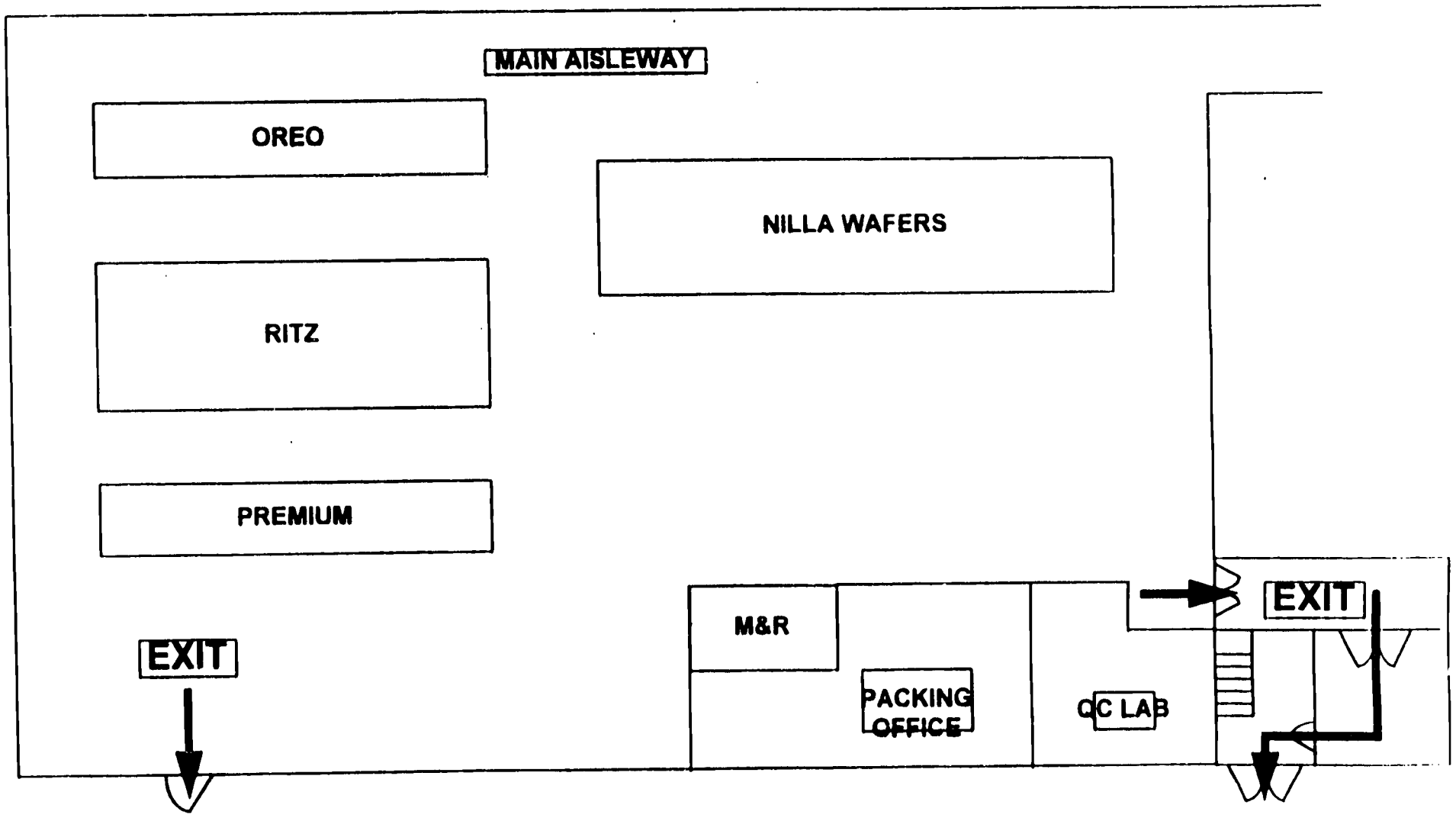
2ND FLOOR - NORTH BAKE SHOP

NABISCO, INC. RICHMOND BAKERY / D.C.



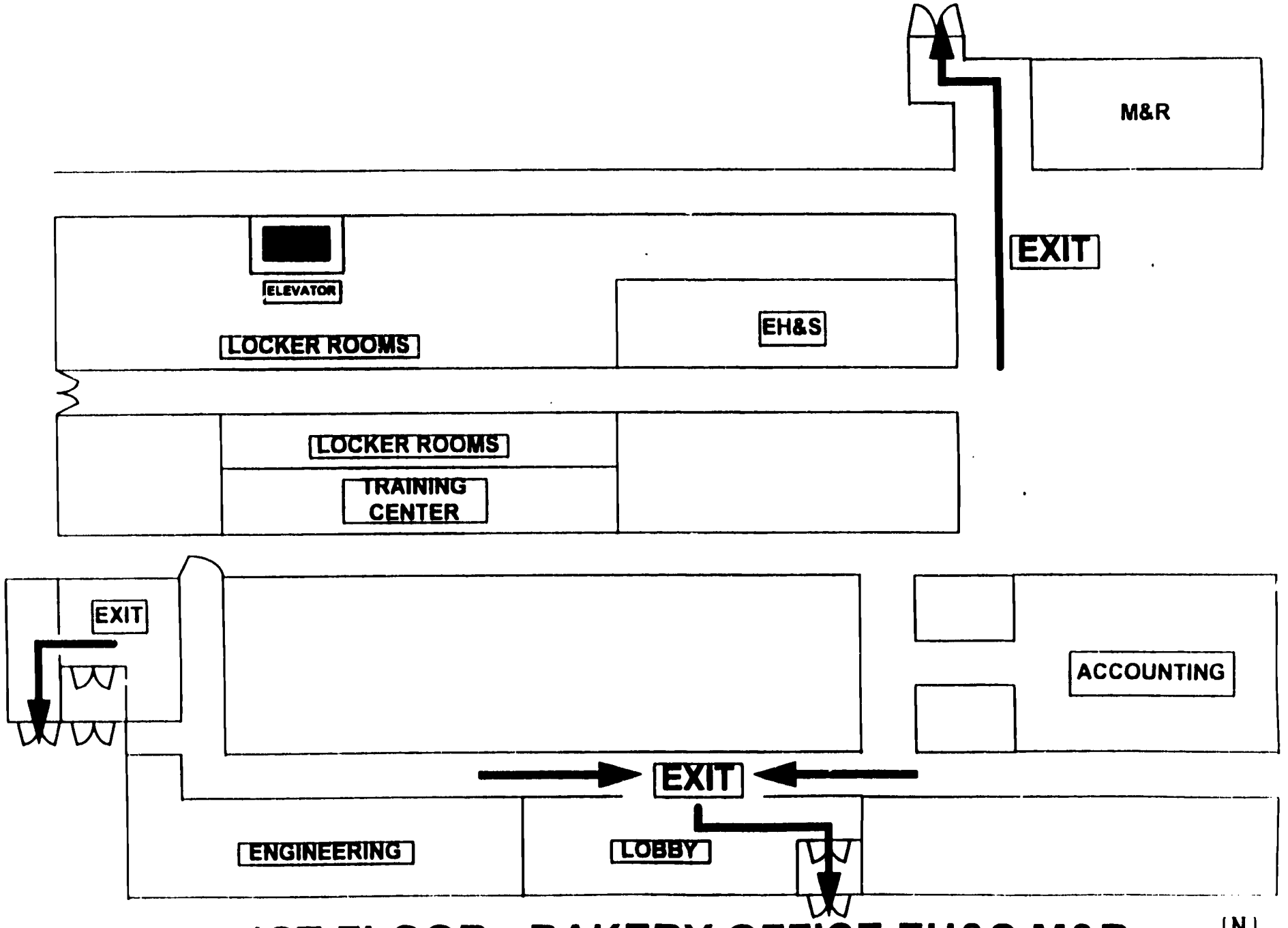
1ST FLOOR - WEST PACKING DEPT.

NABISCO, INC. RICHMOND BAKERY / D.C.



1ST FLOOR - EAST PACKING DEPT.

NABISCO, INC. RICHMOND BAKERY / D.C.



1ST FLOOR - BAKERY OFFICE,EH&S,M&R

N

NABISCO, INC. RICHMOND BAKERY / D.C.

Activity: 10 - Giving and Receiving Oral Directions

Objective(s): This activity will enable participants
1. To practice giving and following oral directions.
2. To reinforce all of the communication concepts learned to date.
3. To develop analytical skills.
4. To develop skill in sequencing instructions.

Materials Required:
1. Large folding map of Metropolitan Richmond area for each participant
2. Set of emergency evacuation diagrams of Nabisco® facility.

Directions:

1. You will be working with a partner. Choose one of the activities below.

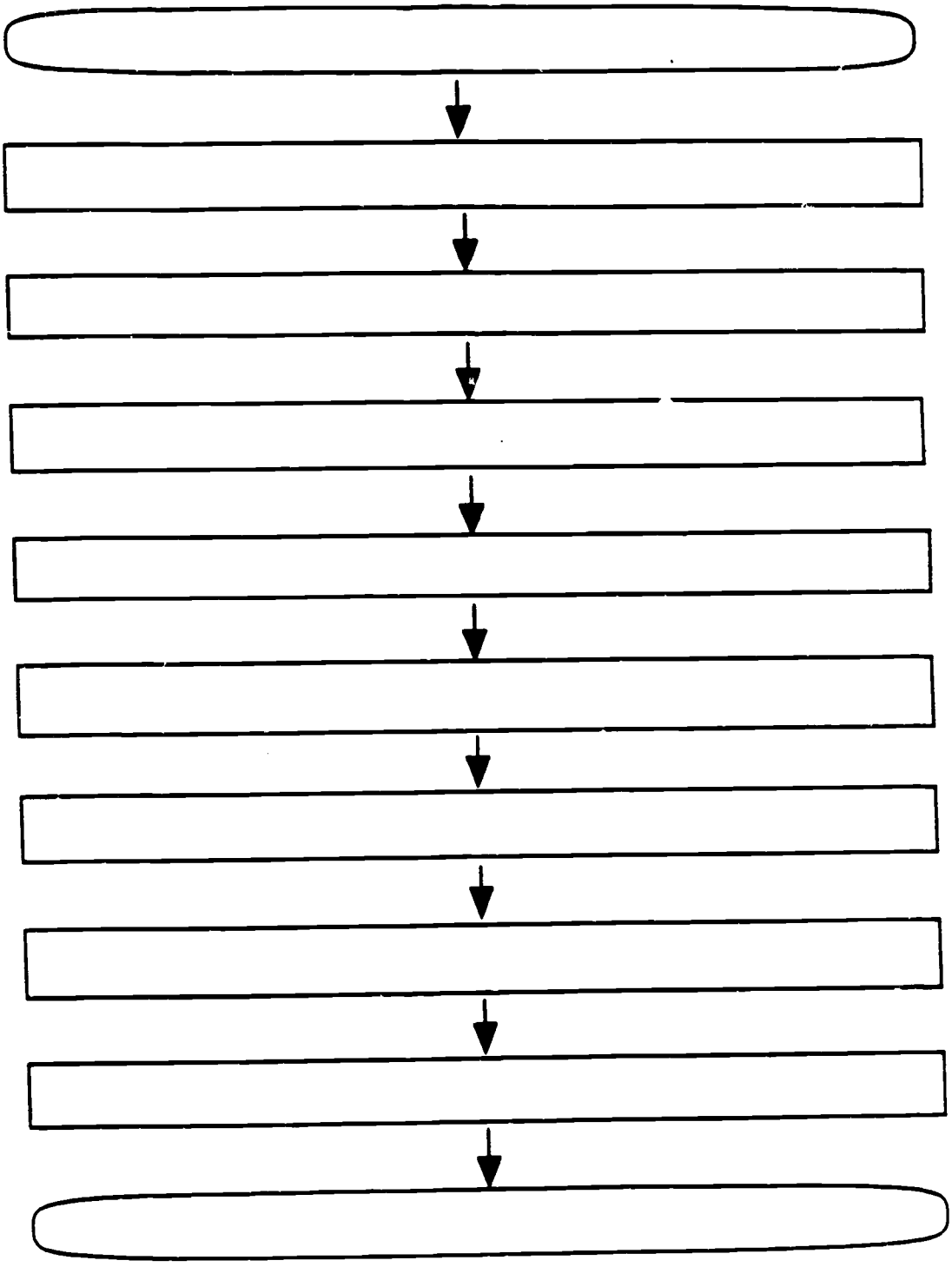
2. The object is for you to plan and give oral directions that are so clear and easy to follow that your partner, using effective and active listening techniques, will reach a predetermined point known only to you.

3. Remember the techniques you've learned for giving directions.

Activity A:
Study the map you've been given and plan (doing a flow chart) how to give oral directions for driving from the work site to your home. If you prefer, you could give directions for getting to a public place such as the baseball park, one of the regional shopping malls, etc. but do not tell your partner what the destination is.

Activity B:
Use the set of emergency evacuation diagrams again as a guide and draw a map showing how to get from the employee parking lot to your work station. Do a flow chart that shows the steps in sequence.

Activity: 10 - Giving and Receiving Oral Directions
Flow Chart



Activity: 11 - Getting Information Orally

Objective(s): This activity will enable participants
1. To practice asking and answering questions to get information they need.

Materials Required:
Information gap activity worksheets
Pen or pencil

You need to know:

About Asking Questions

1. Decide what information you need to have about a situation by asking the "five W's and how" questions to yourself first. Examples:
   a. Who (should page the mechanic when one is needed?)
   b. What (should I do if the ovenband stops?)
   c. When (should I do a cream-up?)
   d. Where (should I check to see which bins need to be fumigated?)
   e. Why (did the belts shut down and the red light start flashing?)
   f. How (many doughs are in the proof room?)

2. You need answers to the "five W's and how" questions in order to do your job effectively and when you don't have those answers, you have an information gap.

3. To close or fill in your information gap, determine who is the best or most likely person to have the answer(s) you need.
   a. Co-workers in the same department
   b. Co-workers in another department
   c. Your internal customer or the person who gets the product after you've done your job.
   d. Your supervisor

4. Generate your questions by
   a. Planning ahead exactly what information you need.
   b. Asking your questions as clearly as you can.
   c. Listening carefully to the answer(s) you get.
   d. Taking notes if necessary.
   e. Evaluating the answers in light of your job.
   f. Repeating the cycle if necessary.

Activity: 11 - Getting Information Orally (continued)

You need to know: (continued)

5. There are two basic kinds of questions:
   a. Open questions don't require a specific answer. People often include their opinions, thoughts and feelings. Example - How should I prepare to measure product breakage?

   b. Closed questions are narrow and usually require a specific answer. People tend to answer closed questions in a direct way, often in a single word or sentence. Example - Should I enter the empty bag weight into the computer?

Directions:

1. You and your partner will have different information for the same incomp' graphics.

2. Each of you must correctly fill in your graphics by getting the missing information from your partner through the questions you ask.

3. You should not look at your partner's information.

4. Carefully analyze the information you do have first.

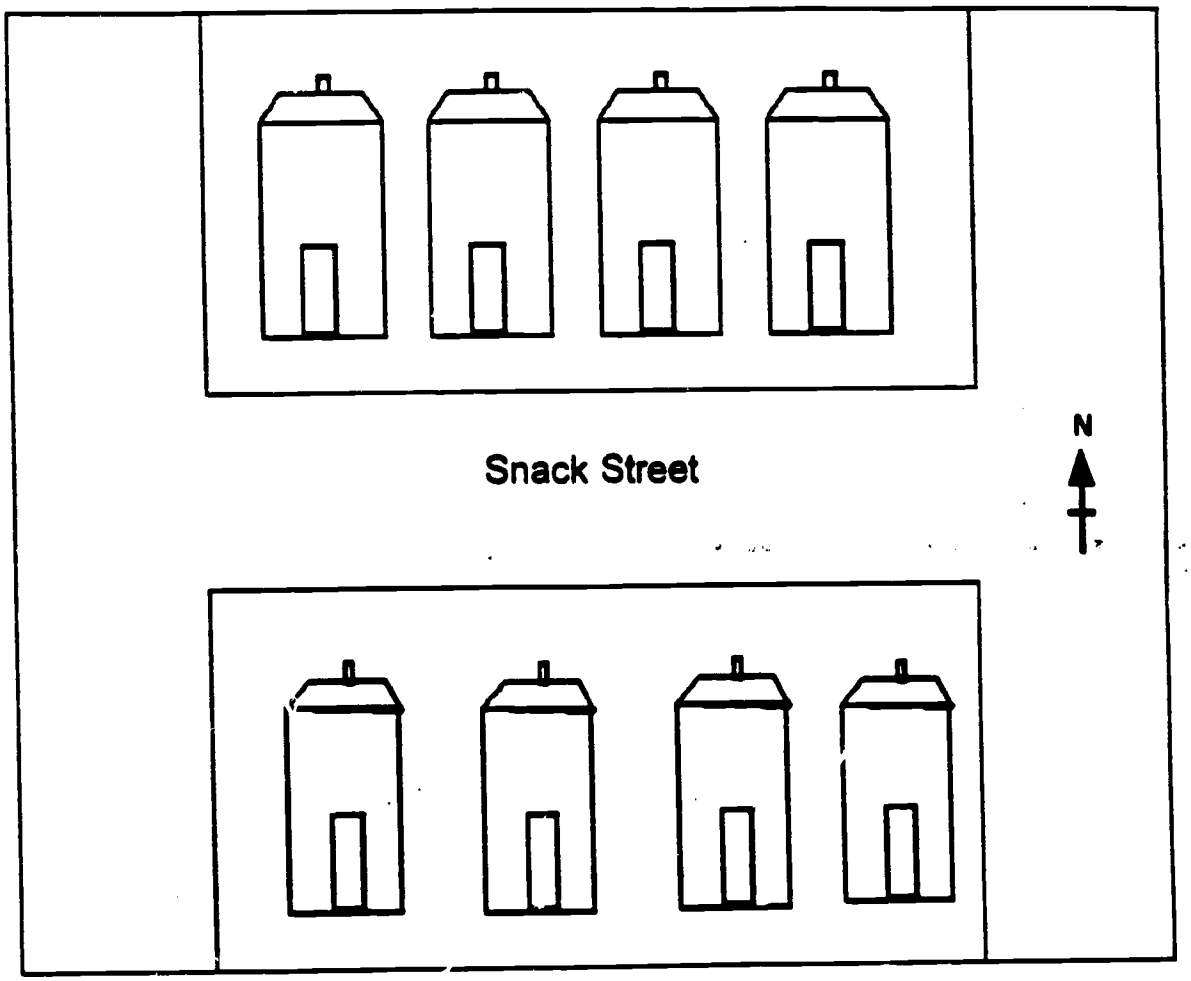
5. Then determine what information you need to get.

6. You and your partner should then ask and answer each other's questions until you both have all the information you need.

Activity: 11 - Getting Information Orally

Exercise 1 - Snack Street

1. Fill in the correct name for each of the buildings on Snack Street below.
2. Remember the techniques for asking questions.
3. Use your reasoning and common sense to name the buildings.



NABISCO FOODS GROUP

		47080		
EQUIP DESCRIPTION		EQUIP AVAILABLE	CRAFT	

WORK REQUESTED:

DATE	REQUEST BY APPROVED BY	COMPLETION SIGN OFF DATE	CRAFT PERSON	SUPERVISOR

CLASS WK	WORK ORDER TITLE

JOB NUMBER	TRADE CODE	WORK CODE	PLANNER	SUPV ASSIGNED	SHIFT	ACTION CODE	COMPONENT SUB	SUB SUB

MOORE® SPEEDISET® MCP® · PATENTED 226

NABISCO FOODS GROUP

		47079		
EQUIP DESCRIPTION		EQUIP AVAILABLE	CRAFT	

WORK REQUESTED:

DATE	REQUEST BY APPROVED BY	COMPLETION SIGN OFF DATE	CRAFT PERSON	SUPERVISOR

CLASS WK	WORK ORDER TITLE

JOB NUMBER	TRADE CODE	WORK CODE	PLANNER	SUPV ASSIGNED	SHIFT	ACTION CODE	COMPONENT SUB	SUB SUB

MOORE® SPEEDISET® MCP® · PATENTED 226

NABISCO FOODS GROUP

DEPARTMENT	COST CENTER	WORK ORDER NO	EQUIPMENT NO	PRIME
		47078		
EQUIP DESCRIPTION		EQUIP AVAILABLE	CRAFT	

WORK REQUESTED:

DATE	REQUEST BY APPROVED BY	COMPLETION SIGN OFF DATE	CRAFT PERSON	SUPERVISOR

CLASS WK	WORK ORDER TITLE

JOB NUMBER	TRADE CODE	WORK CODE	PLANNER	SUPV ASSIGNED	SHIFT	ACTION CODE	COMPONENT SUB	SUB SUB

Activity: 11 - Getting Information Orally

Exercise 2 - Work orders

1. On the opposite page are blank work orders.

2. You and your partner will be given different completed work orders.

3. Use the information that your partner has on his completed orders to fill in the heavily outlined areas on the blank work orders.

4. Ask and answer questions with your partner to get the information you need.

Activity: 12 - Giving and Getting Information Via Telephone

Objective(s): This activity will enable participants
1. To practice asking for and receiving information on the telephone.

Materials Required:
1. Telephone
2. Telephone books

You need to know:

About Listening and Speaking to Others

1. Your attitude and your ability to relate to other people (in person and over the telephone) are shown in the way you speak and in the attention you give when you listen.
2. Attitude and ability to relate to others make up about 85% of job success.
3. Prepare to use the telephone by deciding:
   a. How you will introduce yourself.
      When answering your work phone, say the name of your department and then give your name. When making a call, greet, give your name and department and ask for the person you need.
   b. Who you need to speak with.
   c. Why you are calling
   d. What background information you need to give.
   e. What questions you need to have answered.

Activity: 12 - Giving and Getting Information Via Telephone (continued)

Directions:

1. Fill in the charts with the information you gather as you make the following phone calls.

2. You may complete this activity at home as needed.

3. To gain practice, you must make each call yourself.

CALLS for Chart A

1. Call at least three suppliers of building materials to find the lowest prices for 2" x 4" studs in eight foot lengths.

2. Choose a city you would like to visit. You must be there by 9:00 p.m. on Friday. What will be the best way to get there - plane, train or bus?

CALLS for Chart B

3. You have to send a 20 pound package to Los Angeles, California, for delivery no later than 12 noon on next Tuesday. The Zip Code for the delivery is 90210. You need to send the package the cheapest way possible. Practice your telephone skills and get the information you need to make a decision.

Activity: 12 - Chart A

	Supplier 1	Supplier 2	Supplier 3	Airline	Amtrak	Bus
Step 1. Greeting- "Hello. This is _____."						
Step 2. "With whom am I speaking?"						
Step 3. "I'd like to get some information about _____." OR						
Step 4. "I'm working on a project for a class and I need _____."						
Step 5. Notes (Answers to your questions)						

Activity: 12 - Chart B

	Post Office	UPS	Federal Express	Other	Other
Step 1. Greeting- "Hello. This is _____."					
Step 2. "With whom am I speaking?"					
Step 3. "I'd like to get some information about _____." OR					
Step 4. "I'm working on a new project for a class and I need _____."					
Step 5. Notes (Answers to your questions)					

Activity: 13 - Communicating Within a WorkGroup

Objective(s): This activity will enable the participant
1. To develop an awareness of the concept of workplace culture.
2. To identify the workplace culture at an organization.

Materials Required:
None

You need to know:

About Workplace Cultures

Every workplace is different in that every workplace has its own way of doing things; it's own culture. Listening actively will help you understand the culture of your workplace and your co-workers.

To understand the culture of your workplace, you have to learn four things about it:

1. The goals of the particular workplace. What are you expected to do?
2. The values of your workplace. What are the most important priorities here? What are the standards to which work has to be done or behavior has to be focused?
3. The customs of your workplace. What are the rules or procedures that are followed here?
4. The networks in your workplace. How does information flow here? Who talks to whom?

Directions:

1. Use the chart on the next page to organize your thoughts and notes from our discussion.

Activity: 13 - Communicating Within A WorkGroup

	Workplace #1	Workplace #2	Workplace #3
Goals			
Values			
Customs			
Networks			

Activity: 14 - Communicating With Co-Workers

Objective(s): This activity will enable participants
1. To practice techniques for communicating effectively with co-workers.

Materials Required:
None

You need to know:

About Listening and Speaking to Co-Workers

Please DO	Please DON'T
1. Learn the workplace culture-the written (if any) and unwritten rules of co-worker communication.	Ignore the acceptable ways of communicating in your workplace.
2. Maintain an upbeat, "can do" attitude.	Be influenced by negative shop talk.
3. Learn the workplace jargon or special language.	Hesitate to ask questions when you need information.
4. Be mindful of your non-verbal language and behavior.	Infringe on other's personal space.
5. Remember that the tone of your voice sends more of a message than the actual words say.	Forget about all the non-verbal messages you send.
6. As much as possible, choose a good time to discuss a problem.	Try to discuss problems when others are rushed, distracted or upset.
7. Describe the problem carefully, avoiding personal criticism.	Let discussions of workplace problems become attacks on anyone's compentence.
8. In general, concentrate on the problems themselves; not on blaming.	Be distracted by the way problems are stated by your co-workers.

Activity: 14 - Communicating With Co-Workers (continued)

Please DO	Please DON'T
9. Limit the amount of personal information you share at the workplace.	Allow your personal life to interfere with your workplace responsibilities.
10. Use the active listening techniques with your co-workers giving supportive feedback when and where possible.	Let your emotions get out of control.

Directions:

1. Separate into occupational groups of no more than four people.

2. Each group member should share their perspective of a workplace communication with a co-worker (no names, please) that could have been improved if they or the co-worker had used more effective communication techniques.

3. Within your small groups, decide on several of the situations to discuss with the total group. Limit your discussions to situations about:
   a. telling co-workers about workplace needs or problems or
   b. telling co-workers on the next shift about the current status of an assignment station, piece of equipment, etc.

4. Add to your list of Please Do and Please Don't as the total group discussion unfolds.

Activity: 15 - Communicating With Supervisors

Objective(s): This activity will enable participants
1. To develop an understanding of an employee's roles and responsibilities in employee/supervisor communications.

Materials Required:
Pen or Pencil

You need to know:

About Your Responsibilities as an Employee

1. One of your most important responsibilities is to let your supervisor know about the work that you're doing.

2. Make every effort to learn what your supervisor expects you to tell him and how and when you should tell him. Learn what information is critical (requiring immediate notification of your supervisor) and what information is not as important. Generally, your supervisor wants to know about any work situation that has an impact on how he does his job.

3. Never feel that you shouldn't ask for information or any assistance that's needed to do your job. If you don't know how to do a job task, let your supervisor know.

Activity: 15 - Communicating With Supervisors (continued)

You need to know: <u>About Communicating With Your Supervisor</u>	
Remember To:	**Try Not To:**
Follow the standard operating procedure when communicating with your supervisor Understand as much about a situation as you can before talking to your supervisor Focus on the facts that you're giving to your supervisor Listen actively to your supervisor. Respond to him in accordance with what he asked; not what you think he said. Listen actively so as not to become confrontational or defensive or apologetic because of a misinterpretation of what was said.	Go against company policy or workplace culture in talking with your supervisor. Give inaccurate or insufficient information to your supervisor. Focus on your supervisor's personality or the negative influences of your co-workers. Don't blame other people for problems. Show negative behavior that will only work against you.

Directions:

1. Analyze communication situations you've had with your supervisor over the past few weeks. Think about situations in which you were given information or directions by your supervisor. Also, think about situations where you had to give your supervisor information or tell him about a problem.

2. Use the chart on the opposite page to organize your thoughts as we prepa to discuss some of these supervisory communication situations.

Activity: 15 - Communicating With Supervisors

	Equipment	Materials	Procedure or Production Process	Labor/Scheduling
What (is the situation) or What (happened)				
When				
Where				
Why				
How				

Activity: 16 - Group Behavior

Objective(s): This activity will enable participants
1. To practice identifying positive and negative group behavior.

Materials Required:
1. Teacher dictated group communication materials.

You need to know:

About Group Behavior

Just as each person has a special personality, each group of people develops a personality also. The group's personality is influenced by the roles each member takes on. Group members tend to take on roles that are an extension of their own personality - being a leader or a joker; being a quiet observer or an agitator and so forth.

The important thing to understand is that the behavior of each group member will affect the group's ability to achieve the goal that should be common to everyone.

Behavior that Helps a Group	Behavior that Hurts a Group
1. opening up discussions	1. dominating discussions
2. contributing ideas	2. discouraging ideas
3. explaining to new members	3. playing
4. asking questions	4. blocking development of ideas
5. answering questions	5. "lobbying" for a personal or special interest
6. asking for opinions	6. trying to get undue recognition or attention
7. offering opinions	7. _____
8. taking notes	8. _____
9. listening to others	
10. _____	

Activity: 16 - Group Behavior

Directions:

1. Listen carefully as comments people have made in group discussions are read.

2. We will discuss which comments are positive behaviors and which are negative behaviors.

3. Refer to the lists above and add to them if you'd like.

Activity: 17 - Group Dynamics

Objective(s): This activity will enable participants
1. To develop an awareness of the stages of group dynamics.

Materials Required:
None

You need to know:

About Group Dynamics
Group dynamics refers to the collective pattern of behavior that unfolds as any group of people begin working together towards a common goal. There are several predictable stages of group dynamics and they are universal.

1. At first, a group leader seems to emerge from within the group and most members seem content to follow the leader while they "sort out" other group members and the job the group has to accomplish.

2. Next, and without most group members even realizing it, the members arrange themselves according to their roles, their influence within the group and their expertise.

3. In the next phase,group members become more related and develop a sense of belonging to the group.

4. The last stage of group dynamics begins when members actually begin working and communicating freely with each other in accomplishing the common goal of the group.

Directions:

1. The remaining activities in this module will require communicating within a group.

2. In addition to practicing and improving your listening, speaking, and group participation skills, observe the dynamics of the various groups.

Activity: 18 - Group Decision Making

Objective(s): This activity will enable participants
1. To understand three of the ways a group reaches a decision.
2. To practice making decisions within a group.

Materials Required:
1. Paper
2. Pen or pencil

You need to know:

About Group Decision Making
Groups of people have three basic ways of reaching decisions.

1. Dictatorship. A single group member takes over and makes the decisions for the entire group.

2. Majority Rule. Each group member votes on the decision to be made and the majority wins.

3. Consensus. Each group member decides on the one decision or solution that is acceptable enough so that the entire group is able to support or live with the decision. This method takes time, communication, open-mindedness, creative thinking and total participation. It is the most desirable way to reach a group decision because everyone wins.

Activity: 18 - Group Decision Making (continued)

DINING ROOM STAFF - 3RD Shift

Before leaving each night, you must:

-vacuum carpeting and wet clean tile foyer

-discard flower centerpieces as necessary/refill containers

-change tablecloths

-refill salt and pepper shakers and return them to the tables

-return chairs to tables

-set tables with napkins, silverware, glasses, and coffee cups inverted

-change menus

-add daily special to menus

Activity: 18 - Group Decision Making

Directions:

1. Separate into groups of five members.

2. Pretend that four of the group members work the evening shift in the restaurant of the best resort hotel in the area.

3. The fifth group member will act as an observer of the group.

4. Go over the notice on the opposite page that was on the bulletin board at the restaurant.

5. Each of you should number the items listed on the notice in the order you think they should be done.

6. Then, work together as a group to reach a decision about the most efficient order for the duties.

7. Be ready to express and defend your opinions but practice good group participation skills.

Activity: 19 - Demonstration Production Line

Objective(s): This activity will enable participants
1. To demonstrate an understanding of group process.
2. To practice effective communication within a group.
3. To practice group decision making skills.

Materials Required:
1. Demonstration Production Line Situation Materials
2. Pen or pencil

You need to know:

Techniques for Being a Successful Group Participant

Understand the Group's Members

Upon joining a group, learn the names of the other group members.
Learn all you can about each person's abilities and attitudes.
Look at group members who are talking. Scan others in the group for non-verbal signs of interest or disinterest.
Decide who the group's leaders are.

Understand How the Group Makes Decisions

Identify what the groups standards are. What does the group consider to be acceptable ways to resolve conflict, etc.?
Determine what the groups goals are and what the plans are for reaching the goal.

Use Effective Communication Skills

Always use positive behaviors (verbal and non-verbal).
Avoid negative comments and excessive talking.
Use active listening techniques when appropriate.

Activity: 19 - Demonstration Production Line

Directions:

The Situation

Nabisco® has been invited to participate in an upcoming World's Fair. It has been decided that the company will have a demonstration production line that will actually be a mini bakery for only one product. The public will be able to view the production process from start to finish and they will then be able to purchase the cookies that they have just seen being made.

The facility for the demonstration line does not yet exist and can be built to meet the mini bakery's needs. A special rail line has been built to the site of the Fair and an excellent highway system is in place also.

The Challenge

The REACH participants have been asked to contribute (based on their knowledge) to the planning of the demonstration production line from start to finish.

You need to consider:

1. The need to maintain and even build upon the excellent public relations the company enjoys.
2. The need to create a totally functioning yet scaled down production line with a minimum investment.
3. The need to produce a consistently high quality product, seven days a week from 10:00 a.m. to 10:00 p.m. (the hours of the Fair).
4. The need to produce and package the product for an estimated 25,000 fair goers daily.

Activity: 19 - Demonstration Production Line

Part A

1. Separate into job groups (mixers, utility, etc.)

2. As a job group, envision what your department would be like in the above situation. Make the following decisions:

   a. the single product you think should be produced. What factors influenced your decision?

   b. what the basic requirements would be for your department to "set up" its duties. Which machinery and/or equipment would be needed?

   c. what job positions would be needed and how many people should be scheduled over 12 hours to fill those positions?

   d. what policies and procedures should your department put in place to contain costs?

   e. what policies and procedures should be put in place to facilitate being on public display? (Uniforms, communication methods, sanitation procedures, etc.)

   f. what recommendations would you make to the designer of the facility to ensure that your department's needs for space, safety, noise control, etc., are met.

Part B

1. Now that each job group has reached a decision about each department's needs, as a total group (all occupations together) discuss the same factors and come to a total group decision on each.

2. This is only an exercise. There are no right or wrong answers. This is an opportunity to put into practice all the communication skills you've learned to date.

Problem Solving

This module is designed to help you develop critical thinking skills and interact in a group. All materials are provided by the facilitator. All handouts are in the facilitator's manual.

REACH Program
Understanding How to Use Your Calculator Activities

Cluster:_____

Activity 1 - Understanding how to use a Calculator

Objective (s): This activity will enable participants

1. To become familiar with the keys of a calculator
2. To become familiar with the functions of a calculator
3. To practice entering numbers in a calculator

Materials Used: calculator

You Need to Know:

The second college edition of *The American Heritage Dictionary* defines a calculator as a keyboard machine for the automatic performance of mathematical operations. In today's work environment users simply refer to the calculator as their best friend because they are fast and accurate. However, workers understand that the answers a calculator provides are as accurate as the person using the calculator. That's why it is important to know how your calculator works.

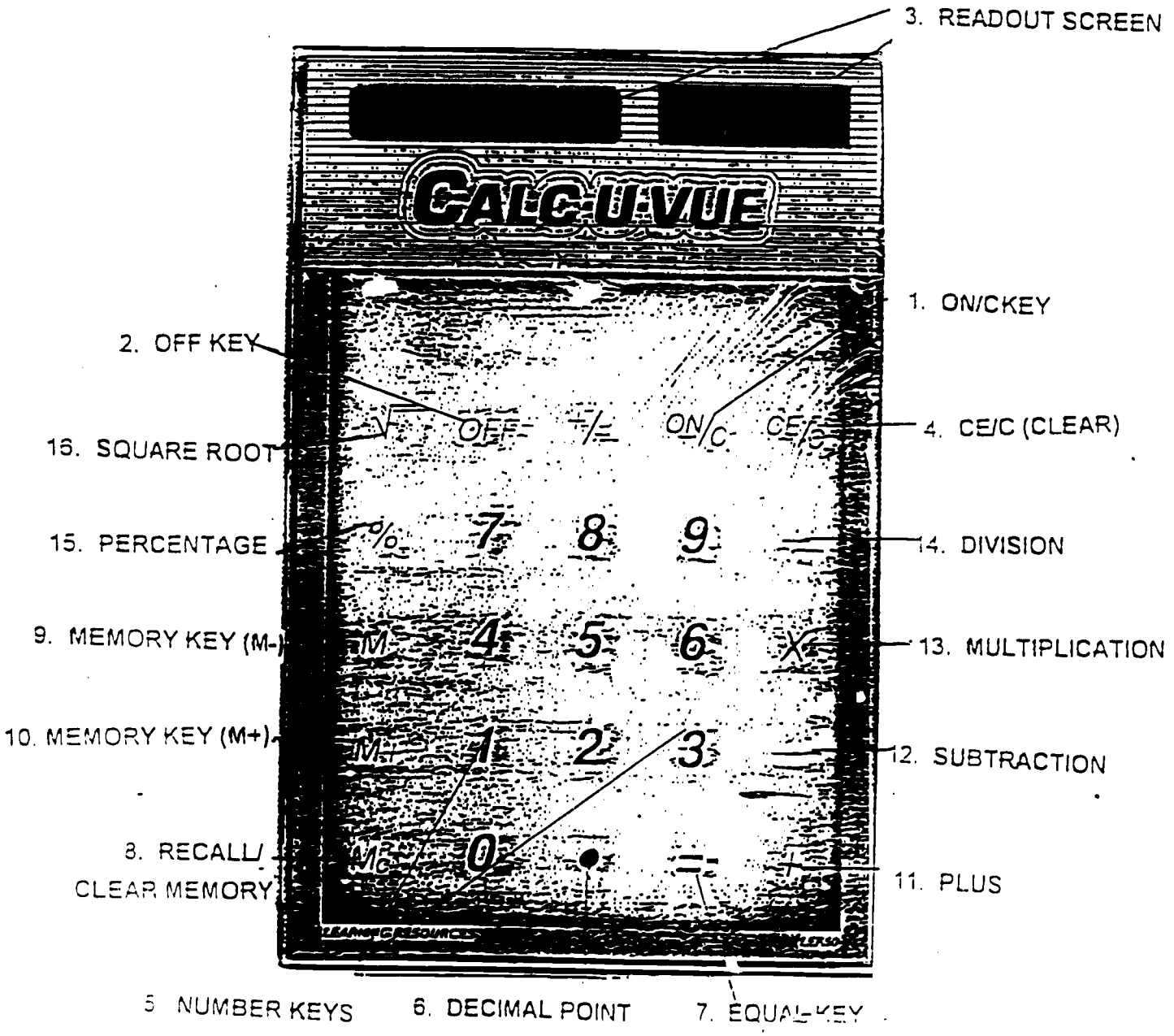
All calculators perform the four basic mathematical functions of addition, subtraction, multiplication, and division. There are other calculators that perform more advance math functions such as square roots, plotting, advanced calculus, and many other scientific calculations. Texas Instruments Inc. is one of many companies that manufacture scientific calculations. In this course, you will be using a basic calculator. It is a calculator that performs the basic four mathematical functions, percentages, and square roots.

Calculators operate by solar-power or battery. Solar-powered calculators have a row of solar cells that change light into electricity. Battery-powered calculators contain a battery, usually in the back of the calcuator. Now, let's get familiar with the calculator. Read through the calculator diagram on the following page.

CALCULATOR DIAGRAM

Directions

Study your calculator. Notice what each key does.



Keys

1. ON/C KEY - Use this key to turn your calculator on.

2. OFF KEY - Use this key to turn your calculator off.

3. READOUT SCREEN - Read the answers on this display screen.

4. CE/C (CLEAR) - Use this key to erase your entries.

5. NUMBER KEYS - Use these keys to enter the numbers.

6. DECIMAL POINT - Use this key to insert a decimal point.

7. EQUAL KEY - Use this key to get the answer.

8. RECALL/CLEAR MEMORY (RM/CM) KEY - Use this key to retain a number entry in the calculator's memory. Consider this sample problem: 100-10 = 90, press the RM/CM and the answer 90 is subtracted from the first entry 100. The answer is a negative 10. This key is helpful when you're working with a series of numbers.

9. MEMORY KEY (M-) - Use this key when working with a series of numbers and different functions. The calculator will hold an answer in memory. For example, 10-5=5, press M- key, the answer is 5, press (-) key, enter 2, press, M- key, the answer is 3. Notice the "M" appears on the readout screen to let you know the memory key is on.

10. MEMORY KEY (M+) - Use this key add a series of numbers. Consider this example, 10+5=5, press M+ key, the answer is 15, press (+) key, enter 5, press M+ key, the answer is 20.

Function Keys

11. PLUS - Use this key to add numbers.
12. SUBTRACTION - Use this key to subtract numbers.
13. MULTIPLICATION - Use this key to multiply numbers.
14. DIVISION - Use this key to divide numbers.
15. PERCENTAGE +/- - Use this key to calculate percentages.
16. SQUARE ROOT - Use this key to calculate the square root of numbers.

Practice

Follow these steps to practice entering whole numbers with your calculator.

Step 1: Turn on your calculator by pressing the key with **ON/C KEY**.
Step 2: Enter a number from the list below on your calculator.
Step 3: Erase the number using the CE/C key.
Step 4: Repeat steps 2-3 until you've entered and erased all the numbers for this exercise.
Step 5: Turn off your calculator.
Note: Most calculators do not display a comma. If the number displays as 1960, simply count three number places from the left. In this case 0, 6, 9, the comma would be inserted after the number 1 (1,960). Any number over 999 should be written with a comma.

A. Practice entering numbers.

1. 349
2. 974
3. 9,175
4. 8, 387
5. 27,285
6. 342,829
7. 88,642
8. 347,829
9. 755,691
10. 2,596,327
11. 9,442,611
12. 5,678

B. Entering numbers with decimal points.

Step 1: Turn on your calculator by pressing the key with **ON/C KEY**. Find the decimal key (.) on your calculator.
Step 2: Enter the number 12
Step 3: Press the decimal key (.)
Step 4: Then enter the number 2
Step 5: Press CE/C key to erase the number 12.2

Practice Exercise Continued...

Step 6: Repeat steps 2-4 until you've entered and erased all the numbers for this exercise.
Step 7: Turn off your calculator.

1. 56.78
2. 99.28
3. 110.8
4. 555.75
5. 100.78
6. 12.58
7. 600.78
8. 900.00
9. 88.8
10. 6.67

Activity 2 - Using and Understanding the Addition Function

Objectives (s): This activity will enable participants

1. To become familiar with the addition function of a calculator
2. To practice the addition function on a calculator

Materials Used: scrap paper, calculator

Directions

A calculator makes adding numbers easy. Follow these steps when adding numbers on your calculator.

Step 1: Turn on your calculator. Look for the plus (+) sign. Then look for the equal (=) sign. You will use both of these keys when you are adding numbers.
Step 2: Enter the numbers 1, 0, 0
Step 3: Press the plus sign (+)
Step 4: Enter 2, 0, 0
Step 5: Press the equal key (=)
Step 6: Read the answer in the readout screen area. The answer is 300.

Practice

Use your calculator to find the sum of the numbers. Write your answers in the space provided.

A. Find the sum.

1. 3,156, 7,125 _____
2. 7,206, 4,926, 3,331 _____
3. 8,501, 6,742 _____
4. 5,123, 9,600, 7,689 _____
5. 3,900, 6,174 _____
6. 378, 4,214 _____

B. Find the sum.

1. 16.2, 12.06 _____
2. 123.0, 451.2 _____
3. 5.2, 6.8 _____
4. 234.2, 123.5 _____
5. 6.1, 6.4 _____
6. 12.1, 45.2 _____

Activity 3 - Using and Understanding the Subtraction Function

Objectives (s): This activity will enable participants

1. To become familiar with the addition function of a calculator
2. To practice the subtraction function on a calculator

Directions

A calculator makes subtracting large numbers easier. Follow the steps to subtract the numbers.

Step 1: Turn on your calculator. Find the minus (-) sign. The find the equal sign (=).
Step 2: Enter the numbers 6, 0, 0. When subtracting remember to enter the larger number first.
Step 3: Press the minus sign (-)
Step 4: Enter the numbers 3, 0, 0
Step 5: Press the equal (=) key. The answer is 300.

Practice

Use your calculator to find the difference between the numbers. Write your answers in the space provided.

A. Find the difference.

1. 7,500, 5,916 _____
2. 9,306, 8,200 _____
3. 3,472, 1,568 _____
4. 99, 48 _____
5. 5,280, 1,000 _____
6. 18,480, 15,840 _____
7. 5, 820, 1,760_____
8. 2,786, 1,308 _____
9. 2,815, 1,940 _____
10. 2,182, 555_____
11. 1,075, 758 _____
12. 2,631, 131 _____

B. Find the difference.

1. 31. 2, 12.6_____
2. 119.1, 67.0 _____
3. 303.1, 240.2 _____
4. 45.3, 23.2 _____
5. 20.1, 18.2 _____
6. 25.9, 12.8 _____

Activity 4 - Using and Understanding the Multiplication Function

Objectives (s): This activity will enable participants

1. To become familiar with the multiplication function of a calculator
2. To practice the multiplication function on a calculator

Directions

A calculator can also make multiplication easier. Read the example below. Follow the steps to understand how to use your calculator to multiply large numbers.

Step 1: Turn on your calculator. Find the multiplication sign (x). Find the equal sign (=).
Step 2: Enter the numbers 8, 5, 6, 4
Step 3: Press the x sign
Step 4: Enter the numbers 7, 2, 1, 3
Step 5: Press the equal sign (=). Read the answer on the readout screen. The answer is 61,772,132 (66 million, 772 thousand, 132).

Practice

Use the calculator to find the product of each group of numbers. The answer to a multiplication problem is called the product. Write the product in the space provided.

A. Multiply the numbers.

1. 6, 6 _____ 2. 27, 4 _____ 3. 12, 12 _____ 4. 50, 6 _____
5. 20, 20 _____ 6. 200, 7 _____ 7. 500, 8 _____ 8. 1000, 8 _____

B. Multiply the numbers.

1. 5,306, 8,317 _____ 2. 648, 4,269 _____ 3. 510, 888 _____

4. 92,000, 45 _____ 5. 80,000, 25 _____ 6. 357, 968 _____

Activity 5 - Using and Understanding the Division Function

Objectives (s): This activity will enable participants

1. To become familiar with the division function of a calculator
2. To practice the division function on a calculator

Directions

You can also solve division problems using your calculator. Follow the sample problem to understand the process. Find the division (÷) sign on your calculator.
Step 1: Turn on your calculator.
Step 2: Enter the numbers 2,0,0
Step 3: Press the division sign (÷).
Step 4: Enter the number 1, 0
Step 4: Press the equal sign (=).
Step 5: Read the answer on the display screen. The answer is 20.

Practice

A. Divide the numbers.

1. 500, 20 _____
2. 600, 30 _____
3. 20, 5 _____
4. 1000, 6 _____
5. 790, 5 _____
6. 180, 4 _____

B. Divide the numbers.

1. 10,000, 90_____
2. 124,780 ,20_____
3. 45,000, 60_____
4. 985, 3 _____
5. 50,650 ,10 _____
6. 540, 25 _____

Activity 1 - Whole Numbers

Objective(s): This activity will enable participants to identify and write whole numbers.

Materials Required:
Pencil

You need to know:

1. Whole numbers are counting numbers and 0; they are numbers that are not fractions or decimals. They tell how many or how much.

2. A whole number represents a complete amount or group.
   EXAMPLES:

   Numbers: 0, 6, 13, 20, 50, 234

   Quantities: 142 machine screws, 12 spools, 47 outlets

   Measurements: 63 feet, 120 millimeters, $354

3. The Arabic number system is based on 10 digits:

   0 1 2 3 4 5 6 7 8 9

   Each of these symbols (0-9) is called a digit. These individual symbols (digits) may be combined to write any number.

Activity 1 - Whole Numbers (continued)

Directions: For each of the following numbers place a (✓) in the box if the number is a whole number.

1.	☐	6	21.	☐	4	41.	☐	8
2.	☐	14	22.	☐	15	42.	☐	18
3.	☐	37	23.	☐	82	43.	☐	56
4.	☐	365	24.	☐	359	44.	☐	321
5.	☐	901	25.	☐	763	45.	☐	288
6.	☐	2,225	26.	☐	2,227	46.	☐	2,221
7.	☐	6,592	27.	☐	6,552	47.	☐	6,512
8.	☐	8,831	28.	☐	8,231	48.	☐	8,631
9.	☐	4,895	29.	☐	3,998	49.	☐	7,246
10.	☐	33,485	30.	☐	50,001	50.	☐	29,092
11.	☐	.6	31.	☐	.1	51.	☐	.8
12.	☐	.005	32.	☐	.5	52.	☐	.05
13.	☐	.07	33.	☐	.7	53.	☐	7
14.	☐	2.5	34.	☐	.25	54.	☐	25
15.	☐	.82	35.	☐	.076	55.	☐	.08
16.	☐	.231	36.	☐	.226	56.	☐	.217
17.	☐	.7304	37.	☐	7.304	57.	☐	73.04
18.	☐	149	38.	☐	14.91	58.	☐	.1491
19.	☐	20.04	39.	☐	2.004	59.	☐	200.4
20.	☐	7.83	40.	☐	.783	60.	☐	.0783

Activity 1 - Whole Numbers (continued)

Directions: For each of the following numbers place a (✓) in the space if the number is a whole number.

_____	1.	4,699	_____	16.	926.
_____	2.	96.677	_____	17.	6.790
_____	3.	620	_____	18.	58,416
_____	4.	2 053	_____	19.	6,815
_____	5.	.4001	_____	20.	649,873
_____	6.	28	_____	21.	.072
_____	7.	.1	_____	22.	.84
_____	8.	8,261.1	_____	23.	.7159
_____	9.	1.25	_____	24.	.638
_____	10.	27,611.9	_____	25.	.3901
_____	11.	.07	_____	26.	495.28
_____	12.	.0001	_____	27.	6215.9
_____	13.	.367	_____	28.	518.7302
_____	14.	3,842	_____	29.	429,631.058
_____	15.	493,200	_____	30.	85,210.3697

Activity 1 - Whole Numbers (continued)

Directions: Write examples of whole numbers in the following blanks.

_____	1.	_____	16.
_____	2.	_____	17.
_____	3.	_____	18.
_____	4.	_____	19.
_____	5.	_____	20.
_____	6.	_____	21.
_____	7.	_____	22.
_____	8.	_____	23.
_____	9.	_____	24.
_____	10.	_____	25.
_____	11.	_____	26.
_____	12.	_____	27.
_____	13.	_____	28.
_____	14.	_____	29.
_____	15.	_____	30.

Activity 2 - Place Values and Whole Numbers

Objective(s): This activity will enable participants to identify the place values of whole numbers.

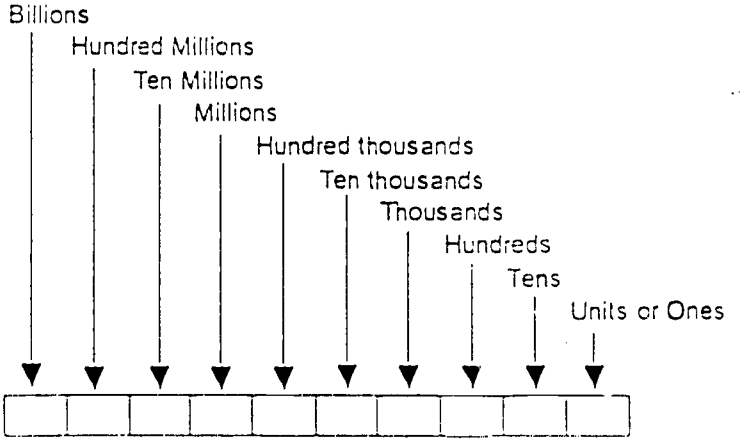
Materials Required:
Pencil

You need to know:

1. Each digit of a number from 0 through 9 has two values:
   A. Face value - what the numeral actually says
   B. Place value - the place (position) of the numeral tells it value

2. The first digit (column) in the extreme right position of a number is called the units digit or units column. The digit in the second position to the left is in the tens column; and the digit in the third location is in the hundreds column, etc. See the diagram below for additional examples of the place names of commonly used digits.

DIGIT PLACE NAMES (WHOLE NUMBERS)



Activity 2 - Place Values and Whole Numbers (continued)

You need to know:

3. Each digit can be assigned a different value depending on its place or position in the number. Example:

thousands	hundreds	tens	units or ones
8	7	6	5
5	6	7	8
7	8	5	6
6	5	8	7

Notice that the 8 in the first number is in the thousands place. That means it is worth 8 thousand. In the second number, the 8 is in the units or ones place. It is worth 8 ones or just plain 8. In the third number, the 8 is in the hundreds place, and it is worth 8 hundred. In the last number, the 8 is in the tens place. That means it is worth 8 tens or 80.

4. Whole numbers represent the sum of individual place values of numerals.

EXAMPLE: 217

200 → 2 hundreds
\+ 10 → 1 ten
\+ 7 → 7 ones
217

The whole number 217 is a simple and shortened form of 200 + 10 + 7.

Directions:

On the following page, write the value of the underlined number in the blank.

Activity 2 - Place Values and Whole Numbers (continued)

1. In the number 283, how much is the 8 worth? _____
2. In the number 1,296, how much is the 1 worth? _____
3. In the number 926, how much is the 6 worth? _____
4. In the number 637, how much is the 6 worth? _____
5. In the number 240, how much is the 4 worth? _____
6. In the number 318, how much is the 8 worth? _____
7. In the number 1,873, how much is the 7 worth? _____
8. In the number 8,176, how much is the 8 worth? _____
9. In the number 561, how much is the 5 worth? _____
10. In the number 746,721, how much is the 4 worth? _____
11. In the number 678, how much is the 7 worth? _____
12. In the number 3,016, how much is the 3 worth? _____
13. In the number 235,619, how much is the 2 worth? _____
14. In the number 145,768, how much is the 5 worth? _____

15. The value of 9 in the number 3,739,681 is: _____
16. The value of 7 in the number 873,000 is: _____
17. The value of 6 in the number 6,284,925 is: _____
18. The value of 4 in the number 46,867 is: _____
19. The value of 8 in the number 1,863,745 is: _____
20. The value of 3 in the number 5,632 is: _____
21. The value of 7 in the number 3,754 is: _____
22. The value of 5 in the number 2,385 is: _____
23. The value of 3 in the number 329 is: _____
24. The value of 6 in the number 76 is: _____
25. The value of 4 in the number 64 is: _____

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Fill in the blanks with the correct numbers.

(1) In the number 6,973.....
the value of 3 is _____ ones or _____.
the value of 7 is _____ tens or _____.
the value of 9 is _____ hundreds or _____.
the value of 6 is _____ thouands or _____.

(2) In the number 1,478.....
the value of 8 is _____ ones or _____.
the value of 7 is _____ tens or _____.
the value of 4 is _____ hundreds or _____.
the value of 1 is _____ thousand(s) or _____.

(3) In the number 11,243.....
the value of 3 is _____ ones or _____.
the value of 4 is _____ tens or _____.
the value of 2 is _____ hundreds or _____.
the value of 11 is _____ thousands or _____.

(4) In the number 48,505.....
the value of 5 is _____ ones or _____.
the value of 0 is _____ tens or _____.
the value of 5 is _____ hundreds or _____.
the value of 48 is _____ thousands or _____.

(5) In the number 6,054.....
the value of 4 is _____ ones or _____.
the value of 5 is _____ tens or _____.
the value of 0 is _____ hundreds or _____.
the value of 6 is _____ thousands or _____.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Fill in the blanks with the correct numbers.

(6) In the number 742.....
the value of 2 is _____ ones or _____.
the value of 4 is _____ tens or _____.
the value of 7 is _____ hundreds or _____.

(7) In the number 8,137.....
the value of 7 is _____ ones or _____.
the value of 3 is _____ tens or _____.
the value of 1 is _____ hundred(s) or _____.
the value of 8 is _____ thousands or _____.

(8) In the number 689.....
the value of 9 is _____ ones or _____.
the value of 8 is _____ tens or _____.
the value of 6 is _____ hundreds or _____.

(9) In the number 38,496.....
the value of 6 is _____ ones or _____.
the value of 9 is _____ tens or _____.
the value of 4 is _____ hundreds or _____.
the value of 38 is _____ thousands or _____.

(10) In the number 379.....
the value of 9 is _____ ones or _____.
the value of 7 is _____ tens or _____.
the value of 3 is _____ hundreds or _____.

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Answer the following by placing the correct digit in the space.

1.	561	Which digit is in the tens place?	_____
2.	780	Which digit is in the hundreds place?	_____
3.	42,625	Which digit is in the ten thousands place?	_____
4.	3,439	Which digit is in the hundreds place?	_____
5.	657,524	Which digit is in the thousands place?	_____
6.	4,075	Which digit is in the units place?	_____
7.	7,302	Wich digit is in the hundreds place?	_____
8.	428,713	Which digit is in the hundred thousands place?	_____
9.	9,371,246	Which digit is in the millions place?	_____
10.	32,584	Which digit is in the units place?	_____
11.	529,682	Which digit is in the thousands place?	_____
12.	115,035	Which digit is in the hundred thousands place?	_____
13.	8,851	Which digit is in the tens place?	_____
14.	738,495	Which digit is in the ten thousands place?	_____
15.	2,700,920	Which digit is in the millions place?	_____

Activity 2 - Place Values and Whole Numbers (continued)

Directions: Show the place value of the following numbers by writing the digits correctly on the chart. An example has been completed for you.
EXAMPLE: 7,654

	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
				7	6	5	4
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20							

Activity 2 - Place Values and Whole Numbers (continued)

EXAMPLE	7,654
1.	6,700
2.	53,426
3.	74,803,000
4.	175
5.	32,072
6.	8,115,035
7.	3,582
8.	493
9.	358,281
10.	1,661
11.	105,302
12.	29,547
13.	284
14.	135,011
15.	22,314
16.	321
17.	387,611
18.	88,027
19.	2,700,920
20.	4,228

Activity 3 - Reading and Writing Whole Numbers

Objective(s): This activity will enable participants to read and write whole numbers.

Materials Required:
Pencil

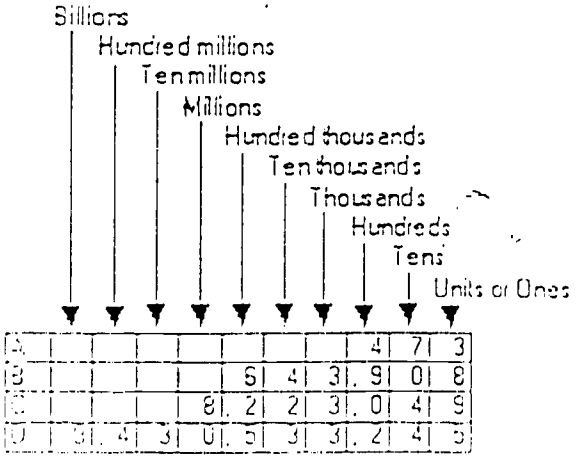
You need to know:

1. Usually the numbers with four digits or more are written with commas after every three digits, counting from right to left.
   EXAMPLE: 71230645
   71,230,645

2. Four-digit numbers are an exception to the rule. Commas are not required in four-digit numbers.
   EXAMPLE: 3743 AND 3,743

   Both are acceptable ways of writing the same number.

3. The numbers in the chart are read as follows:



A. Four hundred seventy three. Note that the 4 is in the "hundreds" column, 7 is in the "tens" column, and 3 is in the "ones" column.

B. Six hundred forty-three thousand, nine hundred eight.

C. Eight million, two hundred twenty three thousand, forty nine.

D. Nine billion, four hundred thirty million, five hundred thirty-three thousand, two hundred forty-five.

Activity 3 - Reading and Writing Whole Numbers (continued)

You need to know:

4. Numbers can be written in words, in an expanded form, or as a numeral.

EXAMPLE: 1,689
One thousand, six hundred eighty nine
1000+600+80+9
1,689

Activity 3 - Reading and Writing Whole Numbers (continued)

Directions:
1. At the instructor's request, read the following numbers aloud.

2. On the following page, write out each number in words, in the blanks provided.

1.	8,497	21.	4,321
2.	742,351	22.	28
3.	932,617	23.	5,504
4.	7,639,792	24.	457
5.	25,816	25.	39
6.	173,855	26.	847
7.	6,382,523	27.	386
8.	782,386	28.	2,131
9.	1,175,140	29.	159
10.	97,268	30.	14
11.	6,973	31.	249,382
12.	382	32.	360
13.	4,880	33.	829
14.	14,228,786	34.	247,427,820
15.	865	35.	37
16.	97,268	36.	89,827
17.	243	37.	22,809
18.	27,268	38.	83
19.	1,478	39.	738,294,699
20.	257	40.	753

Activity 3 - Reading and Writing Whole Numbers (continued)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

Activity 3 - Reading and Writing Whole Numbers (continued)

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

35. _____

36. _____

37. _____

38. _____

39. _____

40. _____

Activity 3 - Reading and Writing Whole Numbers (continued)

Directions:
Write the following numbers, using figures, in the chart below. Make sure you put each digit in the correct column. Insert commas, where applicable.

	Billions	Hundred Millions	Ten Millions	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Units or Ones
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

1. thirty-four thousand eighty six
2. eight hundred two
3. sixty-three thousand five hundred twenty-two
4. three hundred thirty nine
5. seven thousand seven hundred forty
6. nine million eight hundred twenty-three thousand five hundred twenty-seven
7. five hundred seventy eight
8. one hundred thirty five thousand eight hundred fifty one
9. forty-nine thousand seven hundred thirty-six
10. thirteen million four hundred thirty-six thousand nine hundred thirty-two
11. two thousand five hundred fifteen
12. two hundred four thousand nine hundred sixty-two
13. nine hundred ninety-eight thousand five hundred sixty
14. four thousand eighty-two
15. five thousand one hundred twelve

Cluster
Applied Math

Activity 4 - Adding Whole Numbers

Objective(s): This activity will enable participants
(1) to add whole numbers in order to find the total amount.
(2) to check addition answers.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. Addition problems are done daily. For example, you might add the "tare" weight and the full weight together, add the proper amount of ingredient when recipes change, or add weights of two ingredients when both are combined in the same bucket.

2. Addition is combining two or more quantities (amounts) to find a total quantity (amount). The answer is called the sum.

3. When adding, the order of the numbers does not matter. For example, 2 + 6 = 6 + 2.

4. To add numbers greater than 10, arrange them in columns and regroup (borrow and carry).

5. To check addition answers, add the columns in the opposite direction. So if you started at the top and added downward, start at the bottom and add upward.

EXAMPLE:		CHECK:	
45	(1) 5 + 3 = 8	45	(1) 3 + 5 = 8
+33	(2) 4 + 3 = 7	+33	(2) 3 + 4 = 7
---		---	
78		78	

Activity 4 - Adding Whole Numbers (continued)

You need to know:

6. To add whole numbers:

A. Write the numbers under one another with each digit in the problem column.

4	6	2	5
	4	2	3
	5	7	4
3	2	5	1

B. Add the ones column:
5+3+4+1=13
Write down the 3 and carry the 1 to the tens column.

		(1)	
4	6	2	5
	4	2	5
	5	7	4
3	2	5	1
			3

C. Add the tens column:
1 (from the ones column) +2+2+7+5=17
Write down the 7 and carry the 1 to the hundreds column.

	(1)	(1)	
4	6	2	5
	4	2	3
	5	7	4
3	2	5	1
		7	3

D. Add the hundreds column:
1 (from the tens column) +6+4+5+2=18
Write down the 8 and carry the 1 to the thousands column.

(1)	(1)	(1)	
4	6	2	5
	4	2	3
	5	7	4
3	2	5	1
	8	7	3

E. Add the thousands column:
1 (from the hundreds column) +4+3=8
Write down the 8. The sum is 8873.

(1)	(1)	(1)	
4	6	2	5
	4	2	3
	5	7	4
3	2	5	1
8	8	7	3

F. Continue the same process with the remaining columns, if applicable.

Activity 4 - Adding Whole Numbers

(1) Directions: Add.

1.	3 + 5	5 + 0	2 + 6	1 + 5	0 + 2
2.	1 + 8	4 + 5	3 + 5	2 + 6	0 + 8
3.	2 + 2	5 + 3	3 + 6	6 + 1	3 + 3
4.	1 + 2	4 + 3	1 + 1	5 + 2	4 + 1
5.	7 + 1	6 + 3	9 + 0	2 + 7	3 + 4

Activity 4 - Adding Whole Numbers

(2) Directions: Add.

1.	3 + 9	5 + 7	9 + 9	8 + 4	3 + 8
2.	8 + 7	6 + 6	7 + 3	5 + 9	5 + 5
3.	4 + 6	9 + 2	7 + 6	5 + 6	4 + 9
4.	3 + 2	5 + 4	6 + 0	6 + 3	4 + 5
5.	8 + 8	6 + 8	9 + 7	8 + 5	7 + 7

Activity 4 - Adding Whole Numbers

(3) Directions: Add.

1.

6	9	2	1	6
4	6	3	9	2
+ 5	+ 6	+ 8	+ 4	+ 3

2.

8	7	9	5	8
6	0	1	2	5
+ 7	+ 6	+ 8	+ 2	+ 9

3.

4	5	3	4	9
9	6	4	3	7
8	7	8	8	3
+ 1	+ 6	+ 9	+ 8	+ 7

4.

8	3	5	9	6
6	2	5	6	7
8	7	1	5	2
+ 4	+ 9	+ 0	+ 7	+ 3

Activity 4 - Adding Whole Numbers

(4) Directions: Add.

1.	2	18	3	14	5	61	3	62	5	9
	+ 95	+ 9	+ 35	+ 3	+ 37	+ 5	+ 13	+ 9	+ 36	+ 47
2.	11	15	18	12	17	14	19	16	13	18
	+ 2	+ 9	+ 7	+ 5	+ 8	+ 6	+ 4	+ 1	+ 5	+ 9
3.	72	86	93	2	5	7	84	96	57	3
	+ 4	+ 9	+ 3	+ 75	+ 88	+ 99	+ 1	+ 6	+ 9	+ 37
4.	23	2	21	1	28	7	29	6	26	9
	+ 4	+ 26	+ 3	+ 25	+ 8	+ 24	+ 5	+ 22	+ 8	+ 27
5.	4	5	97	3	2	76	6	7	49	8
	+ 73	+ 89	+ 8	+ 56	+ 66	+ 1	+ 82	+ 94	+ 5	+ 39
6.	48	54	7	78	83	3	41	52	4	28
	+ 6	+ 2	+ 67	+ 9	+ 4	+ 91	+ 1	+ 8	+ 37	+ 6
7.	1	8	7	6	4	2	9	5	3	7
	+ 37	+ 34	+ 32	+ 39	+ 31	+ 35	+ 38	+ 33	+ 36	+ 38

Activity 4 - Adding Whole Numbers

(5) Directions: Add.

1.	1	6	42	59	9	2	87	98	3	5
	+ 23	+ 34	+ 7	+ 4	+ 69	+ 74	+ 3	+ 8	+ 98	+ 59
2.	41	1	42	2	44	7	46	6	48	9
	+ 5	+ 48	+ 8	+ 47	+ 9	+ 49	+ 4	+ 43	+ 5	+ 46
3.	29	33	1	8	22	36	2	6	64	5
	+ 5	+ 9	+ 45	+ 19	+ 7	+ 4	+ 16	+ 27	+ 8	+ 37
4.	5	52	1	59	7	4	58	51	9	53
	+ 56	+ 9	+ 54	+ 8	+ 53	+ 55	+ 2	+ 6	+ 58	+ 9
5.	3	27	36	45	3	8	2	95	38	7
	+ 13	+ 9	+ 3	+ 3	+ 57	+ 63	+ 89	+ 8	+ 3	+ 26
6.	5	51	2	17	9	38	4	57	9	47
	+ 46	+ 1	+ 65	+ 8	+ 24	+ 7	+ 43	+ 6	+ 75	+ 6
7.	62	66	7	4	69	14	3	5	64	68
	+ 1	+ 6	+ 61	+ 57	+ 9	+ 7	+ 68	+ 65	+ 6	+ 6

Activity 4 - Adding Whole Numbers

(6) Directions: Add.

1.	25	8	49	6	63	2	12	5	39	7
	+ 1	+ 31	+ 7	+ 58	+ 4	+ 77	+ 9	+ 28	+ 6	+ 38
2.	6	72	76	9	4	77	88	8	9	6
	+ 75	+ 2	+ 7	+ 73	+ 78	+ 5	+ 5	+ 86	+ 84	+ 45
3.	11	26	32	47	53	64	79	85	96	37
	+ 9	+ 7	+ 5	+ 8	+ 6	+ 4	+ 3	+ 1	+ 2	+ 5
4.	87	7	4	9	99	93	97	6	5	7
	+ 6	+ 85	+ 92	+ 96	+ 3	+ 2	+ 7	+ 98	+ 98	+ 96
5.	4	2	3	1	8	7	5	6	9	8
	+ 15	+ 21	+ 39	+ 44	+ 55	+ 68	+ 71	+ 81	+ 89	+ 46
6	23	9	42	7	69	8	97	9	9	97
	+ 6	+ 34	+ 7	+ 59	+ 4	+ 77	+ 5	+ 95	+ 88	+ 9
7	1	5	2	3	6	5	2	9	8	6
	39	47	81	25	52	83	56	37	36	84
	+ 9	+ 8	+ 5	+ 6	+ 9	+ 4	+ 5	+ 8	+ 7	+ 5

Activity 4 - Adding Whole Numbers

(7) **Rows 1 - 5** Directions: Add and check

1.	38 + 21	57 + 32	45 + 3	32 + 25
2.	28 + 49	83 + 46	37 + 86	29 + 45
3.	68 + 49	56 + 71	64 + 28	39 + 42
4.	37 + 22	59 + 76	83 + 24	55 + 99
5.	93 + 14	26 + 53	29 + 84	53 + 28

Activity 4 - Adding Whole Numbers

(7) **Rows 6- 10** Directions: Add and check

6.	42 + 54	34 + 28	37 + 61	24 + 13
7.	28 + 73	53 + 68	67 + 31	13 + 78
8.	31 + 28	93 + 15	59 + 83	82 + 71
9.	47 + 26	93 + 28	66 + 32	28 + 48
10.	65 + 27	47 + 68	74 + 16	55 + 29

Activity 4 - Adding Whole Numbers

(7) **Rows 11 - 15** Directions: Add and check

11.	84 + 29	55 + 89	83 + 15	25 + 39
12.	19 + 47	82 + 36	31 + 45	74 + 26
13.	64 + 28	23 + 88	65 + 87	56 + 49
14.	75 + 78	43 + 88	39 + 29	74 + 23
15.	98 + 43	39 + 26	93 + 23	96 + 16

Activity 4 - Adding Whole Numbers

(7) **Rows 16 - 20** Directions: Add and check

16	66 + 45	24 + 63	57 + 14	92 + 79
17.	61 + 26	65 + 27	48 + 56	14 + 2
18.	32 + 19	39 + 87	29 + 50	47 + 24
19.	13 + 41	59 + 26	25 + 3	17 + 79
20	72 + 24	44 + 36	46 + 2	38 + 25

Activity 4 - Adding Whole Numbers

(8) Rows 1 - 5 Directions: Add and check.

1.	78 + 25	37 + 69	82 + 14
2.	59 + 67	32 + 49	55 + 63
3.	23 + 89	74 + 25	93 + 25
4.	61 + 28	24 + 57	28 + 16
5.	64 + 78	69 + 23	51 + 28

Activity 4 - Adding Whole Numbers

(8) Rows 6 - 10 Directions: Add and check.

6.	73 + 69	84 + 28	62 + 48
7.	87 + 91	48 + 26	53 + 97
8.	68 + 54	83 + 17	75 + 29
9.	74 + 28	68 + 93	95 + 82
10.	46 + 83	72 + 96	47 + 84

Activity 4 - Adding Whole Numbers

(8) **Rows 11 - 15** Directions: Add and check

11.	92 + 15	73 + 16	29 + 33	34 + 69
12.	45 + 57	63 + 98	37 + 69	84 + 57
13.	36 + 83	24 + 47	71 + 98	64 + 36
14.	49 + 87	63 + 29	62 + 79	65 + 97
15.	26 + 75	38 + 44	83 + 29	58 + 46

Activity 4 - Adding Whole Numbers

(9) Directions: Add and check.

1.

68	72	93	87
+ 580	+ 469	+ 708	+ 506

2.

748	825	346	293
+ 87	+ 59	+ 64	+ 53

3.

41	57	53	64
+ 289	+ 418	+ 469	+ 377

4.

302	729	655
+ 83	+ 50	+ 43

Activity 4 - Adding Whole Numbers

(10) Directions: Add and check.

1.	56 + 811	34 + 205	80 + 709	482 + 16
2.	314 + 98	283 + 56	607 + 95	966 + 35
3.	53 + 436	13 + 206	62 + 914	47 + 532
4.	946 + 32	415 + 61	723 + 75	

Activity 4 - Adding Whole Numbers

(11) Directions: Add and check.

1.

66	21	89	92
81	49	67	10
+ 56	+ 43	+ 50	+ 39

2.

87	60	31	79
19	54	28	96
+ 72	+ 38	+ 44	+ 83

3

70	51	42	78
57	91	93	12
+ 202	+ 329	+ 516	+ 490

4

63	84	20	95
85	43	74	80
+ 854	+ 977	+ 627	+ 417

Activity 4 - Adding Whole Numbers

(12) Directions: Add and check.

1.

	91	15	23
	31	75	22
	78	76	87
+	66	+ 31	+ 99

2.

	646	930	347
	60	15	38
	52	37	67
+	944	+ 376	+ 421

3.

	94	40	27
	21	83	40
	39	26	67
	45	29	28
+	80	+ 33	+ 86

4.

	57	43	86
	35	51	65
	12	74	84
	83	32	46
+	58	+ 36	+ 97

Activity 4 - Adding Whole Numbers

(13) Rows 1- 5 Directions: Add and check.

1.	603 + 285	577 + 321	458 + 201	413 + 564
2.	805 + 163	761 + 135	432 + 245	854 + 133
3.	345 + 698	254 + 736	829 + 847	378 + 692
4	748 + 642	293 + 718	786 + 692	267 + 541
5.	843 + 927	288 + 364	674 + 732	235 + 872

Activity 4 - Adding Whole Numbers

(13) **Rows 6 - 10** Directions: Add and check.

6.	762 + 125	210 + 648	307 + 652	386 + 402	138 + 844
7.	328 + 560	415 + 383	574 + 692	925 + 381	558 + 649
8.	493 + 386	254 + 255	368 + 645	758 + 452	423 + 468
9.	475 + 321	347 + 433	425 + 716	129 + 632	
10.	325 + 372	523 + 476	215 + 258	648 + 627	

Activity 4 - Adding Whole Numbers

(14) Rows 1 - 5 Directions: Add and check.

1.	786 + 394	928 + 782	475 + 698	378 + 257
2.	378 + 269	543 + 786	834 + 729	541 + 269
3.	287 + 465	387 + 298	546 + 589	728 + 569
4.	384 + 429	968 + 518	652 + 478	409 + 583
5.	740 + 893	584 + 427	637 + 965	842 + 369

Activity 4 - Adding Whole Numbers

(14) **Rows 6 - 11** Directions: Add and check.

6.	683 + 417	257 + 683	594 + 417	267 + 936
7.	405 + 561	216 + 423	537 + 252	640 + 118
8.	689 + 336	546 + 921	786 + 293	548 + 687
9.	834 + 785	692 + 847	716 + 263	408 + 241
10.	715 + 486	709 + 983	607 + 406	219 + 389
11	885 + 102	235 + 452		

Activity 4 - Adding Whole Numbers

(16) Directions: Add and check.

1.

146	243	880
73	10	77
+ 718	+ 256	+ 523

2.

367	236	413	223
520	153	648	209
+ 124	+ 875	+ 381	+ 574

3.

175	357	526	162	845
263	113	683	842	464
+ 421	+ 318	+ 347	+ 682	+ 573

4.

316	214	817	552	621
470	275	646	673	897
+ 211	+ 463	+ 373	+ 631	+ 973

Activity 4 - Adding Whole Numbers

(17) Directions: Use scratch paper to add these numbers. Use your calculator to check your answers.

1.

685	597	263	760	461	298
691	283	161	218	919	709
274	406	247	322	653	395
+ 394	+ 938	+ 459	+ 938	+ 597	+ 471

2.

518	114	806	638	441
782	726	992	793	348
764	953	528	136	635
207	199	666	483	914
+ 843	+ 727	+ 894	+ 397	+ 679

3.

272	944	357
107	775	106
814	753	197
760	107	371
591	779	810
467	107	849
157	811	693
+ 724	+ 661	+ 556

4.

494	165	618
847	559	622
511	428	159
577	135	285
905	559	341
699	417	375
359	506	662
+ 424	+ 873	+ 996

Activity 4 - Adding Whole Numbers

(18) Directions: Add and check.

1.	8,027 + 1,932	3,329 + 4,060	6,203 + 2,351
2.	6,001 + 2,573	2,347 + 2,412	7,580 + 1,316
3.	4,825 + 3,054	1,756 + 6,213	6,073 + 2,515
4.	4,815 + 2,114	8,047 + 1,832	1,966 + 4,032
5.	4,116 + 4,572	7,038 + 2,521	2,413 + 4,334
6.	4,251 + 3,429	2,357 + 6,043	7,054 + 1,712

Activity 4 - Adding Whole Numbers

(19) Directions: Add and check.

1.	7,244 + 2,351	8,563 + 1,234	5,042 + 2,635
2.	4,162 + 5,736	2,438 + 4,235	7,654 + 3,476
3.	4,651 + 3,238	3,527 + 1,417	6,355 + 3,846
4.	7,136 + 1,042	3,574 + 3,103	5,546 + 2,342
5.	2,746 + 8,337	8,437 + 5,895	4,825 + 2,164
6.	9,223 + 4,439	7,558 + 6,796	3,251 + 4,748

Activity 4 - Adding Whole Numbers

(20) Directions: Add and check.

1.	2,562 3,114 + 3,201	4,658 3,226 + 1,814	5,673 2,225 + 3,070
2.	4,124 3,251 + 1,524	2,543 6,671 + 1,187	7,338 3,229 + 6,360
3.	8,779 2,286 + 5,269	4,855 2,849 + 1,754	7,630 4,108 + 7,068
4.	8,493 7,601 + 2,519	4,181 7,670 + 2,892	4,596 8,892 + 4,625
5.	9,478 6,791 + 5,912	3,997 9,254 + 4,529	5,504 2,741 + 3,116

Activity 4 - Adding Whole Numbers

(21) Directions: Use scratch paper to add these numbers. Use your calculator to check your answer.

1.

3,948	6,787
7,758	3,316
6,799	4,213
+ 2,437	+ 5,449

2.

8,123	2,774
7,510	7,887
1,085	3,551
6,534	4,560
9,469	5,494
3,638	1,745
+ 1,086	+ 8,361

3.

8,649	7,099
7,856	9,592
4,822	3,683
4,776	9,971
6,252	1,617
2,791	2,193
+ 8,679	+ 8,062

4

4,108	9,081
7,915	8,752
3,736	2,978
+ 2,615	+ 7,093

Activity 4 - Adding Whole Numbers

(22) Directions: Add and check.

1.	24,207 + 15,072	54,156 + 30,422	32,354 + 43,104
2.	14,871 + 65,118	75,854 + 24,357	40,955 + 46,365
3.	36,745 + 42,031	56,092 + 23,805	72,033 + 21,563
4.	51,084 + 27,505	69,043 + 20,516	23,864 + 51,133
5.	25,401 + 22,367	86,996 + 97,668	27,514 + 22,384

Activity 4 - Adding Whole Numbers

(23) Directions: Add and check.

1.	21,513 + 62,375	63,285 + 24,926	32,643 + 20,898
2.	18,946 + 51,032	70,128 + 16,641	54,223 + 32,564
3.	51,937 + 35,042	69,821 + 20,104	30,649 + 54,320
4.	58,971 + 28,099	72,064 + 27,248	38,684 + 20,314
5.	76,521 + 13,054		

Activity 4 - Adding Whole Numbers

(24) Directions: Add and check.

1.	52,364 + 2,305	35,086 + 1,213	20,316 + 8,271
2.	86,954 21,326 + 40,579	29,847 31,866 + 49,230	59,146 28,759 + 61,238
3.	76,493 66,590 + 27,286	44,538 64,908 + 70,435	27,881 92,855 + 33,064
4.	43,972 61,258 + 30,417	69,836 71,234 + 33,927	75,634 32,408 + 21,046
5.	27,290 + 2,607	54,763 + 4,134	

Activity 4 - Adding Whole Numbers

(25) Directions: Add and check.

1.	392,844 + 547,276	693,295 + 248,708	476,698 + 781,786
2.	646,245 + 695,048	665,014 + 959,084	236,980 + 346,706
3.	683,945 + 821,596	382,769 + 737,892	473,586 + 469,218
4.	596,868 + 243,117	998,273 + 289,713	610,199 + 583,045
5.	592,768 + 409,826		

Activity 4 - Adding Whole Numbers

(26) Directions: Add and check.

1.	642,865 + 921,565	784,228 + 843,627	372,486 + 687,769
2.	662,184 + 234,013	729,832 + 240,144	229,056 + 500,832
3.	367,455 + 422,301	294,391 + 748,692	249,382 + 389,827
4.	831,476 + 978,937	210,976 + 384,012	861,042 + 121,446
5.	478,695 341,217		

Activity 4 - Adding Whole Numbers

(27) Directions: Use scratch paper to add these numbers. Use your calculator to check your answers.

1.

423,876,982	476,827,698	247,692,385
+ 839,213,469	+ 928,022,809	+ 786,427,820

2.

738,925,467	293,847,693	786,925,478
+ 426,178,698	+ 542,769,827	+ 354,769,842

3.

742,618,726	427,893,876	924,647,822
+ 427,864,415	+ 738,264,699	+ 376,256,878

4.

725,678,296	537,698,276	547,692,859
+ 854,927,707	+ 654,276,987	+ 382,769,842

Activity 5 - Solving Word Problems (Addition)

Objective(s): This activity will enable participants to solve word problems by applying addition skills.

Materials Required:
Pencil

You need to know:

To solve any word problem....

1. Determine what you must find out.

2. Decide what information is necessary in order to solve the problem.

3. Decide what arithmetic operation to use. Since clue words give you the key to solving the problem, pay particular attention to them.

   EXAMPLES:

in all	sum	
together	more	
altogether	plus	→ TO ADD
total	and	
both	added	
combined	increase	

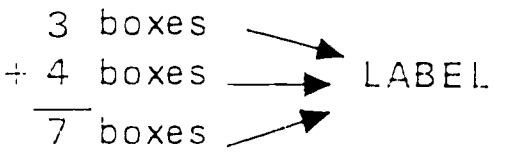
4. Work out the problem and find the solution.

5. Check your arithmetic. Reread the question to make sure that your answer makes sense.

Activity 5 - Solving Word Problems (continued)

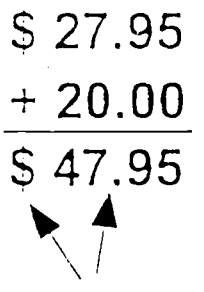
You need to know:

6. Label final answers in order to make the numbers concrete.
   EXAMPLES:
   Ralph ate 3 boxes of Better Cheddars® last week and 4 boxes this week. How many boxes did he eat altogether?



Not just 7, but 7 boxes (final answer).

A uniform costs $27.95 and an identification badge costs $20.00. How much did Henry pay for work attire?



Not just 47.95, but $47.95 (final answer)

Cluster
Applied Math

Activity 5 - Solving Word Problems (continued)

Directions: Read the word problems below and perform the necessary addition computations to answer the questions that follow.

1. An urban supermarket bought four shipments of Chips Ahoy!® cookies. The first shipment contained 87 cartons, the second 135, the third 111, and the fourth 215. In all, how many cartons were bought? _____

2. Annie, a packing technician, drives to Nabisco from various places and back home each evening. Her records show the following mileage for one week: 58 miles, 45 miles, 62 miles, 31 miles, and 79 miles. What was her total mileage for the week? _____

3. In the Bakery cafeteria, Rob bought a hamburger which costs $1.95, a bag of chips for $.65, and a large grape soda for $.93. How much did his lunch cost? _____

4. Bill and Carol Brown keep a record of the amount of gasoline they use to drive back and forth to Nabisco®. Last month they purchased the following number of gallons: 9, 13, 14, 10, 12, and 14. How many gallons did they purchase during the month?

_____

Activity 5 - Solving Word Problems (continued)

5. To reward employees for their outstanding record, Nabisco® management sponsored a luncheon. The following amounts of food were purchased: 110 pounds of hotdogs, 215 pounds of hamburger, 95 pounds of potato salad, 60 pounds of baked beans, and 48 pounds of coleslaw. Altogether, how many pounds of food were purchased? _____

6. During the luncheon, 283 employees were served the first hour, 170 the second hour, 82 the third hour, and 306 the fourth hour. What was the total number of employees served? _____

7. At the Richmond Bakery, the first shift produced 2,000,000 Premium® crackers, the second shift produced 1,743,562, and the third shift produced 1,928,637. How many crackers were produced on this day? _____

8. If 5,000,000 Ritz® crackers can be produced per shift, 2,000,000 Premium® crackers, and 2,400,000 Oreos®, combined how many cookies and crackers can be produced per shift? _____

Activity 5 - Solving Word Problems (continued)

9. Following are the pounds of B&R produced by each production line. What was the total amount of B&R produced for the day? _____

Line 1:	212	Line 5:	310
Line 2:	178	Line 6:	253
Line 3:	427	Line 7:	404
Line 4:	192		

10. One Thursday, line 1 produced 698 bundles of product, line 2 produced 737 bundles, line 3 produced 834 bundles, and line 4 produced 555 bundles. What was the total number of bundles produced for the day? _____

11. Following are the number of Nilla Wafer® units rejected by each fill machine on line 5, shift two. How many units were rejected during the shift? _____

Fill Machine 1:	12	Fill Machine 3:	16
Fill Machine 2:	23	Fill Machine 4:	57

Activity 5 - Solving Word Problems (continued)

12. One Tuesday, three lines produced Wheat Thins®. Line 2 produced 8,983 units, line 5 produced 9,876 units, and line 7 produced 9,495 units. How many units were produced altogether? _____

13. It is 6:17 p.m. and you have to relieve one of the Assemblers in 38 minutes. What time will you arrive to relieve him?

_____

14. Ray travels through a tunnel which costs $1.35 each way in order to get to and from work at Nabisco®. How much money does he spend to get through the tunnel daily? _____

15. During a one-hour period, fill machine 1 filled 786 boxes, fill machine 2 filled 993 boxes, and fill machine 3 filled 884 boxes. How many boxes were filled by all three machines? _____

Activity 5 - Solving Word Problems (continued)

16. Over a one-month period, a bakery produced the following number of pounds of B&R: 29,387, 32,740, 26,513 and 30,200. How many pounds of B&R were produced in all during the month? _____.

17. Following are the slug weights for five Chips Ahoy!® slugs (in grams). What is the total weight of the slugs? _____

253.1 246.7 266.5 258.3 260.9

18. On Wednesday, line 1 produced 374 pounds of B&R, line 2 produced 226 pounds, line 3 produced 427 pounds, and line 4 produced 452 pounds. What was the total amount of B&R produced for the day? _____

19. One Monday, shift 1 produced 634 doughs, shift 2 produced 606 doughs, and shift 3 produced 578 doughs. How many doughs were produced for the day? _____

Activity 5 - Solving Word Problems (continued)

20. Calculate the cumulative totals.

Pounds of B&R produced

Shift 1: 643

Shift 2: 376 Cumulative total = _____

Shift 3: 485 Cumulative total = _____

21. Calculate the cumulative totals.

Number of Wheat Thin® units produced by line 1:

Shift 1: 5,432

Shift 2: 4,987 Cumulative total = _____

Shift 3: 5,321 Cumulative total = _____

22. Following are the net weights of five packages of Chips Ahoy!®. What is the total net weight? _____

16.33 16.54 16.70 16.06 16.35

Activity 6 - Subtraction of Whole Numbers

Objective(s): This activity will enable participants to (1) apply the rules for subtracting whole numbers and (2) check the answers to subtraction problems.

Materials Required:
Pencil

You need to know:

1. Subtraction is used everyday in many ways. Whenever you buy an item at the store, your change can be calculated by subtraction. On the job, you may subtract an oil reading from total usage, subtract the lowest bag weight from the highest bag weight to calculate bag weight range, or subtract minor ingredients to put the proper amount of ingredients into the mixer.

2. Subtraction is the opposite of addition. Addition is combining two or more quantities while subtraction is the process of taking one number away from another. It is the process of determining the difference between two numbers or quantities.

3. Use subtraction to figure out how much is left when you remove one number from another or when you want to compare two numbers.

   EXAMPLE: (A) Betty had $7.00. She gave $3.50 to Ted for his lunch. How much money did Betty have left?

(A)	$ 7.00
	- 3.50
Answer	$ 3.50

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know: (continued)

EXAMPLE: (B) If a large bag of cookies weighs 18 ounces and a small bag weighs 10 ounces, how much more does the large bag weigh?

18 ounces
- 10 ounces
Answer 8 ounces

4. The number from which another number is to be subtracted is called the minuend. The number to be subtracted is the subtrahend. The result (answer) is called the difference or remainder.

EXAMPLE:

246 minuend
- 134 subtrahend
Answer 112 difference (remainder)

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know: (continued)

5. To subtract whole numbers:

EXAMPLE: Subtract 231 from 744.

(A) Write the larger number as the minuend.

(B) Place the digits in the subtrahend in proper columns.

(C) Begin with the units (ones) column and take 1 away from 4. Record the difference (3) in the units column.

(D) Continue in the same manner with the tens and hundreds columns (subtract other columns to the left, where applicable).

(E) The answer (513) is the difference between the two numbers.

	Hundreds	Tens	Ones
Minuend →	7	4	4
Subtrahend →	2	3	1
			3
		1	
	5		

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know:

6. If a digit in the subtrahend is too large to take from the digit above it in the minuend, borrow from the next column in the minuend in order to subtract.

   (A) Since you can't subtract 6 from 2, borrow 1 ten from the tens column. (10 + 2 = 12). Place a small 1 next to the 2 in the minuend to show that it is now 12.

   <u>EXAMPLE:</u>

$$\begin{array}{ccc} & 6 & \\ & \not{7} & {}^{1}2 \\ - & 2 & 6 \\ \hline & 4 & 6 \end{array}$$

   (B) Cross out the 7 in the tens column and make it a six to show that your borrowed 1 ten.

   (C) Subtract: 12 - 6 = 6

   (D) Subtract: 6 - 2 = 4

   (E) The answer (46) is the difference between the two numbers.

Activity 6 - Subtraction of Whole Numbers (continued)

You need to know:

7. If you have to borrow more than once in the same problem, continue the same process with remaining columns. Proceed to subtract by borrowing until you have subtracted each digit

   EXAMPLE:

$$\begin{array}{r} {}^{7}\,{}^{15}\,{}^{1} \\ 8\ \ 6\ \ 4 \\ -\quad 8\ \ 7 \\ \hline 7\ \ 7\ \ 7 \end{array}$$

8. To check a subtraction problem, add the difference (answer) to the subtrahend of the original problem. The sum should be the minuend of the original problem.

   EXAMPLE:

$$\begin{array}{r} 39 \\ -\ 14 \\ \hline 25 \end{array}$$

(1) 9 - 4 = 5
(2) 3 - 1 = 2

   CHECK

$$\begin{array}{r} 39\checkmark \\ -\ 14 \\ \hline 25 \\ \hline 39\checkmark \end{array}$$

(1) 4 + 5 = 9
(2) 1 + 2 = 3

9. For every subtraction problem, there is an equivalent addition problem.

   EXAMPLE: [illegible]

Activity 6 - Subtraction of Whole Numbers (continued)

Directions: Practice subtracting in your head a one digit number from a larger number. Have a classmate time you for exactly 5 minutes as you work to accurately complete the chart. Subtract the numbers in the left column from each of the numbers across the top of the chart. GO AS FAST AS YOU CAN!

—	16	23	30	18	90	12	47	10	25
9									
7									
5									
3									
8									
6									
4									

Activity 6 - Subtracting Whole Numbers

(1) Directions: Subtract.

1.	8	7	4	9	8	3	1	8	5	6
	- 4	- 0	- 2	- 0	- 7	- 2	- 1	- 5	- 2	- 6
2.	6	5	7	4	9	8	2	6	7	9
	- 3	- 4	- 7	- 3	- 2	- 5	- 0	- 2	- 6	- 6
3.	4	8	13	9	6	12	3	15	11	4
	- 0	- 2	- 8	- 1	- 6	- 3	- 1	- 7	- 5	- 1

Activity 6 - Subtracting Whole Numbers

(2) Directions: Subtract.

1.	10	5	18	8	6	15	9	16	5	12
	- 5	- 1	- 9	- 2	- 6	- 7	- 7	- 9	- 5	- 4
2.	5	7	8	13	11	7	8	11	10	9
	- 3	- 6	- 3	- 5	- 3	- 2	- 0	- 9	- 7	- 9
3	13	12	11	2	7	13	6	6	9	13
	- 8	- 3	- 5	- 2	- 0	- 9	- 5	- 1	- 0	- 6

Activity 6 - Subtracting Whole Numbers

(3) Directions: Subtract.

1.	16	8	10	5	6	5	7	14	18	11
	- 7	- 6	- 5	- 4	- 2	- 1	- 3	- 8	- 9	- 4
2.	12	10	12	14	7	10	16	5	7	11
	- 5	- 3	- 8	- 9	- 5	- 4	- 7	- 4	- 3	- 4
3.	7	5	13	14	3	4	15	10	9	2
	- 1	- 2	- 7	- 6	- 2	- 3	- 6	- 9	- 3	- 1

Activity 6 - Subtracting Whole Numbers

(4) Directions: Subtract.

1.	13	4	9	5	8	3	1	8	11	12
	- 7	- 3	- 3	- 0	- 5	- 3	- 1	- 7	- 6	- 7
2.	9	12	10	7	11	11	7	14	15	2
	- 8	- 9	- 8	- 6	- 3	- 9	- 1	- 6	- 6	- 1
3.	10	14	12	6	7	11	9	10	1	8
	- 1	- 9	- 6	- 0	- 5	- 7	- 5	- 4	- 0	- 1

Activity 6 - Subtracting Whole Numbers

(5) Directions: Subtract.

1.	14	11	2	17	16	4	5	13	6	9
	- 7	- 2	- 0	- 9	- 8	- 2	- 3	- 5	- 0	- 9
2.	6	5	10	13	8	17	7	3	16	11
	- 4	- 0	- 2	- 4	- 5	- 8	- 4	- 3	- 9	- 8
3.	6	15	4	3	9	7	10	6	9	8
	- 3	- 8	- 4	- 0	- 4	- 7	- 1	- 0	- 5	- 1

Activity 6 - Subtracting Whole Numbers

(6) Directions: Subtract.

1.	1	14	6	8	9	15	11	10	4	12
	- 1	- 5	- 3	- 7	- 6	- 8	- 6	- 6	- 4	- 7
2.	12	11	1	8	6	14	4	9	3	4
	- 6	- 7	- 0	- 6	- 2	- 8	- 0	- 1	- 1	- 1
3.	8	7	10	5	3	10	6	13	7	11
	- 3	- 2	- 7	- 2	- 2	- 9	- 4	- 4	- 4	- 8

Activity 6 - Subtracting Whole Numbers

(7) Directions: Subtract.

1.	6	17	9	6	16	12	9	4	10	13
	- 5	- 9	- 8	- 1	- 8	- 9	- 0	- 2	- 8	- 6
2.	10	17	15	14	9	10	9	8	13	8
	- 2	- 8	- 9	- 5	- 6	- 6	- 2	- 8	- 6	- 4
3.	9	2	14	16	7	11	5	13	2	12
	- 7	- 2	- 7	- 9	- 0	- 2	- 5	- 9	- 0	- 4

Activity 6 - Subtracting Whole Numbers

(8) Directions: Subtract and check.

1.	60 - 40	35 - 21	77 - 73	74 - 40	58 - 32
2.	63 - 22	72 - 70	85 - 34	96 - 62	43 - 43
3.	91 - 6	62 - 9	33 - 4	52 - 27	45 - 16

Activity 6 - Subtracting Whole Numbers

(9) Directions: Subtract and check.

1.	57 - 18	43 - 25	65 - 8	82 - 75	60 - 42
2.	36 - 18	48 - 29	51 - 36	25 - 18	74 - 27
3.	34 - 22	69 - 35	38 - 31	52 - 32	75 - 51

Activity 6 - Subtracting Whole Numbers

(10) Directions: Subtract and check.

1.	82 - 9	27 - 8	21 - 7	95 - 8	63 - 5
2.	54 - 33	28 - 14	94 - 51	77 - 36	58 - 48
3.	83 - 25	95 - 39	50 - 28	68 - 49	97 - 58

Activity 6 - Subtracting Whole Numbers

(11) Directions: Subtract and check.

1.	78 - 15	28 - 10	56 - 12	67 - 25	79 - 54
2.	67 - 8	95 - 9	48 - 9	68 - 9	84 - 7
3.	76 - 7	47 - 8	94 - 8	81 - 40	62 - 11

Activity 6 - Subtracting Whole Numbers

(12) Directions: Subtract and check.

1.	85	44	68	70	42
	- 16	- 27	- 59	- 32	- 18
2.	76	21	65	87	48
	- 71	- 11	- 53	- 62	- 17
3.	53	28	97	79	64
	- 36	- 19	- 28	- 58	- 26

Activity 6 - Subtracting Whole Numbers

(13) Directions: Subtract and check.

1.	75 - 17	71 - 26	38 - 19	24 - 11	92 - 39
2.	57 - 29	61 - 34	92 - 83	41 - 21	37 - 15
3.	62 - 21	46 - 25	58 - 26	61 - 47	92 - 29

Activity 6 - Subtracting Whole Numbers

(14) Directions: Subtract and check.

1.	300 - 37	400 - 45	600 - 63	200 - 34	900 - 51
2.	553 - 69	417 - 58	864 - 87	241 - 48	752 - 57
3.	251 - 38	742 - 27	927 - 18	381 - 53	793 - 86

Activity 6 - Subtracting Whole Numbers

(15) Directions: Subtract and check.

1.	896	692	546	695	588
	- 88	- 85	- 37	- 88	- 79
2.	205	306	402	508	206
	- 86	- 38	- 46	- 59	- 49
3.	795	932	866	357	614
	- 29	- 38	- 47	- 28	- 17

Activity 6 - Subtracting Whole Numbers

(16) Directions: Subtract and check.

1.	602	501	803	902	401
	- 58	- 29	- 37	- 44	- 53
2.	968	141	572	543	519
	- 74	- 80	- 91	- 62	- 53
3.	640	365	482	981	288
	- 27	- 48	- 75	- 63	- 59

Activity 6 - Subtracting Whole Numbers

(17) Directions: Subtract and check.

1.	334 - 299	634 - 467	310 - 123
2.	246 - 134	983 - 672	643 - 482
3.	401 - 389	893 - 748	472 - 472

Activity 6 - Subtracting Whole Numbers

(18) Directions: Subtract and check.

1. $\begin{array}{r} 641 \\ -\ 500 \\ \hline \end{array}$ $\begin{array}{r} 812 \\ -\ 602 \\ \hline \end{array}$ $\begin{array}{r} 559 \\ -\ 247 \\ \hline \end{array}$

2. $\begin{array}{r} 885 \\ -\ 452 \\ \hline \end{array}$ $\begin{array}{r} 740 \\ -\ 520 \\ \hline \end{array}$ $\begin{array}{r} 482 \\ -\ 331 \\ \hline \end{array}$

3. $\begin{array}{r} 562 \\ -\ 491 \\ \hline \end{array}$ $\begin{array}{r} 496 \\ -\ 263 \\ \hline \end{array}$ $\begin{array}{r} 842 \\ -\ 761 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(19) Directions: Subtract and check.

1. $525 - 247$ $287 - 198$ $216 - 158$

2. $305 - 278$ $207 - 199$ $401 - 285$

3. $466 - 388$ $373 - 199$ $983 - 585$

Activity 6 - Subtracting Whole Numbers

(20) Directions: Subtract and check.

1. $\begin{array}{r} 502 \\ -\ 263 \\ \hline \end{array}$ $\begin{array}{r} 308 \\ -\ 149 \\ \hline \end{array}$ $\begin{array}{r} 604 \\ -\ 326 \\ \hline \end{array}$

2. $\begin{array}{r} 418 \\ -\ 279 \\ \hline \end{array}$ $\begin{array}{r} 957 \\ -\ 821 \\ \hline \end{array}$ $\begin{array}{r} 627 \\ -\ 468 \\ \hline \end{array}$

3. $\begin{array}{r} 650 \\ -\ 440 \\ \hline \end{array}$ $\begin{array}{r} 848 \\ -\ 232 \\ \hline \end{array}$ $\begin{array}{r} 567 \\ -\ 356 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(21) Directions: Subtract and check.

1. $\begin{array}{r} 467 \\ -\ 349 \\ \hline \end{array}$ $\begin{array}{r} 355 \\ -\ 237 \\ \hline \end{array}$ $\begin{array}{r} 653 \\ -\ 409 \\ \hline \end{array}$

2. $\begin{array}{r} 983 \\ -\ 147 \\ \hline \end{array}$ $\begin{array}{r} 578 \\ -\ 429 \\ \hline \end{array}$ $\begin{array}{r} 356 \\ -\ 180 \\ \hline \end{array}$

3. $\begin{array}{r} 942 \\ -\ 611 \\ \hline \end{array}$ $\begin{array}{r} 889 \\ -\ 278 \\ \hline \end{array}$ $\begin{array}{r} 468 \\ -\ 432 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(22) Directions: Subtract and check.

1.	893 - 655	972 - 408	331 - 125
2.	362 - 188	721 - 356	982 - 581
3.	371 - 269	684 - 547	143 - 128

Activity 6 - Subtracting Whole Numbers

(23) Directions: Subtract and check.

1.	974 - 923	567 - 524	534 - 311
2.	337 - 155	812 - 90	764 - 581
3.	952 - 940	540 - 230	686 - 251

Activity 6 - Subtracting Whole Numbers

(24) Directions: Subtract and check.

1.	794 - 478	652 - 239	498 - 379
2.	563 - 185	777 - 298	835 - 348
3.	364 - 263	751 - 401	523 - 321

Activity 6 - Subtracting Whole Numbers

(25) Directions: Subtract and check.

1.	458 - 349	691 - 227	854 - 536
2.	278 - 119	445 - 108	764 - 545
3.	249 - 134	553 - 243	916 - 503

Activity 6 - Subtracting Whole Numbers

(26) Directions: Subtract and check.

1. $\begin{array}{r} 683 \\ -\ 421 \\ \hline \end{array}$ $\begin{array}{r} 944 \\ -\ 703 \\ \hline \end{array}$ $\begin{array}{r} 871 \\ -\ 260 \\ \hline \end{array}$

2. $\begin{array}{r} 772 \\ -\ 341 \\ \hline \end{array}$ $\begin{array}{r} 908 \\ -\ 305 \\ \hline \end{array}$ $\begin{array}{r} 197 \\ -\ 122 \\ \hline \end{array}$

3. $\begin{array}{r} 887 \\ -\ 352 \\ \hline \end{array}$ $\begin{array}{r} 543 \\ -\ 243 \\ \hline \end{array}$ $\begin{array}{r} 781 \\ -\ 300 \\ \hline \end{array}$

Activity 6 - Subtracting Whole Numbers

(27) Directions: Subtract and check.

1.	692 - 491	485 - 324	727 - 512
2.	739 - 628	609 - 203	957 - 342
3.	266 - 118	385 - 166	597 - 408

Activity 6 - Subtracting Whole Numbers

(28) Directions: Subtract and check.

1. 800 - 263 | 300 - 127 | 500 - 233

2. 400 - 291 | 600 - 382 | 200 - 194

3. 700 - 266 | 900 - 724 | 300 - 123

Activity 6 - Subtracting Whole Numbers

(29) Directions: Subtract and check.

1.	5,037	1,201	5,834
	- 329	- 642	- 855
2.	3,633	4,125	2,961
	- 794	- 636	- 972
3.	1,896	1,896	1,896
	- 484	- 494	- 498

Activity 6 - Subtracting Whole Numbers

(30) Directions: Subtract and check.

1.	1,876 - 689	3,243 - 892	3,243 - 856
2.	5,648 - 649	6,345 - 258	1,827 - 918
3.	8,002 - 628	9,003 - 324	4,005 - 556

Activity 6 - Subtracting Whole Numbers

(31) Directions: Subtract and check.

1. 4,080 − 387 | 3,070 − 991 | 5,02 − 438

2. 1,896 − 499 | 1,004 − 687 | 4,468 − 579

3. 3,006 − 439 | 8,007 − 299 | 1,006 − 307

Activity 6 - Subtracting Whole Numbers

(32) Directions: Subtract and check.

1.	2,040	3,060	1,050
	- 462	- 392	- 465
2.	4,003	9,002	6,001
	- 621	- 972	- 430
3.	7,263	4,775	5,176
	- 185	- 683	- 438

Activity 6 - Subtracting Whole Numbers

(33) Directions: Subtract and check.

1.

8,240	2,334	1,615
- 327	- 516	- 807

2.

3,004	5,006	2,007
- 973	- 425	- 347

Activity 7 - Calculating the Range of Whole Numbers

Objective(s): This activity will enable participants to find the range between two numbers.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. Subtraction is used to calculate the range between two numbers.

2. The range is the difference between the lowest number and the highes number calculated when taking measurements such as temperatures, weights, etc.

   EXAMPLE:
   Find the range of these dough weights:
   106 g 101 g 110 g 103 g

   A. Arrange the measurements (temperatures, weights, etc.) in sequence:

      110 g
      106 g
      103 g
      101 g

   B. Determine the largest measurement → 110 g

   C. Determine the smallest measurement → 101 g

Activity 7 - Calculating the Range of Whole Numbers (continued)

You need to know:

D. Subtract the smallest measurement from the largest measurement.

$$\begin{array}{r} 110\ g \\ -\ 101\ g \\ \hline 9\ g \end{array} \quad \text{(range)}$$

E. The difference is the range.

3. The simplest way to report variations is to give the range between the highest and lowest measurement. You can interpret the variation in a process by examining the patterns on control charts. Such patterns let you know if the process is operating according to guidelines or if it is not in control.

4. For example, you can check wet weights, dough weights, or oven temperatures by calculating the range between measurements.

Activity 7 - Calculating the Range of Whole Numbers (continued)

Directions: Underline the largest and the smallest number in each row belov Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	18	12	14	16	
B)	21	27	23	25	
C)	6	2	8	4	
D)	9	7	5	3	
E)	44	48	42	40	
F)	33	35	32	36	
G)	51	50	53	57	
H)	17	11	6	3	
I)	33	13	22	11	
J)	213	266	245	202	

Activity 7 - Calculating the Range of Whole Numbers (continued)

Directions: Calculate the range.

1. Find the range of the following oil readings:

   4 % 11 % 10 % 8 % 13 %

   Range: %

2. Find the range of the following bag weights:

   18 oz. 17 oz. 14 oz. 12 oz. 10 oz.

   Range: oz.

3. Calculate the range of the following wet weights:

   A) 74 69 67 Range:

   B) 76 72 67 Range:

   C) 69 72 68 Range:

   D) 70 74 66 Range:

   E) 76 75 65 Range:

4. Find the range of these oven temperatures:

   A) 410° 580° 550° 520° 415° 330° 420° 450°

   Range: °

   B) 360° 500° 510° 400° 340° 360° 300° 320°

   Range: °

Activity 8 - Calculating Tare Weights

Objective(s): This activity will enable participants to determine product weights.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. To figure out precisely how much product or ingredient is on a scale, you must first subtract the weight of the packaging material or container holding the product or ingredient. This packaging material or container is known as the tare.

2. If a bag of Oreos© is labeled 20 ounces, this means 20 ounces of edible product, not including the bag (tare weight). To determine how much edible product is in the bag, first weigh the empty bag and then subtract this weight from the weight of the full bag. The remainder (difference) is the actual amount of edible product inside the bag. When you press the Tare Key on the scale, the scale makes this calculation for you.

   EXAMPLE: Find the following product weight:

   16 oz. of cookies including the bag
   - 2 oz. of packaging material (tare)
   14 oz. exact weight of cookies inside the bag

Activity 9 - Subtracting Whole Numbers (Word Problems)

Directions: Use subtraction to solve the following problems:

1. Suppose lines 8 and 9 in a bakery produce Snackwells®. The total number of units produced daily is 32,988. Line 9 produces 18,752 units per day. How many units are produced by Line 8?

   _____

2. The total package weight of a box of Cheese Nips® is 383 grams. The tare weight is 73 grams. What is the net weight?

   _____

3. The total package weight of a package of Chips Ahoy!® is 18 ounces. The packaging tare is 2 ounces. What is the net weight?

   _____

4. The total package weight of a box of Premium® crackers is 17 ounces. The tare weight is 1 ounce. What is the actual product weight?

   _____

5. One Thursday, shift 2 produced 634 doughs and shift 3 produced 527 doughs. How many more doughs did shift 2 produce than shift 3?

   _____

6. On Wednesday, shift 1 produced 694 pounds of B&R and shift 2 produced 447 pounds of B&R. How much more B&R was produced by shift 1 than by shift 2?

   _____

Activity 9 - Subtracting Whole Numbers (Word Problems) (continued)

7. On Friday, three shifts produced Oreos®. Shift 3 produced 9,298 units, shift 1 produced 9,986 units, and shift 2 produced 8,897 units.

   A) How many more units did shift 1 produce than shift 3?

   _____

   B) How many more units did shift 1 produce than shift 2?

   _____

   C) How many more units did shift 3 produce than shift 2?

   _____

8. Find the following product weights:

   A) 178g of product; 10g of packaging material

   product weight: _____

   B) 249g of product; 13g of packaging material

   product weight: _____

   C) 254g of product; 12g of packaging material

   product weight: _____

   D) 12 oz. of product; 2 oz. of packaging material

   product weight: _____

   E) 22 oz. of product; 4 oz. of packaging material

   product weight: _____

Activity 10 - Decimal Place Values/Reading and Writing Decimals

Objective(s): This activity will enable participants to identify decimal place values and to read and write decimals.

Materials Required:
Pencil

You need to know:

1. A decimal is a number which stands for a part of a whole. It is written with a decimal point (.) followed by digits to the right. Each digit to the right of the decimal point stands for less than a whole number.

2. Like whole numbers, the placement of each digit in a decimal number, or its place value, determines the value of the decimal.

3. The decimal point (.) separates the whole number places from the decimal places. Moving to the left of the decimal point, place values increase. Moving to the right of the decimal point, place values decrease.

4. Decimals may be read in two different ways:
   (a) Place Value - Read the value of the entire number and read the decimal point as "and." Use the place value of the last digit in reading the decimal. For example, .4 is read "four tenths"; .04 is read "four hundredths"; .004 is read "four thousandths"; .0004 is read "four ten-thousandths"; and 1.45 is read "one and forty five hundredths".

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

You need to know:

Hundreds	Tens	Ones	Decimal Point	Tenths	Hundredths	Thousandths	Ten Thousandths	Hundred Thousandths	Millionths
			.	4					
			.	0	4				
			.	0	0	4			
			.	0	0	0	4		
		1	.	4	5				

(b) Point Value - Read each digit, reading the decimal point as "point." For example, 1.45 is read "one point four five."

EXAMPLES:

.9 = nine tenths, or point nine

.015 = fifteen thousandths, or point zero one five

12.43 = twelve and forty-three hundredths, or twelve point four three

118.257 = one hundred eighteen and two hundred fifty-seven thousandths, or one hundred eighteen point two five seven

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

Directions: Before starting this exercise, read aloud to the instructor the decimals listed below. Write the place name of the last digit in each decimal in the blank provided. Underline all the digits that represent less than a whole.

(1)	29.3	_____
(2)	679.23	_____
(3)	51.084	_____
(4)	392.19	_____
(5)	500.453	_____
(6)	14.7	_____
(7)	38.22	_____
(8)	142.002	_____
(9)	25.6341	_____
(10)	12.36	_____

Activity 10 - Decimal Place Values/Reading and Writing Decimals (continued)

Directions: Rewrite the numbers below as decimals. When you've completed the exercise, read the decimals aloud to the instructor.

(1) twenty-seven and eight tenths _____

(2) forty-five and sixty-three hundredths _____

(3) nineteen and two hundred forty-two thousandths _____

(4) twenty-five and thirty-four ten thousandths _____

(5) fifty and thirty-three thousandths _____

(6) eighty-one hundredths _____

(7) three and five tenths _____

(8) one hundred thirty-seven thousandths _____

(9) twelve and fifteen thousand six hundred twenty-five hundred-thousandths _____

(10) eight hundred seventy-five ten-thousandths _____

Activity 10 - Decimal Place Values/Reading and Writing Decimals

Directions: Write the following decimals in words.

(1) .8 _____

(2) .09 _____

(3) .378 _____

(4) 10.475 _____

(5) .0028 _____

(6) 8.000326 _____

(7) 19.55 _____

(8) .0041 _____

(9) .000208 _____

(10) 16.013 _____

Activity 11 - Adding Decimals

Objective(s): This activity will enable participants to add decimals.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. A decimal is a number which stands for a part of a whole. It is written with a decimal point (.) followed by digits to the right. Each digit to the right of the decimal point stands for less than a whole number. The decimal point is also used to separate whole numbers from decimals.

2. Decimals are special types of fractions which are used daily. They are often referred to as decimal fractions
   A) Any fraction with a denominator of 10 or a multiple of 10 can be written as a decimal.

   EXAMPLES:

$$\frac{3}{10} = .3, \quad \frac{175}{1000} = .175, \quad \frac{15}{100} = .15$$

   B) Decimal fractions are used every day.

   EXAMPLES:

money system (dollars and cents)	$ 5.95
gallons of gasoline	12.8 gallons
timing of sports events	9.5 seconds
car mileage	7.2 miles

Activity 11 - Adding Decimals (continued)

You need to know:

3. Decimal measurements are used in recording net weights, product moisture, slug weights, product pH, etc. Suppose you were asked to find the total slug weight of six Premium® slugs. Since cracker slugs may be measured in decimal form, you would need to know how to add decimals.

4. Adding decimals is very similar to adding whole numbers. In fact, the only difference between adding whole numbers and adding decimals is the placement of the decimal point.

   EXAMPLE: Add .2 + 6.07 + 1.943 + .005

   A) Write the numbers under each other so that all the decimal points are aligned vertically.

$$\begin{array}{r} .2 \\ 6.07 \\ 1.943 \\ .005 \\ \hline \end{array}$$

Zeros may be added to the numbers so that they all have an equal number of places after the decimal poi... Adding zeros will not change the value of the numbers. Besides, you may follow this practice to avoid errors in addition.

$$\begin{array}{r} .2000 \\ 6.0700 \\ 1.9430 \\ .0050 \\ \hline \end{array}$$

Activity 11 - Adding Decimals (continued)

You need to know:

B) Add each column with the same place value, starting with the column farthest to the right.

If a sum is greater than 9, carry to the column immediately to the left.

```
  .2000
 6.0700
 1.9430
  .0050
 -------
 82180
```

C) Write the decimal point in the answer so that it lines up with the decimal points in the problem.

```
  .2000
 6.0700
 1.9430
  .0050
 -------
 8.2180   Answer
```

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	.6 .5 .1	.3 .2 .4	.9 .7 .8	.1 .4 .7
2.	.2 .4 .6	.3 .5 .7	.4 .6 .8	.5 .7 .9
3.	.10 .15 .20	.12 .14 .16	.19 .17 .14	.13 .16 .18
4.	.11 .32 .54	.15 .28 .45	.22 .73 .47	.19 .37 .51

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.

.4	.9	.1	.8
.7	.5	.6	.4
8.7	4.3	3.2	6.5

2.

9.3	2.3	4.8	7.6
17.7	18.6	16.4	15.2
74.2	62.7	88.5	53.9

3.

76.8	32.5	67.9	35.7
119.42	321.26	392.28	231.09
24.4	29.3	21.8	10.6

4.

3.8	5.7	4.5	3.2
2.1	3.2	1.3	2.5

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	9.3 1.4	2.6 5.3	2.9 8.4	8.3 9.9
2.	3.02 8.3	7.29 5.0	6.55 4.3	4.69 6.4
3.	.41 2.89	.57 4.18	.23 7.08	.64 3.77
4.	.32 9.46	.13 2.06	.47 5.32	.16 4.82

Activity 11 - Adding Decimals (continued)

Directions: Add.

1.	6.6 .81 .056	2.1 .49 .043	8.9 .67 .039	9.2 .10 .500
2.	60.3 2.85 5.77	.870 1.54 725.073	194.7 84.02 9.006	6.57 29.35 1.7
3.	14.6 .73 7.18	24.3 .10 25.67	8.80 7.7 52.3	.223 20.9 57.46
4.	.817 6.465 3.73	62.1 8.97 .973	.526 6.83 3.4	62.1 8.97 .9730

Activity 11 - Adding Decimals (continued)

Directions: Calculate the following sums.

1. 5,342.1 + 367.22 = _____

2. 29 + 32.43 + 236.211 + 10.32 = _____

3. Following are net weights for 18-ounce packages of Chips Ahoy!® What is the total net weight for these six packages?

   Answer: _____ounces

   17.9 18.2 18.4 18.7 18.5 18.8

4. Following are the net weights for 13.5-ounce boxes of Cheese Nips®. What is the total net weight for these 4 boxes?

   Answer: _____ounces

   13.383 13.501 13.496 13.023

5. Following are the slug weights for six Chips Ahoy!® slugs. What is the total weight of the slugs?

   Answer: _____grams

   255.3 249.1 254.6 264.4 257.8 261.7

Activity 12 - Rounding Decimals

Objective(s): This activity will enable participants to round decimals to the nearest tenth, hundredth, and thousandth place.

Materials Required:
Pencil

You need to know:

1. Decimals are often rounded off, especially when working with measurements. In fact, the steps for rounding off decimals are the same as those used for rounding off whole numbers.

2. HOW TO ROUND DECIMALS
   A) Identify the digit just to the right of the place to which you are rounding.

   B) If this digit is less than 5, drop it (and all the digits to its right, if applicable).

   C) If the digit is 5 or more, add 1 to the digit in the place to which you are rounding.

3. EXAMPLE:

   Suppose you were asked to round the net weight of a carton of Premiums® to the nearest tenth (16.65 ounces).

   The digit just to the right of the place to which you are rounding is 5 (16.65 ounces).

   If this digit is less than 5 (16.64 ounces), drop it (and all the digits to its right, if applicable).
   16.64 = 16.6 ounces (answer)

   Since this digit is at least 5 (or more), add 1 to the digit in the place to which you are rounding.
   16.65 ounces = 16.7 ounces (answer)

Activity 12 - Rounding Decimals

Directions: Round the numbers as indicated below.

1. Round the net weight of this product to he nearest tenth.

   16.37 ounces _____ounces

2. Round the product moisture to the nearest tenth and the nearest hundredth.

   4.172% _____%

   _____%

3. Round the slug weight to the nearest tenth and the nearest one.

   254.65 grams _____grams

   _____grams

4. Round the following number to the nearest ten thousandth, thousandth, and hundredth.

   .01525 _____

   _____

   _____

Activity 12 - Rounding Decimals

Directions: Round the following decimals to the nearest tenth:

1)	4.57	_____
2)	2.52	_____
3)	1.85	_____
4)	12.04	_____
5)	.68	_____

Directions: Round the following decimals to the nearest hundredth:

6)	9.048	_____
7)	7.563	_____
8)	2.497	_____
9)	3.299	_____
10)	.485	_____

Directions: Round the following decimals to the nearest thousandth.

11)	5.1836	_____
12)	7.4889	_____
13)	1.6378	_____
14)	.2546	_____
15)	.1168	_____

Activity 13 - Subtracting Decimals

Objective(s): This activity will enable participants to subtract decimals.

Materials Required:
Pencil
Scratch Paper

You need to know:

1. Write the larger number on top and line up the decimal points one under the other.

   EXAMPLE

   19.7 - .169

   ```
    19.7
   .169
   ```

2. Add zeros to the right of the decimal point so that each decimal has the same number of places. The top number should have the same number of decimal places as the bottom.

   ```
   19.700 (minuend)
   -  .169 (subtrahend)
   ```

3. Subtract as you would for the whole numbers and bring down the decimal point in the difference. This decimal point should be aligned under the other decimal points.

   ```
   19.700
   -  .169
   ------
   19.531 (difference or answer)
   ```

Activity 13 - Subtracting Decimals

Directions: Find the differences in the problems below.

(1) 6.2 - 3.76 = _____

(2) 45.92 - 23.07 = _____

(3) 5 - 2.493 = _____

(4) 382 - 46.20 = _____

(5) 12 - .936 = _____

(6) 835.091 - 482.320 = _____

(7) 3.2 - .1986 = _____

(8) 78 - 35.83 = _____

(9) 29.34 - 16.52 = _____

(10) .07 - .002 = _____

(11) 1 - .047 = _____

(12) .47 - .3992 = _____

(13) 9.3 - .764 = _____

(14) 963.857 - 241.534 = _____

Activity 13 - Subtracting Decimals

Directions: Find the difference in the following problems.

1. 93.7 - 39.48 = _____

2. 3,724.266 - 859.001 = _____

3. Calculate the net weight of a box of Better Cheddars®:
   Total package weight (ounces): 9.86; Tare weight (ounces): 1.3

   Net weight: _____

4. Calculate the net weight of a box of Honey Maid Graham Crackers®:
   Total package weight (ounces): 17.6; Tare weight (ounces): 1.28

   Net weight: _____

5. Suppose the wet weight of a Premium® cracker sample is 89.8 grams. The dry weight is 86.45 grams. What is the difference between the wet and dry weights?

   _____

6. On Thursday, shift 1 produced 646.99 pounds of B&R and shift 2 produced 972.5 pounds. How much more B&R was produced by shift 2 than by shift 1?

   _____

7. The average number of Oreo® units produced per day on shift 1 is 4,000.58. The average number of Oreo® units produced per day on shift 2 is 3,895.6. On average, how many more units does shift 1 produce than shift 2?

Activity 14 - Comparing Decimals

Objective(s): This activity will enable participants to compare decimals.

Materials Required:
Pencil

You need to know: To compare decimals.....

1. Compare the digits to the left of the decimal point as whole numbers. If one whole number is larger, then that decimal is larger.

   EXAMPLE Compare: 427.36 with 425.263

   427 is larger than 425; therefore 427.36 is larger than 425.263.

2. When the whole numbers in decimals are equal, compare the first digit to the right of the decimal point. If one digit is larger, then that decimal is larger.

   You may give each decimal compared the same number of places by writing in zeros, if necessary. By using zeros as placeholders, you are giving each decimal a common denominator.

   EXAMPLE Compare: 18.331 with 18.47
   (18.331 with 18.470)

   The whole numbers are identical (18 and 18). Four (4) is larger than 3; therefore, 18.47 is larger than 18.331.

3. If the digits in the first place to the right of the decimal point (tenths) are the same, then compare the next place to the right (hundredths). If one digit is larger, then that decimal is larger.

   EXAMPLE Compare: 1.486 with 1.49
   (1.486 with 1.490)

   The whole numbers are identical (1 and 1). The digits in the first place to the right of the decimal point are the same (4 and 4). Nine (9) is larger than 8; therefore, 1.49 is larger than 1.486.

Activity 14 - Comparing Decimals

Directions: Write the larger decimal of each pair in the blank below.

(1)	.502	.52	_____
(2)	.17	.21	_____
(3)	.6	.06	_____
(4)	.400	.500	_____
(5)	.30	.90	_____
(6)	.4	.45	_____
(7)	.57	.06	_____
(8)	.7	.2	_____
(9)	.14	.41	_____
(10)	.83	.8	_____

Activity 15 - Calculating Range Using Decimals

Directions: Circle the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	17.8	17.08	17.1	17.11	_____
B)	43	43.1	40	43.01	_____
C)	234.9	234.19	233	234	_____
D)	16.91	17.1	16.98	17.09	_____
E)	23.16	22.93	23.61	23.094	_____
F)	18.33	18.32	18.28	18.23	_____
G)	51.98	51.	51.9	51.89	_____
H)	46.7	46.71	46.75	46.78	_____
I)	19.75	19.80	20.00	19.85	_____
J)	34.99	34.9	35	35.72	_____

Activity 15 - Calculating Range Using Decimals

Directions: Circle the largest and the smallest number in each row below. Calculate the range of each row of numbers and write your answer in the blank.

					Range
A)	16.8	16.08	15.1	15.11	_____
B)	16.3	16.1	15.8	15.9	_____
C)	19.85	20.00	19.75	20.71	_____
D)	243.7	243.17	242.00	243.00	_____
E)	41.0	41.3	40.0	41.6	_____
F)	6.8	7.2	6.9	7.6	_____
G)	1.6	1.2	.8	1.0	_____
H)	3.07	3.04	3.09	3.03	_____
I)	15.85	15.90	16.05	16.25	_____
J)	19.2	19.8	20.4	20.8	_____

Activity 16 - Multiplying Decimals

Objective(s): This activity will enable participants to multiply decimals.

Materials Required:
Pencil
Scratch Paper

You need to know: To multiply decimals, follow the steps below...

1. Line up the numbers one under the other for ease in multiplying. You may ignore the decimal places until you have found the product (number obtained by multiplying).

2. Multiply the decimals just as you would multiply whole numbers.

3. Count the number of decimal places in the numbers you have multiplied. Remember that whole numbers have 0 decimal places.

4. Starting from right to left, count off the same number of decimal places in the product. Place a decimal point in the product.

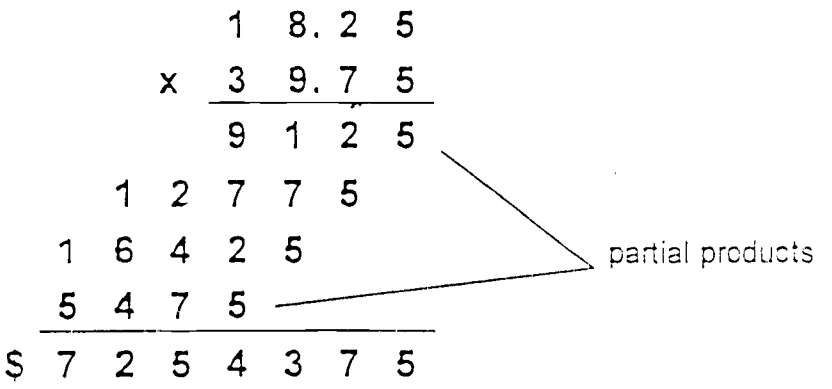
EXAMPLE

Suppose you are a packing technician employed by Nabisco and you want to compute your wages for a particular week. You earn $ 18.25 per hour and worked 39.75 hours. By multiplying the hourly rate by the number of hours worked, you can compute your pay for the week.

$ 18.25	hourly rate
x 39.75	hours worked

Activity 16 - Multiplying Decimals (continued)

You need to know:



	$ 18.25	2 decimal places
	x 39.75	+ 2 decimal places
product	$ 725.4375	4 decimal places
	($ 725.44)	

5. To multiply decimals by 10, 100, or 1,000...
   a. count the number of zeros in 10, 100, or 1,000.
   b. move the decimal point to the right as many places as there are zeros in 10, 100, or 1,000.
   c. write in additional ending zeros, if necessary.
   d. remember that a whole number is understood to have a decimal point at its right.

Activity 16 - Multiplying Decimals

(1) Directions: Find the following products.

1. 1.14 x .8 = .912

2. .23 x .47 = .1081

3. 6.59 x .701 = 4.61959

4. Suppose you make $16.75 per hour. Last week you worked 39.5 hours. What will be your gross wages for the week?

   $ 661.625 ($ 661.63)

5. The net weight of a box of crackers is 13.5 ounces. Assuming that all boxes have the same net weights, how much will 12 boxes weigh?

   162 ounces

If you have less than 4 correct, see your instructor for additional help.

Activity 16 - Multiplying Decimals

(2) Directions: Multiply.

1.	34.7 x 8	2.89 x 7	.551 x 6	60.3 x 9	7.18 x 4
2.	3.8 x 4	.92 x 9	6.7 x 6	5.3 x 8	.84 x 7
3.	41 x .03	78 x .5	59 x .09	86 x .4	19 x .06

Activity 16 - Multiplying Decimals

(3) Directions: Find the products in the problems below.

1.	.09 x .6	.05 x .7	.004 x .3	.08 x .04	.002 x .8
2.	2.8 x 4.3	5.6 x .82	.72 x 5.7	.81 x .69	.94 x 1.8
3.	41.8 x .7	3.90 x .08	.516 x .5	73.8 x .06	3.47 x .4

Activity 16 - Multiplying Decimals

(4) Directions: Multiply.

1.	5.6 x .2	.73 x .08	9.2 x .7	.087 x .4	3.3 x .06
2.	30.5 x .27	7.40 x 6.6	61.8 x 4.8	.514 x .91	9.06 x 7.3
3.	906 x .07	504 x.002	783 x .8	652 x .06	.467 x.003

Activity 16 - Multiplying Decimals

(5) Directions: Multiply.

1.	.02 x .8	.25 x .04	1.2 x .008	.073 x .05
2.	14.21 x 35	.216 x .24	17.7 x 2.5	3.2 x 87
3.	547.1 x .73	3.07 x 731	17.39 x 12.4	1.754 x .23
4.	4.08 x.0017	.0125 x .315	.468 x.1302	.12121 x .03

Activity 16 - Multiplying Decimals

(6) Directions: Multiply.

1.	17.32 x .16	.0648 x 2.3	913.2 x .049	40.21 x 20.8
2.	45.21 x 5.6	3.748 x 73	206.9 x .28	.7488 x 4.9
3.	.2789 x .17	3.845 x 29.2	5183.6 x .0016	303.003 x 56.8

Activity 16 - Multiplying Decimals (continued)

You need to know:

EXAMPLES

45. 8 x 10	=	45.8	=	458.
45.8 x 100	=	45.80	=	4,580.
45.8 x 1,000	=	45.800	=	45,800
.136 x 10	=	.1 36	=	1.36
.136 x 100	=	.13 6	=	13.6
.136 x 1,000	=	.136	=	136.

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(7) Directions: Use the shortcut to multiply each of the following problems.

1. 10 x 7.6 = _____
2. 100 x .013 = _____
3. 10 x 7.64 = _____
4. 10 x .013 = _____
5. 10 x .7839 = _____
6. 100 x .002 = _____
7. 1,000 x .7839 = _____
8. 10 x .9084 = _____
9. 1,000 x .7839 = _____
10. 1,000 x 908.4 = _____
11. 10 x 7.9 = _____
12. 100 x 90.84 = _____

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(8) Directions: Multiply each of the following problems using the shortcut.

1. .2 x 10 = _____
2. 45.06 x 100 = _____
3. 72.4 x 100 = _____
4. .35 x 10 = _____
5. .539 x 100 = _____
6. .457 x 1,000 = _____
7. .05 x 100 = _____
8. 42.4 x 100 = _____
9. 83.73 x 1,000 = _____
10. 2.97 x 100 = _____
11. 22.8 x 1,000 = _____
12. .9 x 1,000 = _____

Activity 16 - Multiplying Decimals By 10, 100, or 1,000

(9) Directions: Multiply each of the following problems using the shortcut.

1)	.34 x 10 =	1.24 x 100 =	3.85 x 1,000 =
2)	.03 x 100 =	.275 x 100 =	8.9 x 100 =
3)	.8 x 10 =	.09 x 10 =	3.64 x 10 =
4)	.9 x 1,000 =	2.36 x 1,000 =	.475 x 1,000 =
5)	.06 x 1,000 =	.863 x 100 =	.721 x 10 =
6)	1.6 x 1,000 =		

Cluster
Applied Math

Activity 17 - Dividing Decimals By Whole Numbers

Objective(s): This activity will enable participants to divide decimals by whole numbers.

Materials Required:
Pencil
Scratch Paper

You need to know: To divide decimals by whole numbers...

1. Place the decimal point up in the quotient (answer) directly above its position in the dividend (problem).

<u>EXAMPLE</u>

$$5\overline{)\,2\;2\,.\,4}$$

$$\downarrow$$

$$\begin{array}{r} . \\ 5\overline{)\,2\;2\,.\,4} \end{array}$$

2. Divide as you would whole numbers until all digits of the dividend have been used.

$$\begin{array}{r} 4\,.4 \\ 5\overline{)\,2\;2\,.4} \\ \underline{2\;0} \\ 2\;4 \\ \underline{2\;0} \\ 4 \end{array}$$

Activity 17 - Dividing Decimals By Whole Numbers (continued)

4. Suppose you were asked to calculate the average machine downtime for each of the 7 production lines in the Richmond bakery on a given day. You would divide the total downtime hours by the number of lines. Round the answer to the nearest hundredth.

EXAMPLE

$7\overline{)28.6}$

Total Machine Downtime Hours	28.6
Number Of Lines	7

$$\begin{array}{r} 4.085 \\ 7\overline{)28.60} \\ 28 \\ \hline 60 \\ 56 \\ \hline 40 \\ 35 \\ \hline 5 \end{array} = 4.09 \quad \text{Answer}$$

5. To divide decimals by 10, 100, or 1,000...
   a. count the number of zeros in 10, 100, or 1,000.
   b. move the decimal point to the left as many places as there are zeros in 10, 100, or 1,000.
   c. write in additional ending zeros, if necessary.

4.63 ÷ 10 = .4 63 = .463

29.5 ÷ 100 = 2 9 5 = .295

.075 ÷ 1,000 = 0 0 0 075 = .000075

Activity 17 - Dividing Decimals By Whole Numbers (continued)

You need to know:

3. Write the remainder over the divisor as a fraction.

$$
\begin{array}{r}
4.4\,\tfrac{4}{5} \\
5\overline{)\,22.4} \\
20 \\
\hline
24 \\
20 \\
\hline
4
\end{array}
$$

OR

Divide further by adding ending zeros.

$$
\begin{array}{r}
4.48 \\
5\overline{)\,22.40} \\
20 \\
\hline
24 \\
20 \\
\hline
40 \\
40 \\
\hline
\end{array}
$$

Activity 17 - Dividing Decimals By Whole Numbers

(1) Directions: Find the quotients in the problems below.

1. $3\overline{).27}$ $2\overline{).492}$ $27\overline{)85.32}$ $12\overline{).150}$

2. $5\overline{).45}$ $6\overline{)36.12}$ $34\overline{)356.32}$ $8\overline{).526}$

3. $8\overline{).56}$ $12\overline{)74.76}$ $64\overline{)58.56}$ $76\overline{)12.54}$

Activity 17 - Dividing Decimals By Whole Numbers

(2) Directions: Find the quotients in the problems below.

1.	$8\overline{).192}$	$3\overline{)148.8}$	$5\overline{)19.45}$	$4\overline{)2.524}$
2.	$6\overline{)13.8}$	$9\overline{)70.2}$	$4\overline{).384}$	$7\overline{)57.75}$
3.	$16\overline{)76.8}$	$21\overline{)7.56}$	$19\overline{)1.52}$	$38\overline{)216.6}$
4.	$52\overline{)9.516}$	$43\overline{)1565.2}$	$77\overline{)464.31}$	$65\overline{)33.605}$

Activity 17 - Dividing Decimals By 10, 100, or 1,000

(3) Directions: Find the quotients using the shortcut.

1. .62 ÷ 10 = _____ 5.74 ÷ 100 = _____

2. .3 ÷ 10 = _____ 12.09 ÷ 100 = _____

3. .08 ÷ 100 = _____ .834 ÷ 100 = _____

4. 21.6 ÷ 100 = _____ 38.6 ÷ 1,000 = _____

5. 84.7 ÷ 100 = _____

Activity 17 - Dividing Decimals By 10, 100, or 1,000

(4) Directions: Find the quotients using the shortcut.

1. $7.7 \div 10 =$ _____ $.14 \div 10 =$ _____

2. $52.9 \div 100 =$ _____ $64.7 \div 1{,}000 =$ _____

3. $.239 \div 1{,}000 =$ _____ $58.09 \div 1{,}000 =$ _____

4. $8.306 \div 100 =$ _____ $50.73 \div 1{,}000 =$ _____

5. $.4 \div 1{,}000 =$ _____

Activity 18 - Dividing Decimals By Decimals

Objective(s): This activity will enable participants to divide decimals by decimals.

Materials Required:
Pencil
Scratch Paper

You need to know: To divide decimals by decimals...

1. Make the divisor a whole number by moving the decimal point to the right as far as it will go.

   EXAMPLE

   $7.5\overline{)2.25}$ $\qquad$ $7.5\overline{)2.25}$

2. Move the decimal point in the divident the same number of places to the right that you moved the point in the divisor.

   $7.5\overline{)2.25}$

3. Place a decimal point in the quotient directly above its new position in the dividend.

   $7.5\overline{)2.25}$

Activity 18 - Dividing Decimals By Decimals (continued)

You need to know:

4. Divide as you would divide a decimal by a whole number.

$$\begin{array}{r} .3 \\ 75\overline{)22.5} \\ 225 \end{array}$$

5. Sometimes it is necessary to add ending zeros to the dividend in order to have enough places to move the decimal point. Create the same number of places in the dividend as are in the divisor. Continue dividing until quotient has as many places as are required for the answer.

EXAMPLE

$$.008\overline{)44.8}$$

$$\begin{array}{r} 5600. \\ .008\overline{)44.800} \\ 40 \\ \hline 48 \\ 48 \\ \hline 0 \\ 0 \\ \hline 0 \\ 0 \end{array}$$

Activity 18 - Dividing Decimals By Decimals (continued)

6. To check your answers, multiply the quotient by the original divisor (the decimal). You should get the dividend.

CHECK

5600	quotient
x .008	original divisor
44.800	dividend

Activity 18 - Dividing Decimals By Decimals

(3) Directions: Find the quotients in tne problems below.

1. $.8\overline{)7.68}$ $.7\overline{)26.6}$

2. $4.1\overline{)1.148}$ $9.2\overline{)128.8}$

3. $.06\overline{)0.882}$ $.28\overline{).5404}$

4. $8.7\overline{).522}$ $.19\overline{).3933}$

Activity 18 - Dividing Decimals By Decimals

(4) Directions: Find the quotients in the problems below. Check your answers.

1. $.007\overline{)5.32}$ $.009\overline{)4.32}$

2. $.016\overline{)212.8}$ $.025\overline{).1}$

3. $.003\overline{)8.1}$ $.008\overline{)77.12}$

4. $.091\overline{)55.52}$ $.68\overline{)57.8}$

Activity 18 - Dividing Decimals By Decimals

(5) Directions: Divide and check.

1. $.0018\overline{)1.683}$ $.0073\overline{)15.184}$

2. $.0024\overline{).78}$ $.0006\overline{)42.84}$

3. $.008\overline{)4.48}$ $.06\overline{)558.6}$

4. $.32\overline{)156.8}$ $45\overline{)1381.5}$

Activity 18 - Dividing Decimals By Decimals

(2) Directions: Find the quotients in the problems below.

1. $.6\overline{)0.42}$ $.4\overline{)2.76}$

2. $5.3\overline{)4.399}$ $3.2\overline{)0.288}$

3. $.75\overline{)453.75}$ $.52\overline{)6.656}$

4. $3.6\overline{)145.44}$ $.64\overline{).11648}$

Activity 18 - Dividing Decimals By Decimals

(1) Directions: Find the quotients in the problems below.

1. $.4\overline{).8}$ $.07\overline{)4.921}$ $.25\overline{)16.5}$ $4.4\overline{)82.28}$

2. $.15\overline{).45}$ $.6\overline{)72.18}$ $.06\overline{)3.6}$ $.08\overline{)170.4}$

3. $.12\overline{)1.56}$ $1.04\overline{)93.8}$ $6.8\overline{)44.2}$ $3.8\overline{)62.7}$

Activity 19 - Calculating Percent of Oil

All ingredients in a product must be added in the amount specified by the master recipe. By doing so, consistency is maintained in the product and the product complies with labeling information provided for the consumer.

For instance the correct amount of spray oil on a product must be monitored. To perform this calculation you need to take weights, read the scale, subtract, divide, and multiply.

Step 1:
Record the dry weight of the product

Step 2:
Record the wet weight of the product (after the oil spray machine)

Step 3:
Subtract the dry weight from the wet weight

Step 4:
Divide the wet weight into the answer for step 3

Step 5:
Multiply your answer by 100. The answer is the percent of oil in that sample.

Now try the following:

	Wet Wt.	Dry Wt.	% Oil
1.	50	45	
2.	69	63	
3.	100	90	
4.	112	110	

Activity 20 - Calculating Cubic Footage

When working in Environmental Services, an employee must sometimes spray designated areas to prevent infestation. The chemicals must be used according to the label directions for the amount of space to be sprayed. Therefore, the cubic footage of the area to be sprayed must be determined.

To calculate cubic footage you must be able to measure width, length, height and then multiply.

If a room measures 70 feet by 80 feet and is 20 feet high, you multiply.
70 X 80 X 20 = 112,000 cubic feet.

Find the cubic footage of the following rooms.

Room A measures
100 ft. long, 45 ft. wide, 25 feet tall _____cu. ft.

Room B measures
12 ft. wide, 15 ft. long, 8 ft. tall _____cu. ft.

Room C measures
35.5 ft. long, 22.25 ft. wide, 12 ft. tall _____cu. ft.

Activity 21 - Calculating Sprays

An Environmental Services employee must sometimes use a spraying device for tasks such as administering pesticides. How much liquid you put in the spraying device is determined by the label directions and the amount of area or space to be sprayed.

First, you must calculate the space as you did in the previous activity. Next, you follow label directions, using division to calculate the amount of liquid to pour into the tank.

For instance, if the area to be sprayed is 10,000 cubic feet, and one gallon sprays 5,000 cubic feet, you will need 2 gallons, because

10,000 ÷ 5,000 = 2

Use the room measurements in the previous activity to calculate how many gallons of liquid will be needed if one gallon is necessary for 1000 cubic feet.

Room A _____gallons

Room B _____ gallons

Room C _____ gallons

Cluster_____

Activity 1: Learning Military Time

Objective (s): This activity will enable participants

1. To become familiar with military time (24 hour clock time)

2. To understand how military time is organized

Materials Used: Pencils, Paper
Military Time Reference Sheet

You Need to Know:

In grade school we were all very proud when we learned how to tell time. We learned the purpose of the minute and hour hands on a regular manual clock. Then the digital display clocks came along and made it even easier for us to tell time.

However, there is another way to express the time of day and that is in military time. Military time denotes the number of hours into a new day and adds "hundred" as a suffix. For example, 12 noon, midday is expressed as 1200 hours - 12 hours into a new day followed by the phrase "hundred hours."

Many companies require that their employees use a "time-clock" that records hours worked in military time. Various areas of the Nabisco Facility use military time. For example, the Mixing Department uses this 24-hour clock method to calculate lay time, which is the time between the mixing and dumping of the dough. On the following page you will find a **Military Time Reference Sheet** that shows the equivalent conventional time. Take a few moments to review that sheet.

MILITARY TIME REFERENCE SHEET

	Conventional Time		Military Time
AM	12:00	midnight	2400 hours
	12:01	1-minute past midnight	0001 hours
	12:10	10 minutes past midnight	0010 hours
	1:00	1-O'clock in the morning	0100 hours
	2:00	2-O'clock in the morning	0200 hours
	2:30	2:30 in the morning	0230 hours
	3:00	3-O'clock in the morning	0300 hours
	4:00	4-O'clock in the morning	0400 hours
	5:00	5-O'clock in the morning	0500 hours
	6:00	6-O'clock in the morning	0600 hours
	7:00	7-O'clock in the morning	0700 hours
	8:00	8-O'clock in the morning	0800 hours
	9:00	9-O'clock in the morning	0900 hours
	10:00	10-O'clock in the morning	1000 hours
	11:00	11-O'clock in the morning	1100 hours
PM	12:00	noon, midday	1200 hours
	12:18	18-minutes past noon	1218 hours
	12:45	45-minutes past 12 noon	1245 hours
	1:00	1-O'clock in the afternoon	1300 hours
	1:05	5-minutes after 1 p.m.	1305 hours
	2:00	2-O'clock in the afternoon	1400 hours
	3:00	3-O'clock in the afternoon	1500 hours
	4:00	4-O'clock in the afternoon	1600 hours
	5:00	5-O'clock in the afternoon	1700 hours
	6:00	6-O'clock in the afternoon	1800 hours
	7:00	7-O'clock in the evening	1900 hours
	8:00	8-O'clock in the evening	2000 hours
	9:00	9-O'clock in the evening	2100 hours
	10:00	10-O'clock in the evening	2200 hours
	11:00	11-O'clock in the evening	2300 hours
	11:03	3-minutes past 11 at night	2303 hours
	11:22	22-minutes past 11 at night	2322 hours
	11:47	47 minutes past 11 at night	2347 hours

Activity 2 - Working with the Military Time Reference Sheet

Objective (s): This activity will enable participants

1. To become familiar with military time

2. To understand how military time is organized

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Look at the Military Time Reference Sheet. Observe the progression of the time and hours. For example, 12 noon by conventional time is the same as 1200 (12-hundred) hours in military hours. Locate that time on your reference sheet. The next time on the sheet is 12:18 p.m. or 1218 hours (18 minutes after 12 noon). Now complete the worksheet below by writing in the missing information. You may use your reference sheet.

Military Time Worksheet

Conventional Time		Military Time
AM 12:00	midnight	2400 hours
12:01	1-minute past midnight	
12:10	10 minutes past midnight	0010 hours
1:00	1-O'clock in the morning	
2:00	2-O'clock in the morning	0200 hours
2:30	2:30 in the morning	
3:00	3-O'clock in the morning	0300 hours
4:00	4-O'clock in the morning	
5:00	5-O'clock in the morning	
6:00	6-C'clock in the morning	0600 hours
7:00	7-O'clock in the morning	
8:00		
9:00	9-O'clock in the morning	0900 hours
10:00	10-O'clock in the morning	
11:00	11-O'clock in the morning	1100 hours

Activity 2 Continued...

Military Time Worksheet

Conventional Time			Military Time
PM	12:00	noon, midday	1200 hours
	12:18	18-minutes past noon	
	12:45	45-minutes past 12 noon	1245 hours
	1:00	1-O'clock in the afternoon	
	1:05	5-minutes after 1 p.m.	1305 hours
	2:00	2-O'clock in the afternoon	
	3:00		
	4:00	4-O'clock in the afternoon	1600 hours
	5:00	5-O'clock in the afternoon	
	6:00	6-O'clock in the afternoon	1800 hours
	7:00	7-O'clock in the evening	
	18:00	8-O'clock in the evening	2000 hours
	9:00		
	10:00	10-O'clock in the evening	2200 hours
	11:00	11-O'clock in the evening	
	11:03	3-minutes past 11 at night	
	11:22	22-minutes past 11 at night	2322 hours
	11:47		

Activity 3 - Translating Conventional Time to Military Time

Objective (s): This activity will enable participants

1. To record military time

2. To translate conventional time to military time

Materials Used: Pencils, Paper
Military Time Reference Sheet

Directions

Write the correct military time in the blank spaces.

A. **Military Time Translation**

Conventional Time		Military Time
AM	12:00	_____
	12:01	_____
	12:10	_____
	1:00	_____
	2:30	_____
	11:00	_____

B. Military Time Translation

Conventional Time		Military Time
PM	12:00	_____
	12:10	_____
	1:00	_____
	2:00	_____
	4:17	_____
	11:00	_____

Activity 4 - Using Military Time in the Workplace

Objective (s): This activity will enable participants

1. To record military time

2. To translate conventional time to military time

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Read the work schedule below and write in the military time for the hours sanitation employees must clean the locker rooms and lounges each day. Write the military time in the spaces provided. Use your military reference sheet, if necessary.

Work Schedule

	Military Time
First Shift	
7:30 a.m.	_____
9:30 a.m.	_____
11:00 a.m.	_____
1:00 p.m.	_____
2:30 p.m.	_____

Activity 4 - Using Military Time in the Workplace

Second Shift

3:30 p.m. _____

5:30 p.m. _____

7:30 p.m. _____

9:00 p.m. _____

10:30 p.m. _____

Third Shift

11:30 p.m. _____

1:30 a.m. _____

3:30 a.m. _____

5:30 a.m. _____

6:30 a.m. _____

Activity 5 - Recording Military Time

Objective (s): This activity will enable participants

1. To record military time
2. Translate military time to conventional time

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Read the paragraphs below and write in the military time translation for the conventional time noted.

1. Clara plans to purchase a car at Nicker's Chevrolet today. She is going to meet John at 2:35 p.m. at the dealership. How is 2:35 p.m. expressed in military time?_____.

2. It took 10 hours to produce a cookie. If John started at 7:00 a.m., what time did he finish the process? Write the time he started and the completion time in military time. Start time:_____; Completion time: _____.

3. Jack is interviewing six people for jobs in the bakery. He intends to spend one hour with each person. Jack does not know military time. Help Jack by changing the military time to conventional time.

0900 hours _____

1100 hours _____

1400 hours _____

1800 hours _____

1900 hours _____

2100 hours _____

Activity 6- Using flash cards to learn military time

Objective (s): This activity will enable participants

1. To practice the use of military time
2. To Translate conventional time into military time

Materials Used: Pencils, Paper, Military Time Flash Cards

Directions

Ask your facilitator for a set of flash cards. Take one card from the stack and look at each side. Please note that one side has the conventional time and the other side has the military time. Use the flash cards to challenge yourself. You will need a blank sheet of paper to write your answers. Now, take another card from the stack. Look at the conventional side of the card. Do not look at the nswer on the military side. Write your answers on your sheet of paper. Continue this process until you have selected at least 20 cards. Then check your answers.

Activity 7 - Recording Military Time

Objective (s): This activity will enable participants

1. To record military time
2. Translate conventional time into military time
3. Practice using military time to complete work tasks

Materials Used: Pencils, Paper, Military Time Reference Sheet

Directions

Read the paragraph and write in the military time for the conventional time. Write the translation in the parenthesis provided. Do not use your military reference sheet.

John is a worker in the Mixing Department. On Tuesday, he reports to that department at 5:00 a.m. (_____**hours**). However, he was late and he clocked in at 5:30 a.m. (_____**hours**).

After talking to his supervisor for one half-hour. He actually started work at 6:00 a.m. (_____**hours**). His task for the day was to mix dough for Vanilla Wafers. He takes one-hour to mix the dough. It is now 7:00 a.m. (_____**hours**). According to his procedures, the dough must stand for six hours before it is dumped. The dough will be dumped at 1:00 p.m. (_____**hours**).

John Miller clocks out at that time. Therefore, Mary will dump the dough. Mary dumped the dough on time. Then she went to on break at 2:30 p.m. (_____**hours**). She returned at 2:45 p.m. (_____**hours**).

Mary took her lunch break at 4:30 p.m. (_____**hours**). She returned at 5:30 p.m. (_____**hours**). At 8:30 p.m., _____**hours**) Mary's day came to an end. She clocked out. It took her 20 minutes to get home. She arrived at home at 8:50 p.m. (_____**hours**).

On Wednesday, Mary will work the third shift. She must report to work at 11:00 p.m. (_____**hours**). John will work the second shift. He reports to work at 3:00 p.m. (_____**hours**). He intends to be on time. So, he leaves home one hour early. John will leave home at 2:00 p.m. (_____**hours**).

ANSWER SHEET

Exercise 2: Military Time Worksheet (Answers in bold print)

	Conventional Time	Military Time
AM	12:00 midnight	2400 hours
	12:01 1-minute past midnight	0001 hours
	12:10 10 minutes past midnight	0010 hours
	1:00 1-O'clock in the morning	0100 hours
	2:00 2-O'clock in the morning	0200 hours
	2:30 2:30 in the morning	0230 hours
	3:00 3-O'clock in the morning	0300 hours
	4:00 4-O'clock in the morning	0400 hours
	5:00 5-O'clock in the morning	0500 hours
	6:00 6-O'clock in the morning	0600 hours
	7:00 7-O'clock in the morning	0700 hours
	8:00 8-O'clock in the morning	0800 hours
	9:00 9-O'clock in the morning	0900 hours
	10:00 10-O'clock in the morning	1000 hours
	11:00 11-O'clock in the morning	1100 hours
PM	12:00 noon, midday	1200 hours
	12:18 18-minutes past noon	1218 hours
	12:45 45-minutes past 12 noon	1245 hours
	1:00 1-O'clock in the afternoon	1300 hours
	1:05 5-minutes after 1 p.m.	1305 hours
	2:00 2-O'clock in the afternoon	1400 hours
	3:00 3-O'clock in the afternoon	1500 hours
	4:00 4-O'clock in the afternoon	1600 hours
	5:00 5-O'clock in the afternoon	1700 hours
	6:00 6-O'clock in the afternoon	1800 hours
	7:00 7-O'clock in the evening	1900 hours
	18:00 8-O'clock in the evening	2000 hours
	9:00 9-O'clock in the evening	2100 hours
	10:00 10-O'clock in the evening	2200 hours
	11:00 11-O'clock in the evening	2300 hours
	11:03 3-minutes past 11 at night	2303 hours
	11:22 22-minutes past 11 at night	2322 hours
	11:47 47 minutes past 11 at night	2347 hours

Activity 3a. 2400 hours, 0001 hours, 0010 hours, 0100 hours, 0230 hours, 1100 hours.

Activity 3b. 1200 hours, 1210 hours, 1300 hours, 1400 hours, 1617 hours, 2300 hours

Activity 4. First Shift: 0730 hours, 0930 hours, 1100 hours, 1300 hours, 1430 hours. Second Shift: 1530 hours, 1730 hours, 1930 hours, 2100 hours, 2230 hours. Third Shift: 2330 hours, 0130 hours, 0330 hours, 0530 hours, 0630 hours.

Activity 5. 1. 1435 hours 2. started at 0700 hours (7:00 a.m.), finished at 1700 hours (5:00 p.m.). 3. 9:00 a.m., 11:00 a.m., 2:00 p.m., 6:00 p.m. 7:00 p.m.,9:00 p.m.

Activity 6. Flash Cards. See answers on back of flash cards.

Activity 7. 0500 hours, 0530 hours, 0600 hours, 0700 hours, 1300 hours, 1430 hours, 1445 hours, 1630 hours, 1730 hours, 2030 hours, 2050 hours, 2300 hours, 1500 hours, and 1400 hours.

Graph Comprehension

Activity 1 - Understanding the Purpose and Use of Graphs

Objective (s): Participants will be able to

1. Become familiar with the purpose of graphs
2. Become familiar with the different types of graphs

Material Needed: Pencil

<u>You Need to Know</u>:

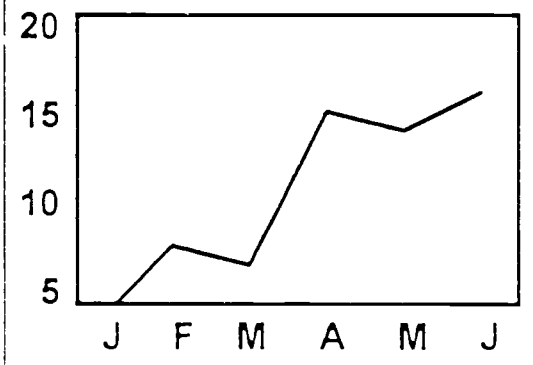
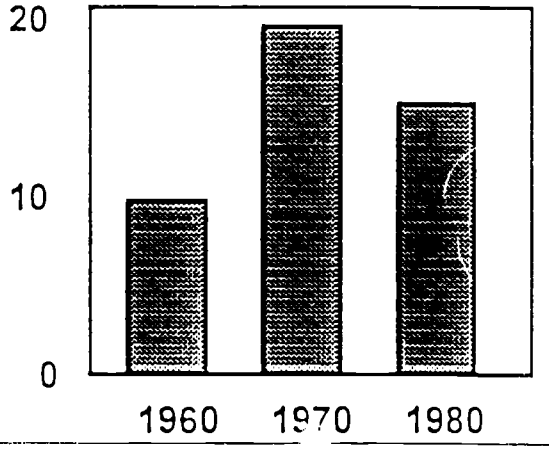
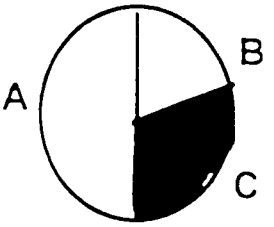
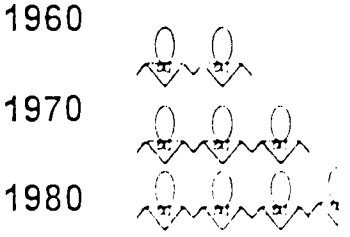
As we go about our everyday activities, we find it necessary to read charts, tables, and other graphic displays to gain information. For example, at the grocery store, we read nutrition facts tables on the back of cereal boxes. Likewise, at the Nabisco Facility employees read control charts, time charts, dials, gauges, thermometers and etc.

Photographs, drawings, cartoons, graphs, charts, diagrams, tables, and maps appear in all kinds of materials today. All of the visual aids mentioned above help us to understand and receive information. Graphs are used to show how number values relate. They are used in business reports, magazines, and even on television during the weather report. **Therefore, graphs are visual representations of information that show comparisons and relationships**.

The purpose of graphs is to clarify concepts that are presented about numerical data. Most people can understand information better when it is presented graphically. Modern textbooks and employee training manuals include graphic displays. Written text often appears to be more interesting to read when graphics are included.

Directions:
Turn to the next page. Read about the different types of graphs and their purpose

Activity 1 - Understanding the Purpose of Graphs

Types of Graphs	Description & Purpose
Line 	Shows precise relationship between two sets of data. Each point (data point or dot) on the line graph represents the two items in relation to each other. This is the most accurate type of graph. It shows how a trend may be taking place. For example, the fluctuation of bag weights of Oreo cookies over a period of time.
Bar 	A bar graph allows you to show comparisons of values taken at different times or representing different age groups, sexes, product attributes, etc. The bars may be vertical (up and down) or horizontal (side to side). The bars may also be subdivided into parts of a whole or into percentages.
Pie (Circle) 	A pie graph is most commonly known as a circle graph or pie chart. It shows how various parts relate to a whole (100%) and shows percentages. One part of the circle graph is called a slice.
Pictograph (Pictogram) 	Often called a picture graph, a pictogram is the easiest to read, but is difficult to draw. It shows approximate comparisons as bar graphs do, but uses representational figures such as cars, people, or other items being compared.

Activity 2 - Identifying different types of Graphs

Objective(s): Participants will be able to

1. Identify different types of graphs

Materials Needed: Pencil

You Need to Know:

There are many types of graphs used in manufacturing industry. The majority of graphs fall into one of four types: line, bar, pie (circle) or pictograph. Each type of graph has certain advantages. For example, a circle graph is used to show how various items are part of a whole (percentage of 100%). However, a line graph is used to show a trend of the price of sugar. The type of graph used to display information depends on the type and quantity of data that is being presented.

Directions: In the previous activity you learned about four kinds of graphs. First, think of where you may have seen a particular type of graph in the bakery. Then think of where else you may have seen such a graph. Fill in the blank with the department or location.

I have seen examples of line graphs in the_____department.
I have seen examples of line graphs _____.

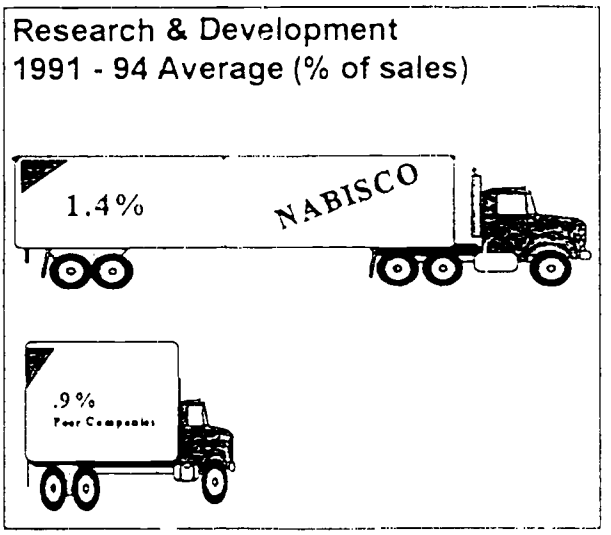
I have seen examples of bar graphs in the _____department.
I have seen examples of bar graphs _____.

I have seen examples of pie charts in the_ _____department.
I have seen examples of pie charts _____.

I have seen examples of pictographs in the_____department.
I have seen examples of pictographs _____.

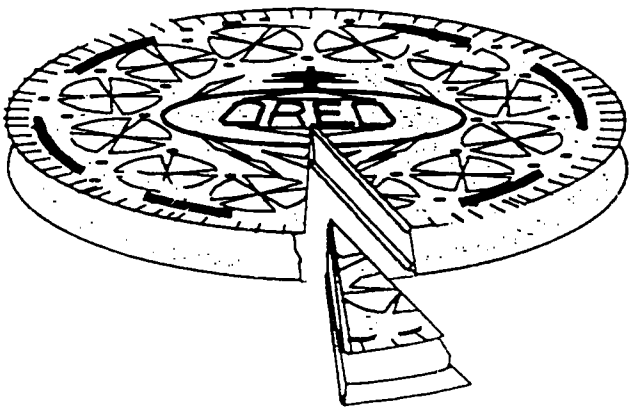
Activity 2 - Identifying different types of Graphs, Continued

Directions:
Review the different types of graphs or visual displays below and on the following pages. In the blank spaces provided, identify the type of graph. If you need help, refer back to the first activity.



Rate of OREO Production (In LBS.)

180,633 lbs. per day



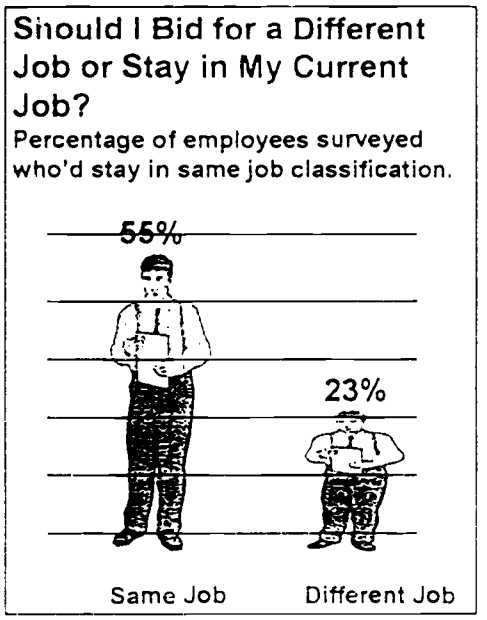
127 lbs. per minute

A. _____

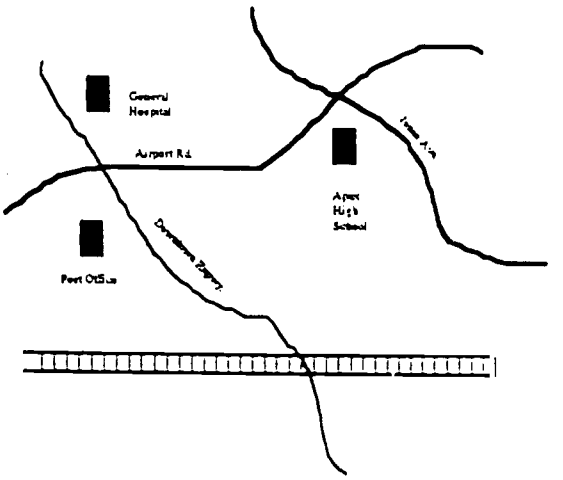
B. _____

	PHONE COSTS - ☎ = $10,000
1994	☎ ☎ ☎ ☎ ☎ ☎ ☎
1993	☎ ☎ ☎ ☎ ☎
1992	☎ ☎ ☎ ☎
1991	☎ ☎ ☎ ☎

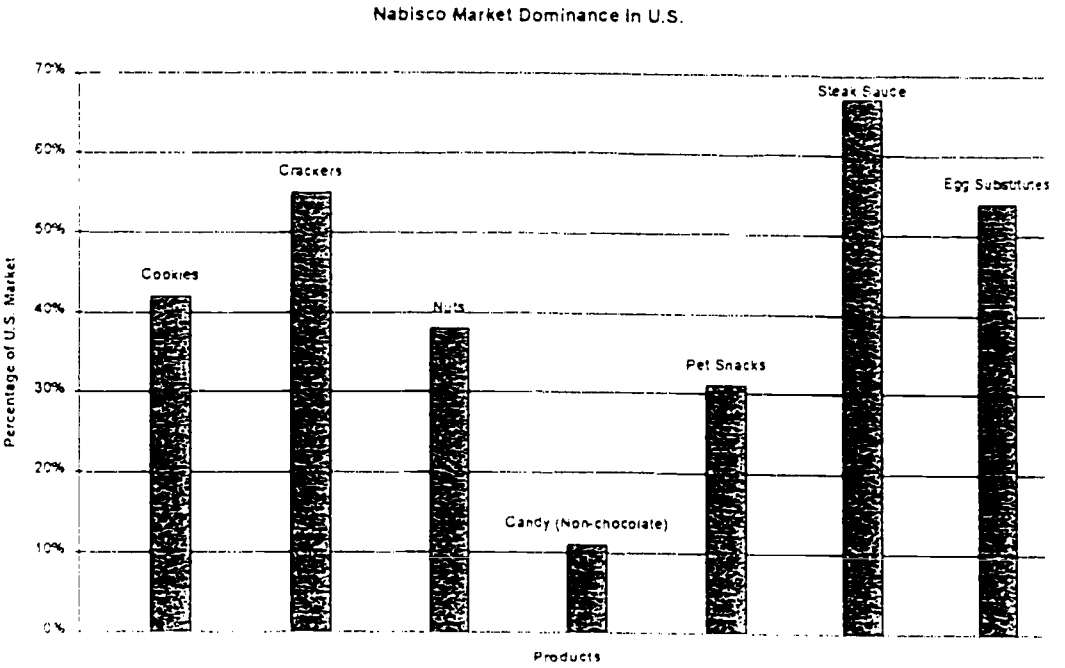
C. _____


Should I Bid for a Different Job or Stay in My Current Job?
Percentage of employees surveyed who'd stay in same job classification.
55%
23%
Same Job
Different Job

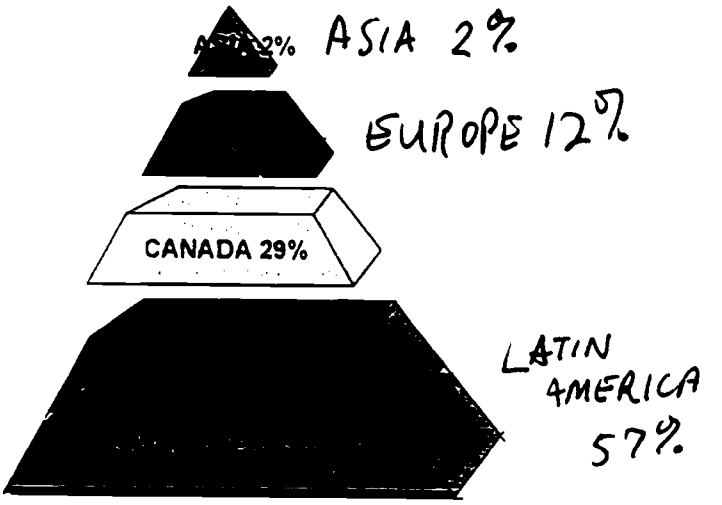
D. _____


General Hospital
Airport Rd.
Post Office

E. _____


Nabisco Market Dominance in U.S.
70%
60%
50%
40%
30%
20%
10%
0%
Percentage of U.S. Market
Cookies
Crackers
Nuts
Candy (Non-chocolate)
Pet Snacks
Steak Sauce
Egg Substitutes
Products

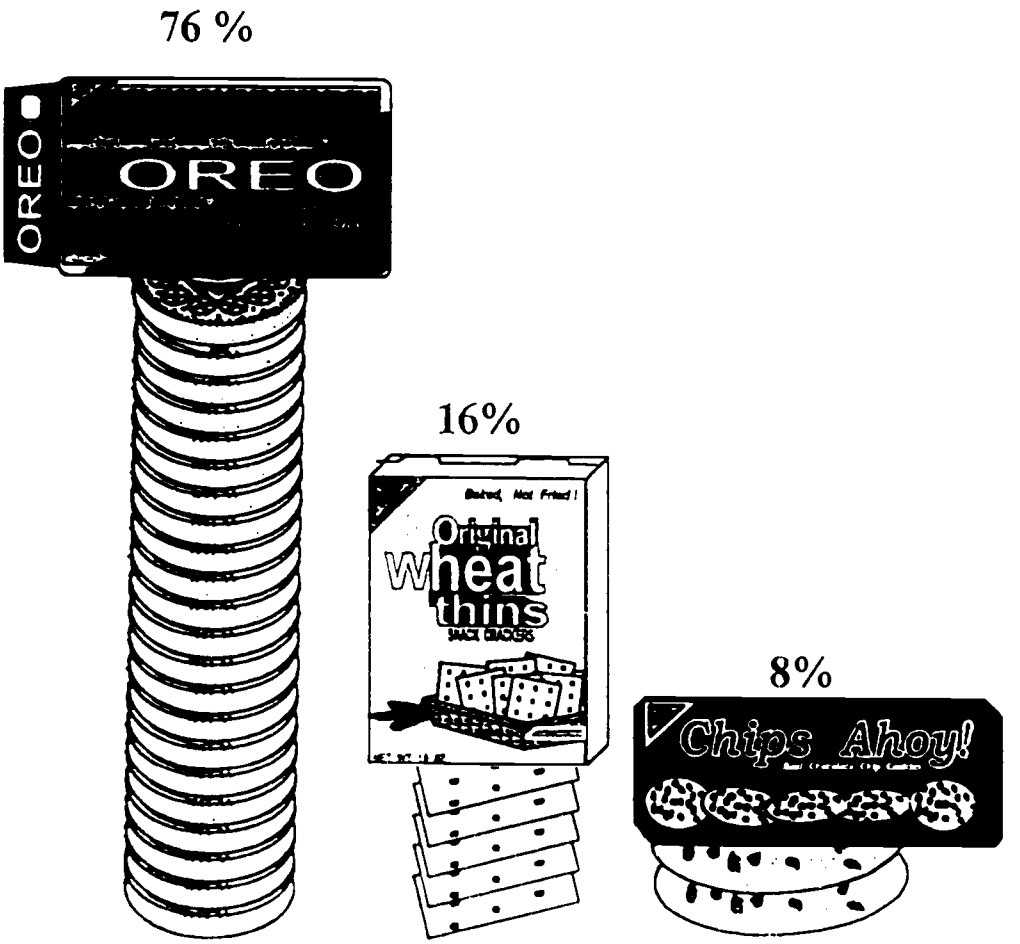
F. _____



NABISCO INTERNATIONAL SALES

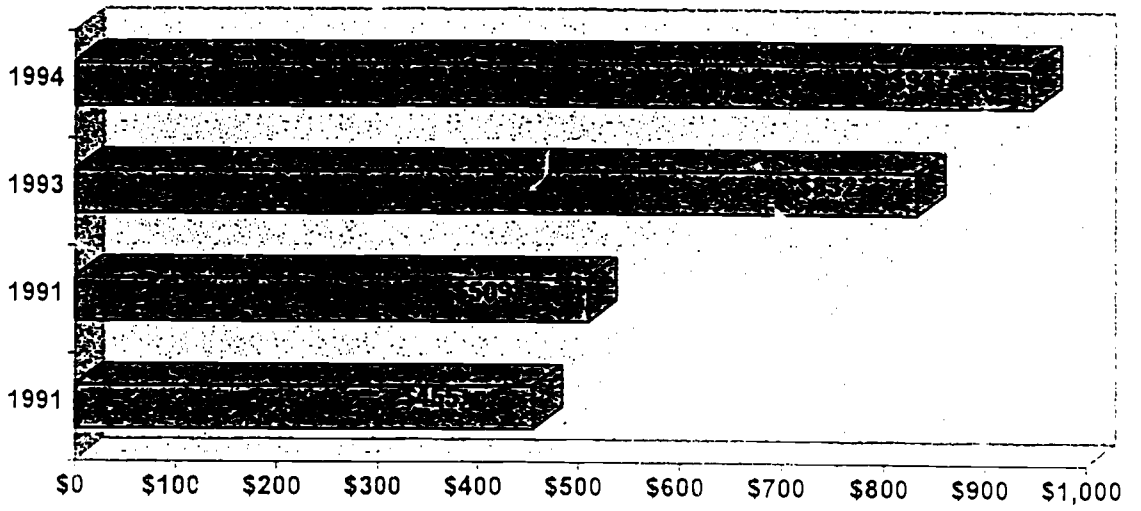
G. _____

A group of 25 Richmond, VA third graders compared their favorite Nabisco products. Thei data are graphed below.



H. _____

Nabisco New Product Sales in the U.S.
(in millions)



1. _____

Activity 3 - Learning to Read Graphs

Objective(s): Participants will be able to

1. Become familiar with general tips for reading graphs

Materials Needed: Pencil

You Need to Know:

Tips for reading graphs

1. Notice the title and type of graph you're reading. The title will tell you the purpose and main idea.

2. Notice the arrangement of the data (numerical values). Read the vertical and horizontal column headings to get an understanding of what is being compared. For example, a graph may compare the amount of salt used in the Ritz cracker with the Sociables.

3. Notice the scale. What are the increments (number of spaces) of increase or decrease? Be aware of any fluctuation of the data. Look at the pattern of the data points.

4. Read the key (same as legend). It tells you the meaning of the symbols. Color coding and surface patterns are important. For example, look at heavy shading, dots, crossed lines etc.

5. Notice the symbols being used. This is particularly important with pictographs. Some symbols are decorative or may be very meaningful. That's why it is so important to check the key.

6. Read any text around the graph. Relate the graph to any written text. Do some critical thinking. Draw conclusions based on the data presented only. Ask yourself, what comparisons are being made?

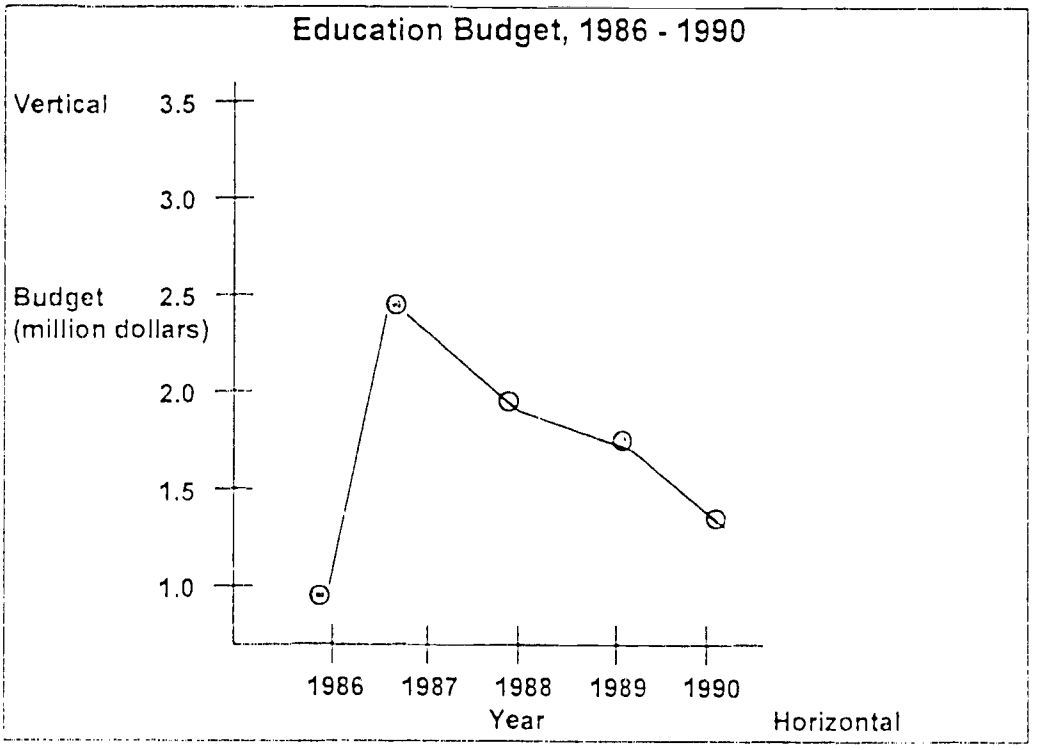
Activity 4 - Reading and Understanding Line Graphs

Objective(s): Participants will be able to

1. Read graphs using tips identified in the previous activity.
2. Practice reading line graphs.

<u>You Need to Know</u>:

Line graphs are easy to read. They present precise values. Line graphs have reference lines called axis. **The horizontal (side to side) line is called the x-axis. The vertical (up and down) line is called the y-axis.** Look at the graph below.



The horizontal axis that goes from left to right usually shows the units of time. The units may be hours or days, months, etc. Each mark on the scale stands for one unit of time. The vertical axis (up and down) shows the amount that is being measured. The amount may be dollars, pounds, or another kind of unit. Each mark stands for one unit

The graph shows education budget for the years 1986 through 1990. Look at the horizontal axis (x-axis). What unit does each mark represent?

Each mark on the time axis represent one year. Each mark on the dollar axis represent a certain money amount: one-tenth of $1 million ($100,000).

To read the amount, you read the mark on the dollar axis that's directly across from the point. Then you read the mark on the time axis that is directly beneath the point.

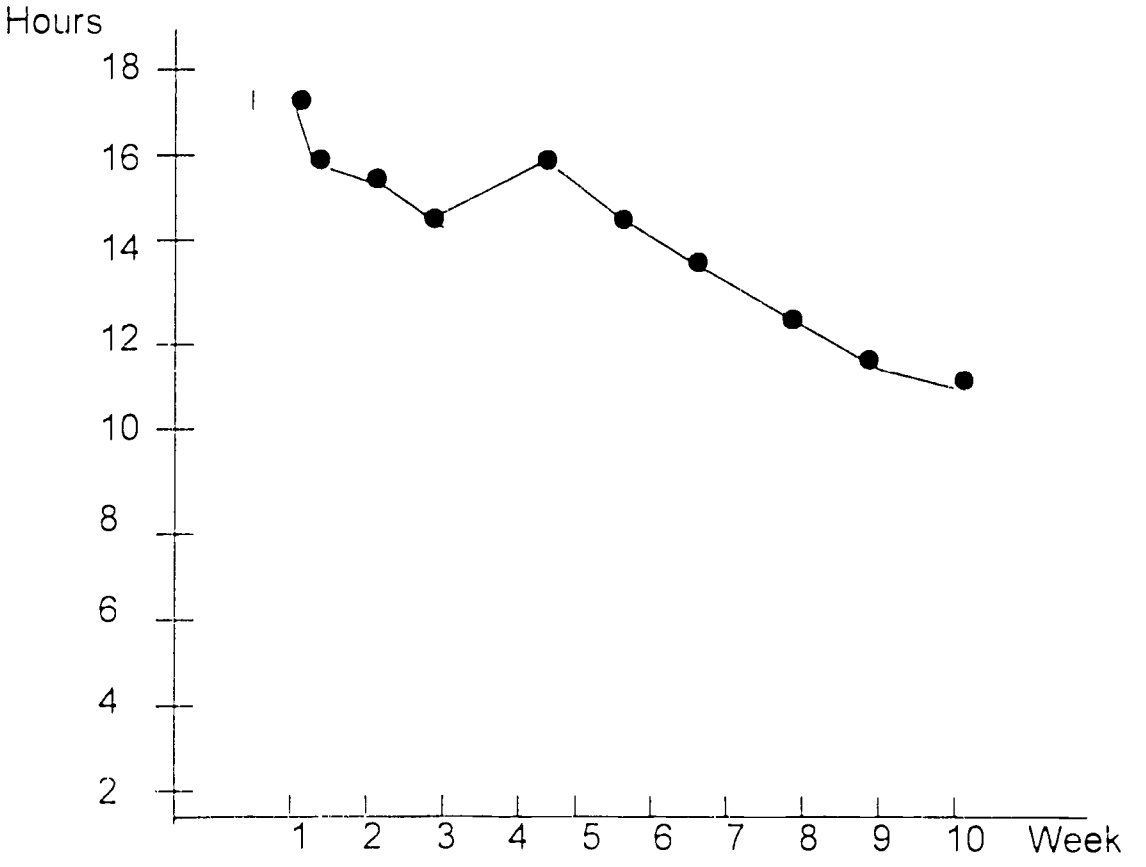
Look at the point that is farthest to the left. What amount does it represent?

You would read the amount as $1.0 million in 1986.

Activity 4 - Understanding and Reading Line Graphs

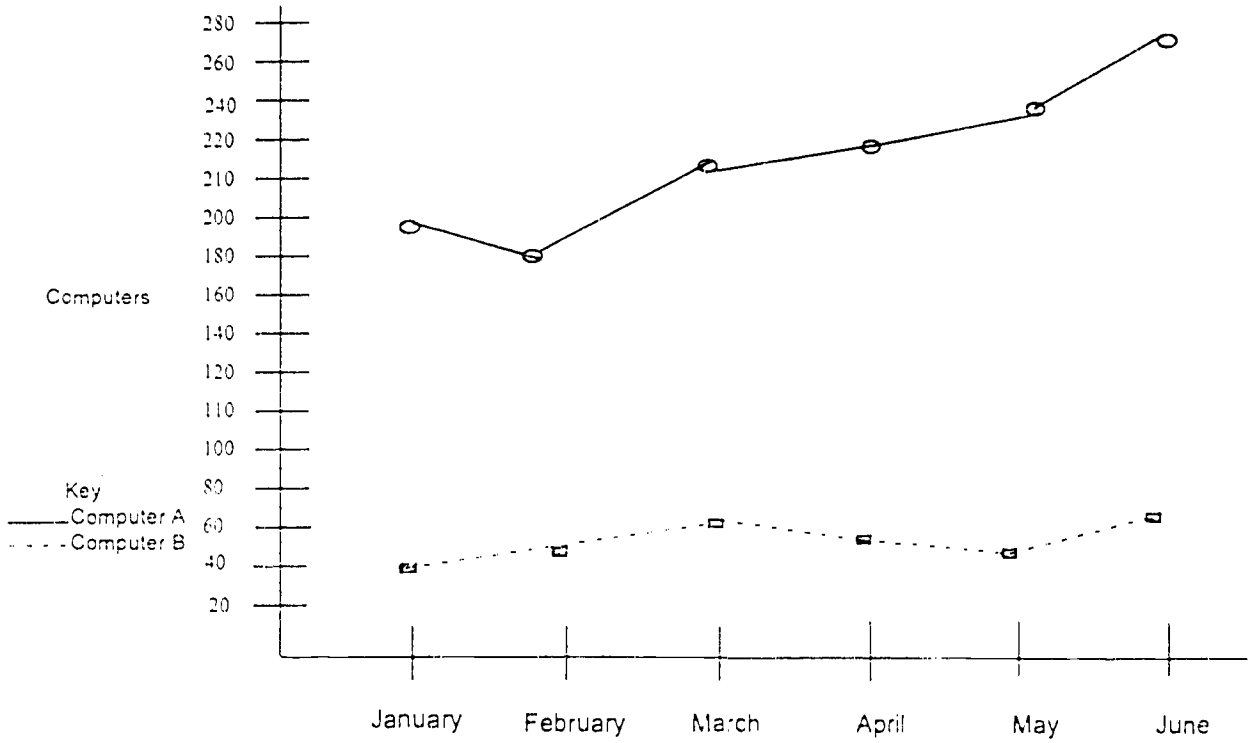
Line graphs can also be used to show how something has changed over a period of time. Data points (dots) are used to represent trends or relationships. Look at the example of the amount of down time recorded each week because of computer failure.

Computer Failure - Down Time



Sometimes a graph is used to show two or more different trends. These line graphs allow you to compare the changes in the trends during the same time period. A computer store may want to see how many of the two different brands of computers sold from January to June. Turn to the example on the next page.

Sales of Computers A and B, January - June



Look at the line graph. How do you know which line stands for computer A?_____.

The tips you learned in previous activities helped you understand that you should always notice the key (legend). Sometimes, a line may be identified by a label (word). Now identify the two lines above by writing ***Computer A*** or ***Computer B*** beside the right line on the graph.

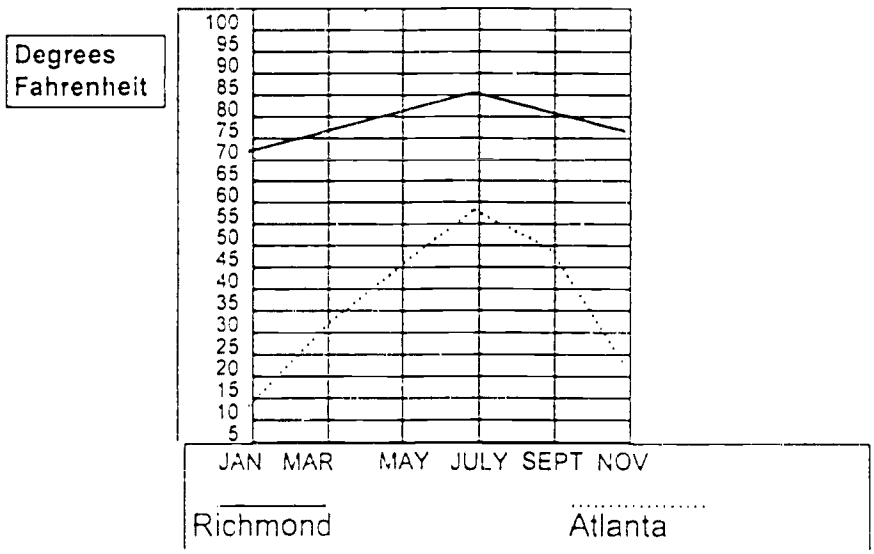
Activity 5 - Reading and Understanding Line Graphs

Objective(s): Participants will be able to

1. Read graphs using the tips identified in the previous activity.
2. Practice reading line graphs.

Directions:
Nabisco's bake shop employees are usually concerned about the weather because temperatures affect the baking process. Read the graph, and answer the questions.

Monthly Normal Temperatures



1. Which line represents Richmond?_____

2. How were you able to determine which line represented Richmond?_____

Activity 5 - Reading and Understanding Line Graphs, Continued

3. Which city, Richmond or Atlanta, has the greatest range of temperatures during the year?_____

4. During which month is there the least amount of difference between the temperatures of the two cities?_____

5. During January, how much warmer is Richmond's average temperature than Atlanta? _____

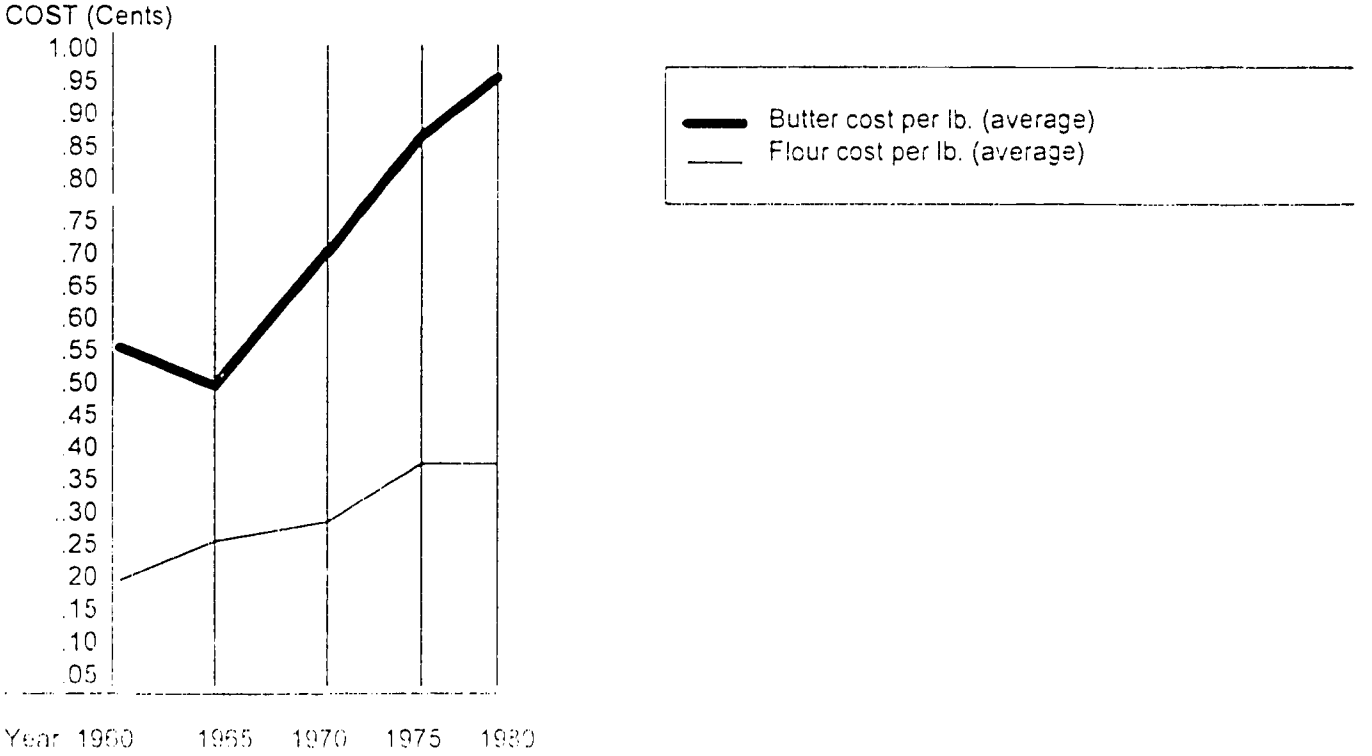
6. What relationship or comparison is being made here? *(Write your answer using a complete sentence.)* _____

_____

_____

Directions: Read the line graph below. Answer the questions.

Price Trends for Butter and Flour



1. How much did a pound of flour cost in 1960?

Activity 5 - Reading and Understanding Line Graphs, Continued

3. How much did a pound of butter cost in 1960?_____

4. Between which two years did the price of butter fall?

_____

5. How much more did a pound of flour cost in 1980 than in 1960?

_____

6. In 1980, how much more did a pound of butter cost than a pound of flour?_____

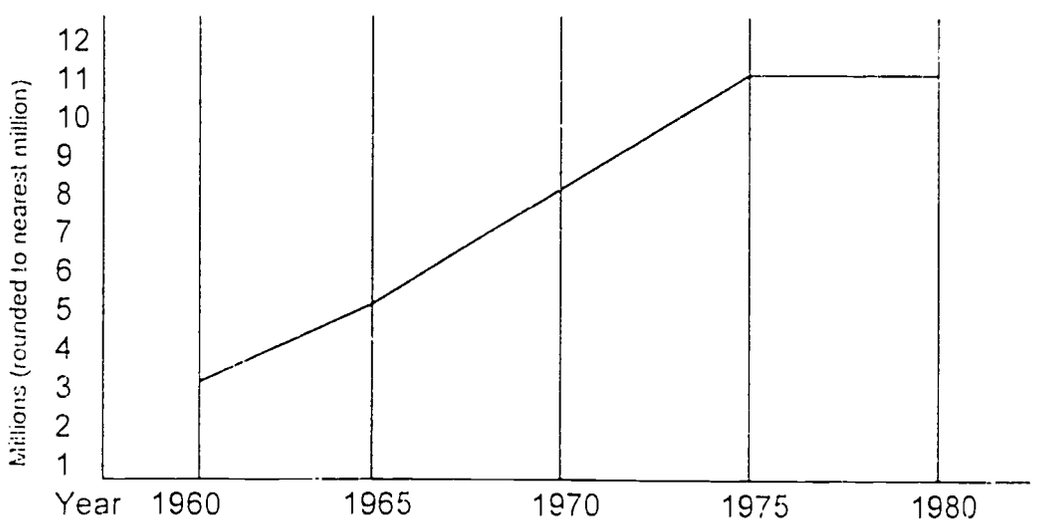
Activity 6 - Reading and Understanding Line Graphs

Objective(s): Participants will be able to

1. Practice reading line graphs.

Directions:
Read the line graphs below. Answer the questions.

Total Number of Crackers Purchased By Year



1. Does the graph show exact numbers or approximate numbers?

_____

2. About how many crackers were purchased in 1970?

_____

3. Between which years did the number of purchases level off?

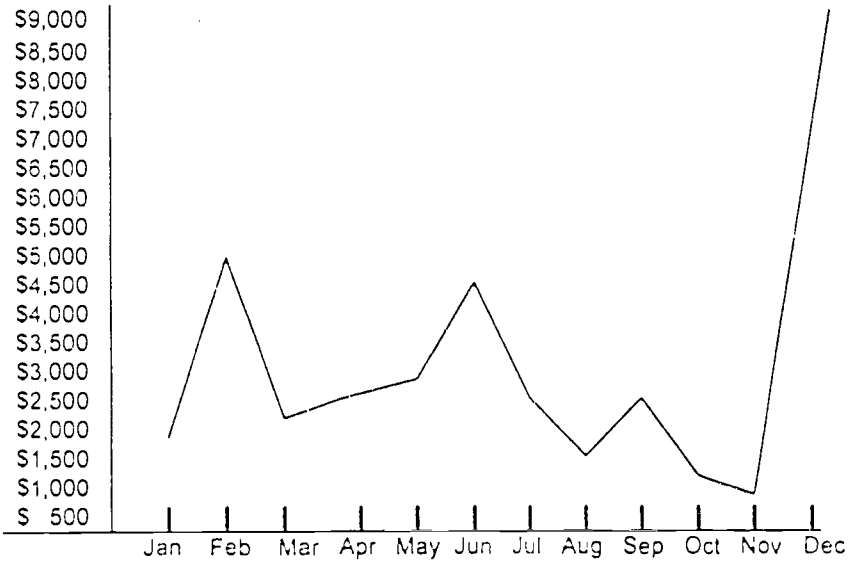
_____

4. About how many more purchases were made in 1970 than in 1960?

_____

Activity 6 - Reading and Understanding Line Graphs, Continued

1990 Monthly Sales of Animal Cookies



1. What is the subject of the line graph (write a complete sentence)?

   _____

2. What is the main point?_____

3. In what month did the store make the fewest sales?_____

4. In what month did the store make the greatest sales?_____

5. What interesting conclusion can you draw about the great rise in animal cookies sales in December?_____

   _____

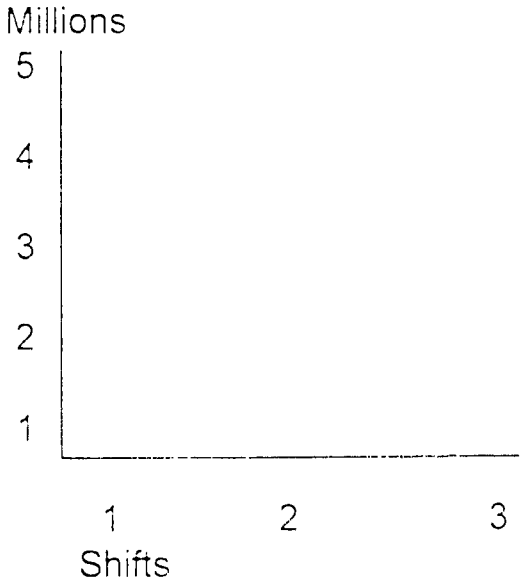
Activity 7 - Understanding Line Graphs in the Workplace

Objective(s): Participants will be able to

1. Read graphs using tips identified in the previous activity.
2. Practice reading line graphs.

Directions:
Read the line graph below. Answer the questions.

Premium Crackers Produced Per Shift



1. What is the unit of the y-axis?_____

2. Plot the data points for each shift. The first one has been done for you (*Shift 1* - 1.0 million). *Shift 2* - 2.5 million; *Shift 3* - 4 million Now draw a line connecting the data points.

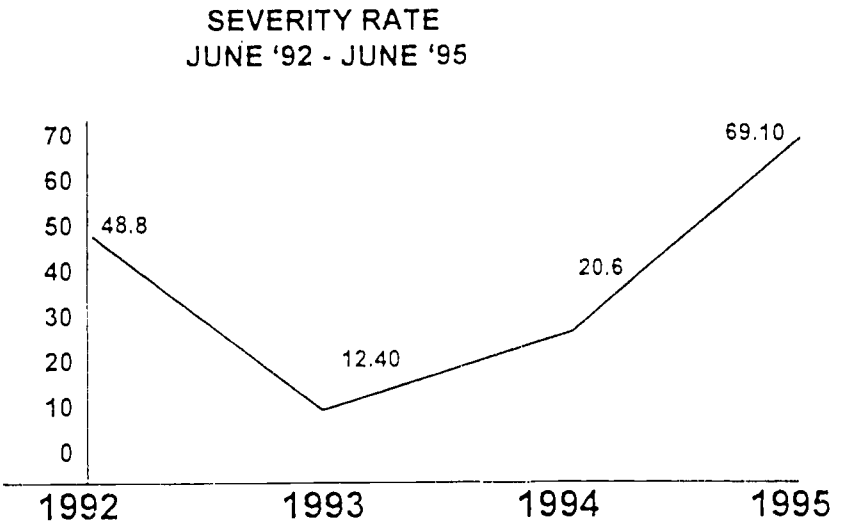
2. At what point were the fewest crackers produced?

_____

3. What conclusion can be drawn from the graph about the production of crackers?

Activity - 7 Understanding Line Graphs in the Workplace, Continued

Directions: The line graph below depicts the severity of accidents that have occured at a factory from June '92 through June '95. Read the line graph below. Answer the questions.



1. Based on the data how would you summarize the accident severity rate over the time period indicated?_____

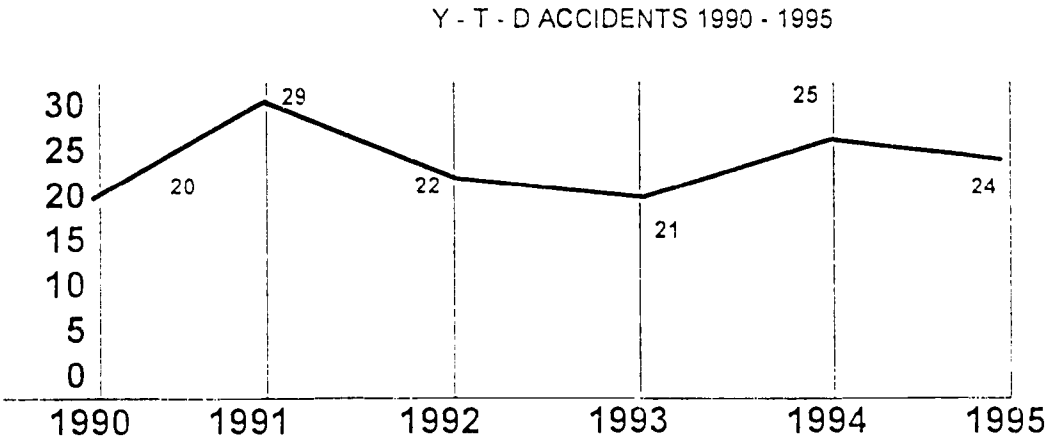
2. This line graph depicts the accident severity rate over what time period?_____
_____

3. Compare the serverity rate of 1992 to 1995. Is it increasing or decreasing?_____

4. What is the difference in the severity rate for 1995 and 1993?
_____

Activity - 7 Understanding Line Graphs in the Workplace, Continued

Directions: The line graph below depicts the number of accidents that have occured at a company from 1990 and 1995. Read the line graph below. Answer the questions.



1. In what year was the highest number of accidents recorded?

   _____

2. In what year was the lowest number of accidents recorded?

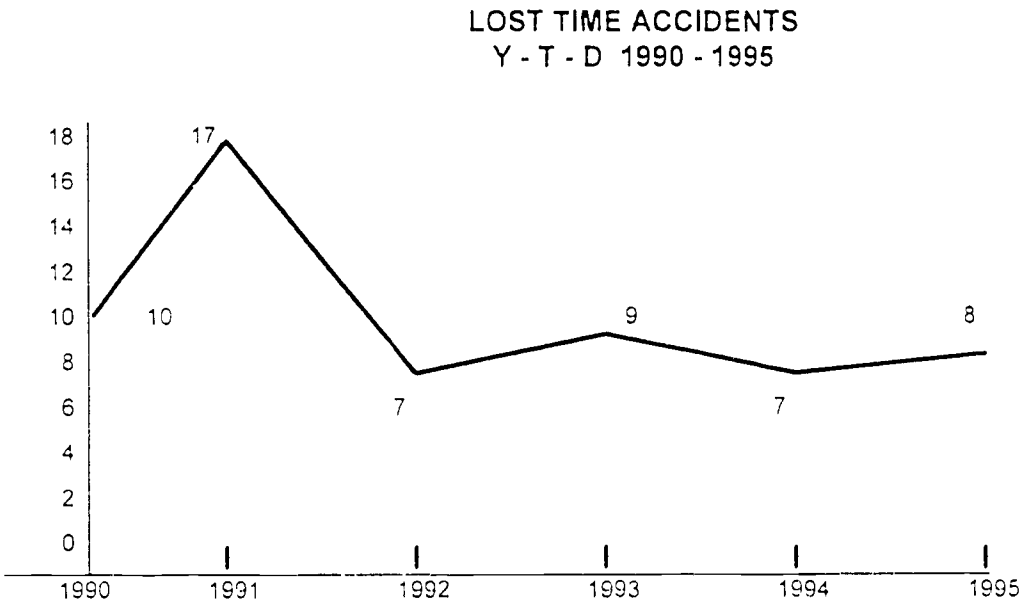
   _____

3. Between which years did the accident rate seem to almost level off?_____

4. What is the difference in number of accidents between 1992 and 1993, and 1994 and 1995? _____

Activity - 7 Understanding Line Graphs in the Workplace, Continued

Directions: The line graph below depicts the amount of time lost due to accidents at a factory from 1990 and 1995. Read the line graph below. Answer the questions.



1. What year was recorded as having the largest amount of time lost due to accidents?_____

2. What years were recorded as having the smallest amount of time lost due to accidents?

   _____

3. What conclusion can be drawn regarding the amount of lost time in 1991 and 1994?_____

   _____

Activity - 8 Creating a Line Graph

Objective(s): Participants will be able to

1. Practice creating a line graph.

Materials Needed: Pencil, graph paper

Directions:
Use graph paper to create a line graph. Study the data presented below to determine what should be represented. Give the graph a title. You may refer back to the graphs in the previous activities.

Number of Oreos produced per day
1 million
1.5 million
2 million
2.5 million
3 million
3.5 million
4 million

5 days of production
Monday through Friday

Activity 9 - Reading and Understanding Bar Graphs

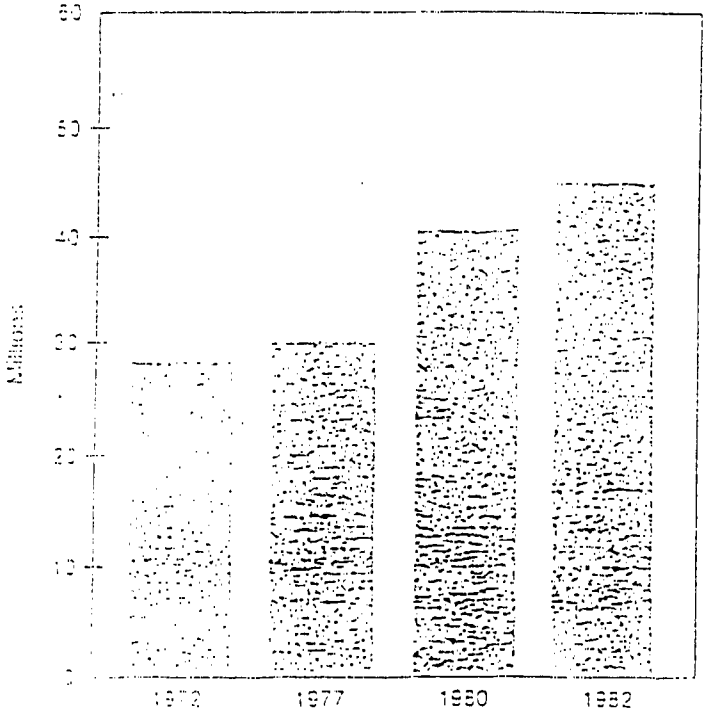
Objective(s): Participants will be able to

1. Practice reading bar graphs.

<u>You Need to Know</u>:
The same tips you used to read line graphs can be applied when reading bar graphs. If you need to review the tips, refer back to activities three and four.

Directions: Read the bar graph below. Answer the questions.

Employee Recreational Activities Attendance



1. This graph provides information for how many years?_____

2. Is the participation in recreational activities increasing or decreasing?_____

3. About how many more people participated in recreational activities in 1980 than in 1977?

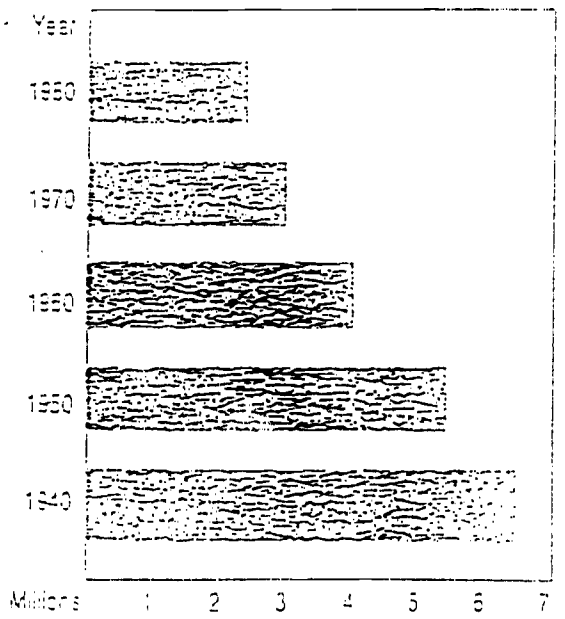
Activity 10 - Reading and Understanding Bar Graphs

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph below. Answer the questions.

Number of Manufacturing Plants in the United States



1. Is this a vertical or horizontal bar graph?_____

2. About how many plants were there in the United States in 1960?

_____

3. About how many more plants were there in 1940 than in 1980?

_____

4. Based on the trend shown in the chart, would you expect there to be more or fewer plants by the year 1985?

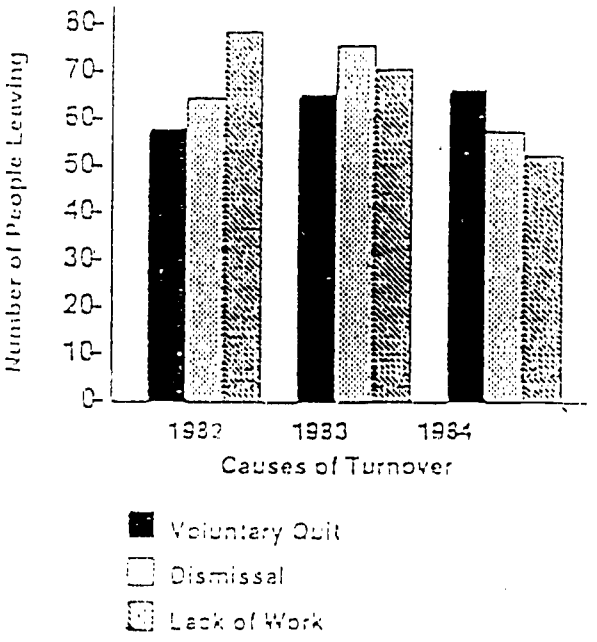
Activity 11 - Reading and Understanding Bar Graphs

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph below. Answer the questions pertaining to it below. Circle true or false or write the answer in the blank.

Causes of Turnover at Company XYZ



1. Based on the data shown, in 1984 were there more dismissals than voluntary quits? T F

2. There were more dismissals in 1983 than in any other year? T F

3. Which year represented the least about of voluntary quits?_____

4. What are the increments of increase on the y-axis?_____

5. What does the y-axis data represent?_____

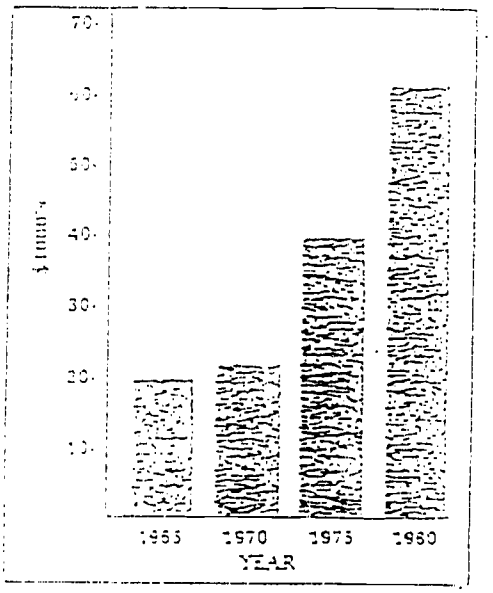
Activity 12 - Reading and Understanding Bar Graphs

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph below. Answer the questions pertaining to it below.

Average Price of Roller Belts



1. Does this graph show exact numbers or approximate numbers?_____

2. What was the average price of a roller belt in 1955?

_____

3. Between which years shown on the graph did the price of a the roller belt increase the least amount?_____

4. About how much more did a roller belt cost in 1980 than in 1970?

5. Based on the graph, would you expect the price of roller belts to rise in the future?

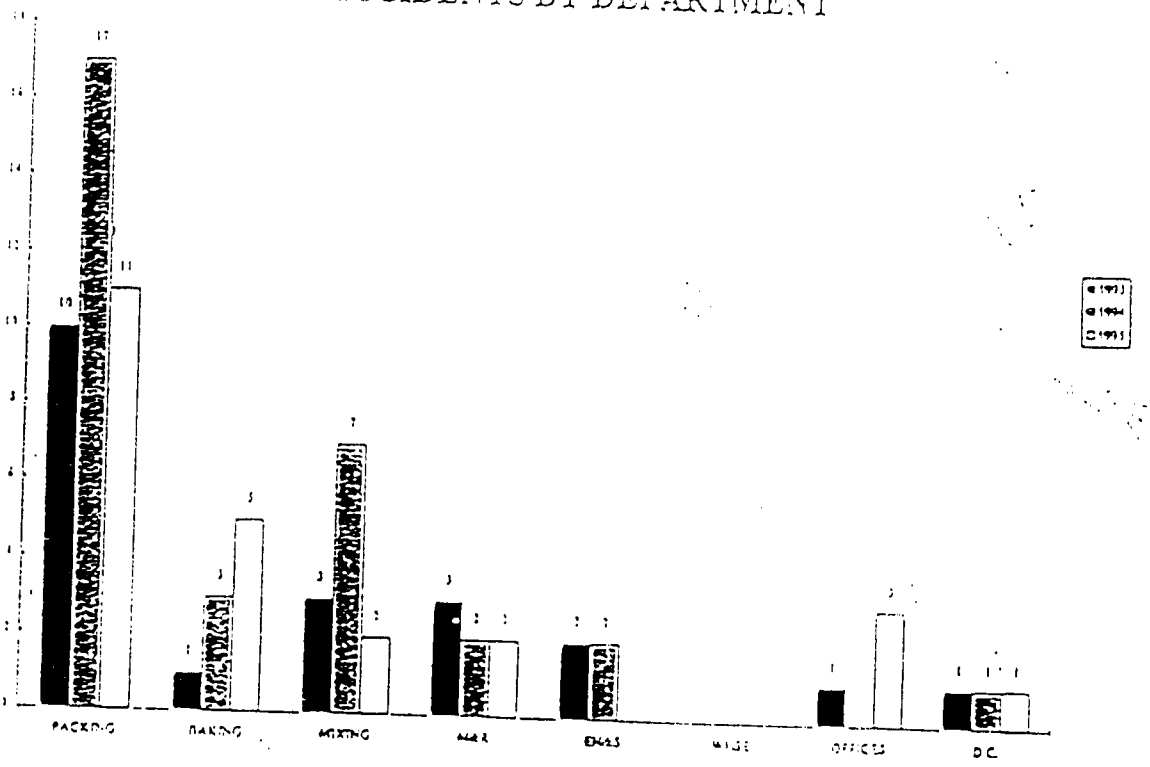
Activity 13 - Reading and Understanding Bar Graphs in the Workplace

Objective(s): Participants will be able to

1. Practice reading bar graphs.

Directions: Read the bar graph. Answer the questions.

ACCIDENTS BY DEPARTMENT



1. Which department had the lowest number of accidents in 1993?_____

2. Which department had the lowest number of accidents in 1994?_____

3. Which department recorded the most accidents over the three year period?_____

Activity 14 - Creating a Bar Graph

Objective(s): Participants will be able to

1. Practice creating a bar graph.

Materials Needed: Pencil, graph paper

You Need to Know:

Before attempting to create a bar graph, study the problem or question to determine what information is given for the values.

Determine the type of units should be shown on the x-axis. Do the same for the y-axis. If you need help, turn back to previous activities.

Directions:

Use graph paper to create a bar graph. Study the data presented below to determine what should be represented. Give the graph a title.

Number of students attending REACH from M&R, Packing, Mixing

Department	*Number of Students*
M&R	5
Packing	15
Mixing	3

Activity 15 - Reading and Understanding Pie Graphs (Charts)

Objective(s): Participants will be able to

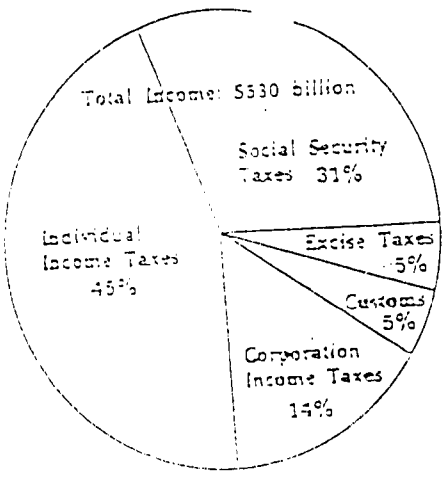
1. Practice reading pie graphs.

You Need to Know

Circle graphs show an entire quantity divided into various parts. Each part of the circle is called a segment or slice. Each segment has its own name and value. In most cases, values of circles graphs are parts of a dollar or percent of a whole (100%). They are usually used to show budget percentages. For example, the sources of each dollar that in the federal government budget.

Directions: Read the pie charts below. Answer the questions.

Government Spending



1. What is being presented in this graphic?_____

2. The federal government received about 75% of its money from two sources. What are the two sources?_____

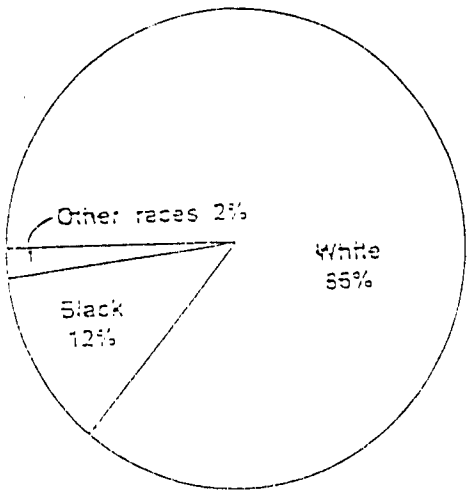
What percent of the government's income comes from customs and excise taxes combined?_____

Activity 15 - Reading and Understanding Pie Graphs (Charts), Continued

4. About how much money did the government's receive from customs and excise taxes combined?_____

5. What is being compared or the relationships of the numbers in this graphic?_____

Population of Maine
Total Population: 6 Million



1. What is the total population of Maine?_____

2. What percent of Maine's population is white?_____

3. What percent of non-whites live in Maine? _____

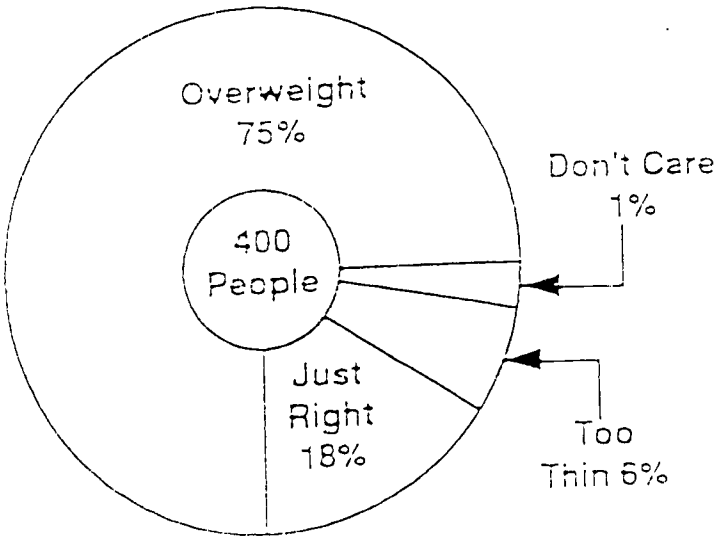
Activity 16 - Reading and Understanding Pie Graphs

Objective(s): Participants will be able to

1. Practice reading pie graphs.

Directions: Read the pie chart below. Answer the questions.

Survey of Feelings About Weight



1. How many categories of feelings are presented in the chart?_____

2. What percentage of people felt they were overweight?_____

3. What is the total number of people who participated in the survey?

_____

4. More people felt they were "just the right size" than the overweight?
(circle one) T or F

5. What percentage of people didn't care about their weight question?

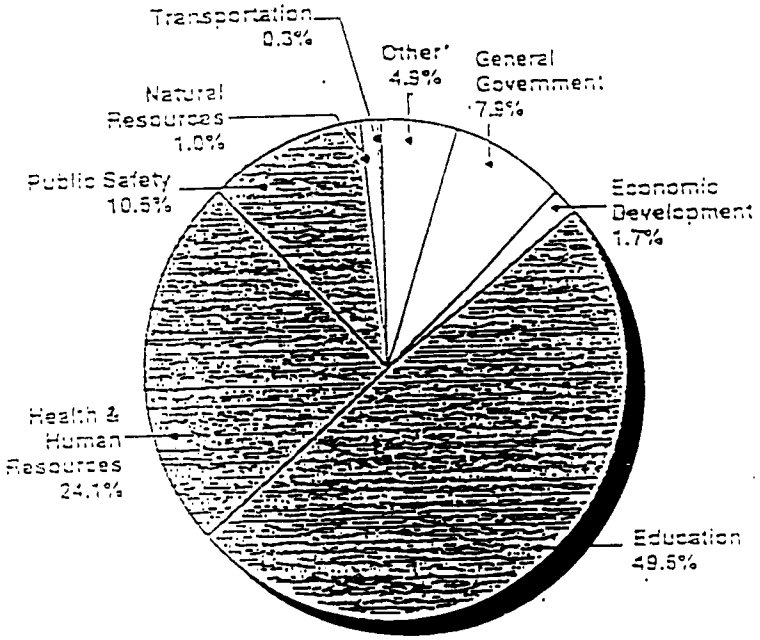
Activity 17 - Reading and Understanding Pie Graphs

Objective(s): Participants will be able to

1. Practice reading pie graphs.

Directions:
Read the pie chart below. Answer the questions.

Montana's General Fund Budget 1992



1. Most of the budget came from what three areas?

_____, _____,
_____

2. What is the combined percentage of the budget directed to Transportation and Natural Resources? _____

3. What slice of the pie presents the lowest percentage of the budget?

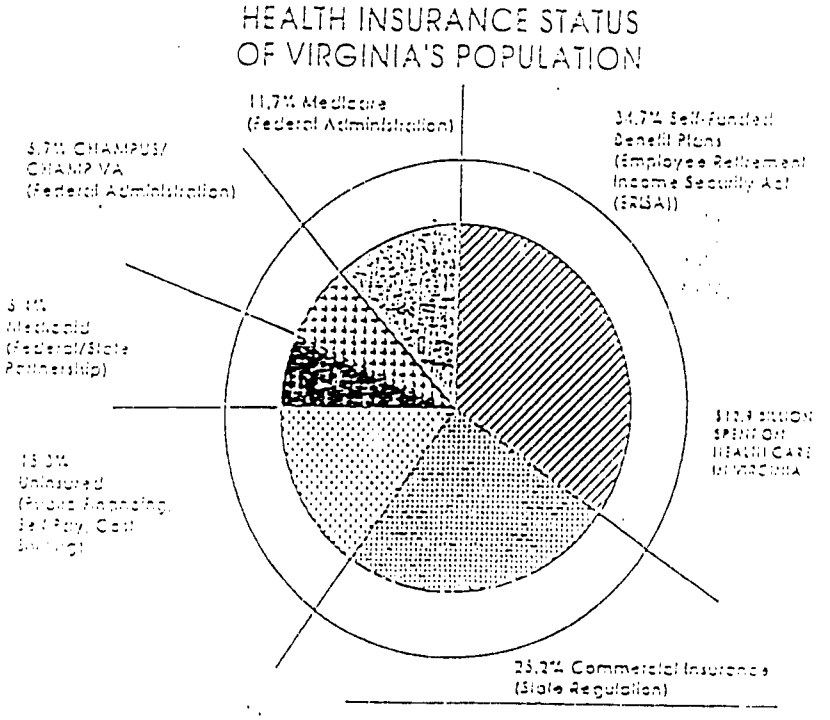
_____

Activity 18 - Understanding Pie Graphs

Objective(s): Participants will be able to

1. Practice reading pie graphs.

Directions:
Read the pie chart below. Answer the questions.



1. How many Virginians were uninsured?_____

2. How many Virginians receive Medicare?_____

3. The majority of Virginians participate in self-funded benefit plans?
T or F

4. What is the combined percentage of Virginians that participate in Champus, Medicaid, and Medicare plans?_____

Activity 19 - Creating a Pie Graph

Objective(s): Participants will be able to

1. Use numerical data given to create a pie charts.

Materials Needed: Pencil, graph paper

Directions:
Below you will find figures on the number of people who purchased OREO cookies last year and the results of a NILLA's taste survey. Create pie charts using the figures. Use graph paper and don't forget to give the charts a title and label all slices.

Chart # 1
1977 Oreo Purchasers
25% people in age range of 20-25
45% in age range of 30-35
20% between ages of 40-45
10% Unknown

Chart #2
Nilla Wafers, Taste Survey
78% - Liked the taste with peanut butter
20% - Didn't like tne taste with peanut butter
2% - No preference

Activity 20 - Reading and Understanding a Pictograph

Objective(s): Participants will be able to

1. Practice reading a pictograph.

Directions: Read the pictograph below. Answer the questions.

Nabisco Facility Employee Population

Atlanta	
Las Vegas	
Richmond	
New Jersey	

 = 100

1. What is being compared in this graphic?_____ _____

2. What type of graphic is represented?_____

3. According to the graph, about how many people are employed by the Las Vegas facility?_____

4. About how many people are employed by the New Jersey facility?_____

5. How many people are employed by the Las Vegas, Richmond, and the Atlanta facilities combined?_____

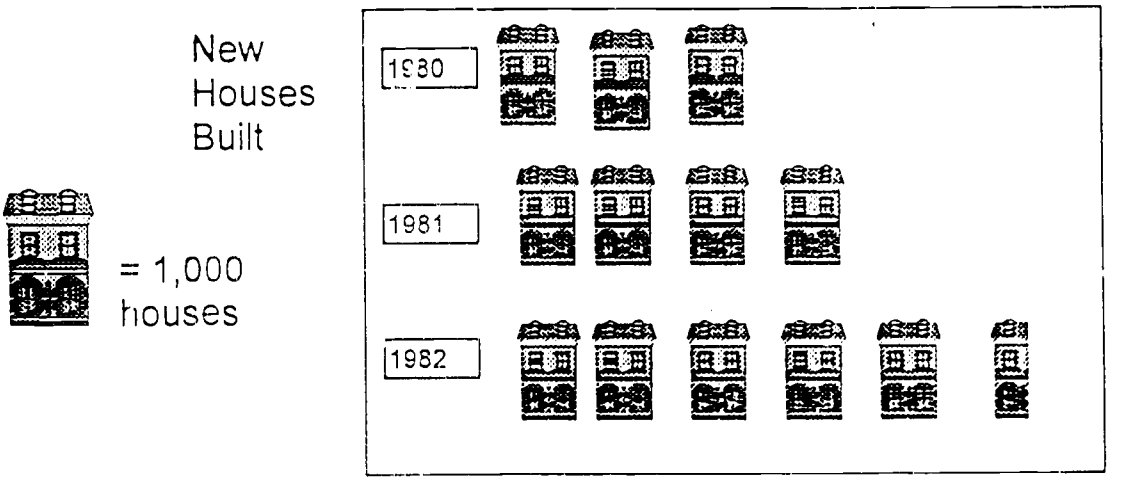
Activity 21 - Reading and Understanding a Pictograph

Objective(s): Participants will be able to

1. Practice reading a pictograph.

Directions: Read the pictograph. Answer the questions.

New Homes Built in James City



1. What is the value of one house on the graph?_____

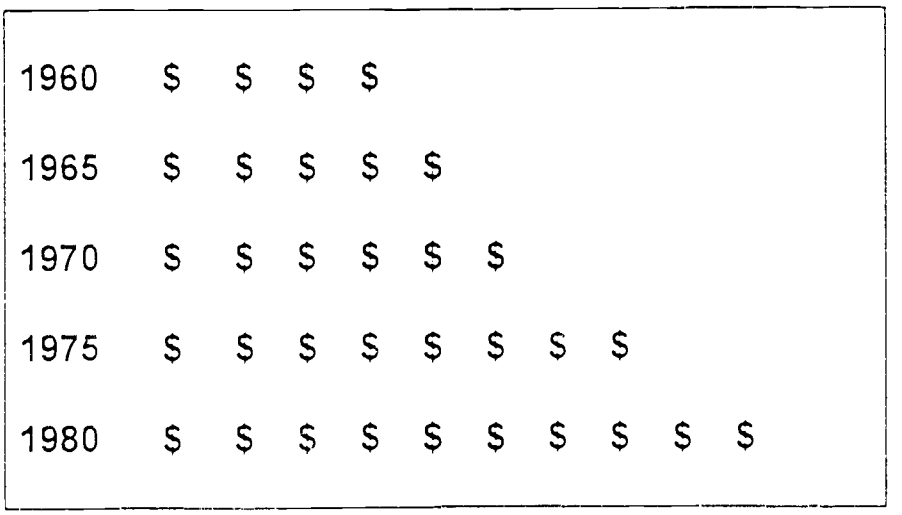
2. In 1980, about how many houses were built in James City?

   _____

3. Find the total number of houses built in James City for the years 1980, 1981, and 1982?

Activity 21 - Reading and Understanding a Pictograph, Continued

Average Yearly Cost of Tuition &
Fees at Public Colleges
$ = $200



1. What was the average cost of tuition and fees for the year 1965?

   _____

2. Is the cost of tuition and fees increasing or decreasing?_____

3. How much more did tuition and fees cost in 1980 than in 1960?

   _____

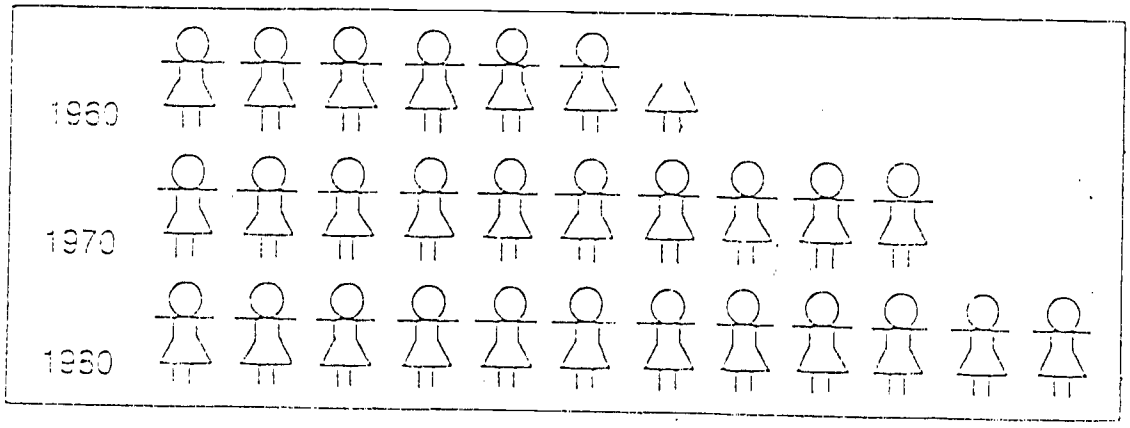
Activity 22 - Reading and Understanding a Pictograph

Objective(s): Participants will be able to

1. Practice reading a pictograph.

Directions: Read the pictograph. Answer the questions.

Working Women in the United States



1. If the trend shown in the graph continues, would you expect there to be more or fewer working women by the year 1985?_____

2. About how many working women were there in 1960?_____

About how many more working women were there in 1980 than in

Activity 23 - Creating a Pictograph

Objective(s): Participants will be able to

1. Use numerical data to create a pictograph.

Materials Needed: Pencil, graph paper

<u>You Need to know</u>:
Determine what information needs to be represented. Consider what figure would best represent the information to be presented. Create a key (legend) to help readers understand what the values.

Directions:
Below you will find figures on the number of people who commute to work each day. Create a pictograph using a car as your symbol to represent the following numerical values.

Carpools by Van by Shifts
Shift 1 - 15
Shift 2- 10
Shift 3 - 4

Activity 24 - Understanding the Purpose of Charts

Objective (s): Participants will be able to

1. Become familiar with the purpose of charts
2. To identify different types of charts

Materials Needed: Pencil

You Need to Know:

Charts are used to organize information.

Charts are visual summaries of important steps or relationships. They may combine pictorial, symbolic, numeric, and or verbal elements.

Directions: Read the information about charts that follows.

Types of Charts Description & Purpose
Flow Chart Shows simple and complex sequences. Shows a process, organization, or functional relationship.
Tree Shows the way many things developed from one source. Also shows what has developed from the root to many branches.
Time Line Shows relations among events, cause and effect, sequence, multiple lines may be used to show overlapping events

Comparison
Shows differences and similarities (compare and contrast, pros and cons, advantages and disadvantages. May be verbal or statistical.
Diagram
Shows structure of a system (a schematic), steps in a process. Classifies complex procedures.

Activity 25 - Learning how to read Charts

Objective (s): Participants will be able to

1. Become familiar with general tips used to read charts.
2. Practice using the tips to read charts.

Materials Needed: Pencil

<u>You need to Know</u>:

Here are some tips for reading charts:

1. Notice the title and type of chart. This will give you the main idea and purpose.

2. Notice symbols. Notice details. Observe relationships.

3. Notice the pattern of organization:
   - cause and effect
   - comparison/contrast
   - chronological order
   - classification
   - step-by-step procedure
   - system

4. Think about the data. Draw conclusions based on the data.

5. Read any text that is associated with the chart.

Now, let's look at a mileage chart on the next page.

MILEAGE DISTANCE CHART

Mileage shown does not always represent the shortest route. To find the distance between two towns, trace down the vertical column of one town to its intersection with the horizontal row of the other town. To convert miles to kilometers multiply miles by 1.61 (approximate).

	Alton	Aurora	Bloomington	Burlington, Iowa	Cairo	Carbondale	Champaign	Chester	Chicago	Clinton, Iowa	Danville	Decatur	De Kalb	Dixon	Dubuque, Iowa	East St. Louis	Effingham	Elgin	Evansville, Ind.	Freeport	Galesburg	Harrisburg	Indianapolis, Ind.	Jacksonville
Aurora	255																							
Bloomington	151	113																						
Burlington, Iowa	120	164	135																					
Cairo	175	357	266	365																				
Carbondale	122	325	207	295	57																			
Champaign	159	130	52	183	234	200																		
Chester	44	322	208	264	85	33	220																	
Chicago	285	41	135	223	374	322	133	350																
Clinton, Iowa	229	103	152	114	402	335	205	323	144															
Danville	194	143	86	219	273	235	37	257	140	228														
Decatur	107	152	45	173	215	157	49	164	181	193	85													
De Kalb	253	29	117	131	333	323	144	325	65	95	178	165												
Dixon	258	63	103	142	374	314	164	320	100	44	196	156	42											
Dubuque, Iowa	291	152	204	145	451	387	256	356	177	52	259	243	125	64										
East St. Louis	24	274	160	204	153	100	157	83	295	255	203	115	277	233	306									
Effingham	93	204	109	224	164	122	78	143	211	257	115	64	217	220	312	99								
Elgin	232	22	122	203	385	343	149	340	42	124	158	179	37	64	142	292	222							
Evansville, Ind.	187	329	253	340	143	101	206	139	296	380	175	181	343	344	435	166	117	324						
Freeport	264	98	146	179	412	352	202	341	113	69	234	193	69	37	63	320	253	78	424					
Galesburg	165	131	87	45	336	253	139	250	185	71	172	122	145	99	122	183	195	174	341	127				
Harrisburg	151	325	225	322	51	39	200	77	332	376	187	175	333	336	411	129	122	344	[illegible]	373	311			
Indianapolis, Ind.	232	210	173	307	305	252	124	253	182	325	90	173	246	253	375	240	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	244		
Jacksonville	61	214	101	119	243	180	120	46	236	170	156	73	218	198	221	85	120	233	252	225	104	207	244	
Joliet	247	25	97	190	252	309	125	305	46	133	115	145	54	93	187	257	129	43	230	12	147	230	152	231

A mileage distance chart shows how far it is from one city to another. The chart above shows the distance in miles between major cities and towns.

If you wanted to find the distance between East St. Louis, Illinois, and Indianapolis, Indiana. First trace down the column that says East St. Louis. Then find the row that says Indianapolis, Indiana. Trace across the row and find the point where the two cities intersect, or meet. That number is the miles between the two cities. Look at the chart, the 240 miles has been circled for you. Now use the chart to answer the questions below.

1. The distance from Burlington, Iowa, to Alton, Illinois, is_____miles.
2. The distance from Decatur, Illinois to Champaign, Illinois is__ miles.
3. The distance from Clinton Iowa, to East St. Louis,Illinois , is__ miles.

Activity 26 - Reading and Understanding Tables

Objective (s): Participants will be able to

1. Become familiar reading tables
2. Interpret data presented in tables

Material Needed: Pencil

You Need to Know:
When you want only certain facts, getting them for a table is usually much easier. A table has columns and rows of data. Columns are read up and down. Rows are read from side to side. A table may be as simple as two columns and two rows or it may be a complex as twenty columns and twenty rows of data. All of the data in a certain column is related in some way. Likewise, all of the data in a certain row is related in some way. Tables may include abbreviations or symbols and a key to explain what they mean.

Directions: Use the tables that follow to answer the questions.

Comparison of Weekly Earnings by Occupations

	Average Weekly Earnings		Women's Pay as Percentage of Men's
	Women	Men	
Postal clerks	$347	$359	97%
Nurses, dietitians, therapists	$292	$305	96%
Health technicians	$253	$299	85%
Textile workers	$175	$205	85%
Secondary school teachers	$290	$347	84%
Social workers	$253	$322	82%
College teachers	$349	$448	78%
Food-service workers	$138	$176	78%
Computer specialists	$335	$439	76%
Lawyers	$397	$532	75%
Editors, reporters	$286	$389	74%
Scientists	$325	$455	71%
Accountants	$277	$400	69%
Cashiers	$149	$216	69%
Engineers	$348	$503	69%
Assemblers	$186	$272	68%
Office-machine operators	$201	$295	68%
Bookkeepers	$203	$306	66%
Factory inspectors	$204	$311	66%
Office managers	$283	$430	66%
Retail-sales clerks	$140	$215	65%

1. According to the table, what is the average weekly pay for a woman computer specialist?_____

2. Of those listed, in how many occupations do women average more pay than men?_____

3. On average how much more do men cashiers make per week than do do women cashiers?_____

4. What type of comparison or relationship is presented in this graphic?_____

Activity 26 - Reading and Understanding Tables, Continued

A Parent's Guide for Immunizations of Children

Immunization	Age (months) 2	4	6	12	15	18	60 (5 years)
Diphtheria	x	x	x			x	x
Whooping cough	x	x	x				
Tetanus	x	x	x			x	x
Polio	x	x	x			x	x
Measles					x		
German Measles					x		
Tuberculosis (TB) Test				x			

1. What is the subject of the table?

   _____

2. A parent brings in her six-month-old child for his immunization. What immunizations will the child receive?_____

3. A parent brings in her 15-month old child for two immunizations. What are they?_____

4. A parent has one-year old twins. She wants to know what they must take?_____

Activity 27 - Reading and Understanding Tables in the Workplace

Objective(s): Participants will be able to

1. Become familiar reading tables.
2. Interpret data presented in tables.

Oven Profile - Oven C, May 5, 1992

TOP	ZONE	1	2	3	4	5	6	7	8
	TEMP	400	585	500	510	400	300	425	420
	PRES	10	20	22	19	20	18	5	7
	BURNERS	ON	ON	ON	ON	ON	ON	OFF	ON
BOTTOM	ZONE	1	2	3	4	5	6	7	8
	TEMP	300	500	525	425	375	370	350	300
	PRES	10	12	5	1	0	0	1	0
	BURNERS	ON	ON	ON	ON	ON	OFF	OPFF	OFF
	ZONE	1	2	3	4	5	6	7	8
	FANS	OFF	OFF	ON	ON	ON	OFF	ON	OFF
	DAMPERS	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED
	COMMENTS								

1. What is the temperature in zone 4 of the top portion of the oven?____

2. Are the burners on in Zone 1? (check one) Yes____ No____

3. How many zones are recorded on the table?_____

Activity 28 - Reading and Understanding Graphic Measurements

Objective (s): Participants will be able to

1. Become familiar with graphic measurements
2. Practice reading graphic measurements

Material Needed: None

You Need to Know:

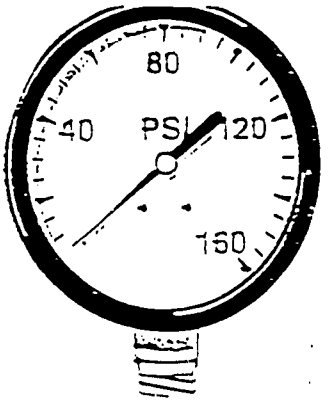
The Nabisco facilty has various graphic measurements that employees use to record data in order to monitor some part of the production process. For example, employees in the mixing department monitor the mixing process by checking the potentiometer read-out. Likewise, bake shop employees are constantly checking temperature gauges. They are also familiar with Scorpion Charts. (A Scorpian is a device that measures variation in temperature in different parts of an oven.)

A gauge is an instrument that measures pressure, temperature, and levels. One of the most common temperature gauges is the thermometer. Many people use a thermometer to measure heat and cold in ovens or refrigerators. Water heater installers use a thermometer test gauge when they are trying to find problems with a water heating system. If a house has a gas heater, it has a gas gauge that measures how much gas is used. There are also pressurized gauges, like gas, air, or water gauges. Pressurized gauges display the amount of pressure. However, they can also indicate high or low pressure.

Directions: Turn to the next page. Look at the different types of guages. Then move on to the next practice activity.

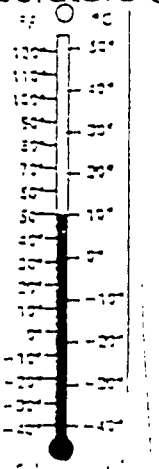
Activity 28 - Reading and Understanding Graphic Measurements, Continued

Pressure Gauge



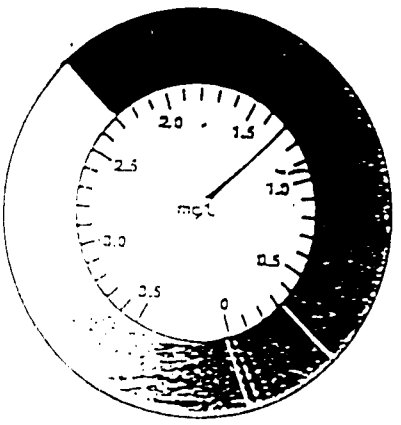
Shows a certain amount of pressure or level (e.g., gas,water, air gauges)

Temperature Gauge



Measures heat and cold in ovens or refrigerators (e.g., test gauge) for water heater.

Level Gauge

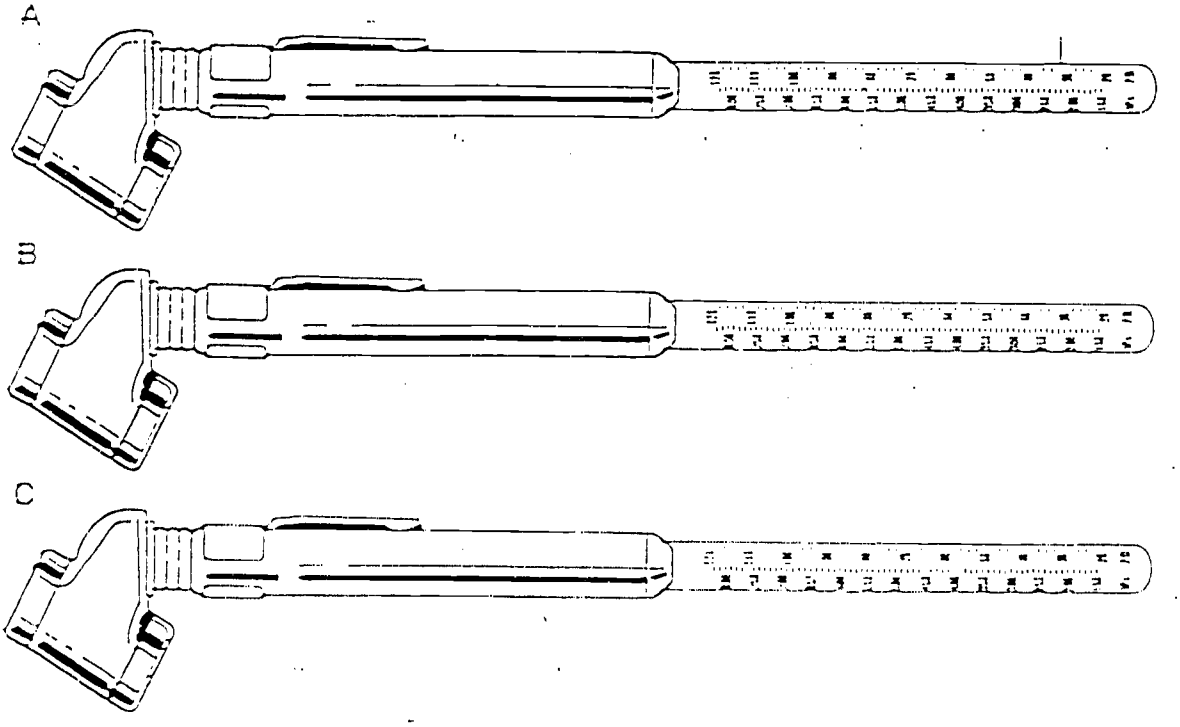


Measures levels and standards (e.g. level gauge)

Activity 28 - Reading and Understanding Graphic Measurements, Continued

Let's look at the air pressure gauges below. Gauge A has a mark at the 32 psi unit. Using Guage A as your guide, place a mark at the correct air pressure for tires B and C.

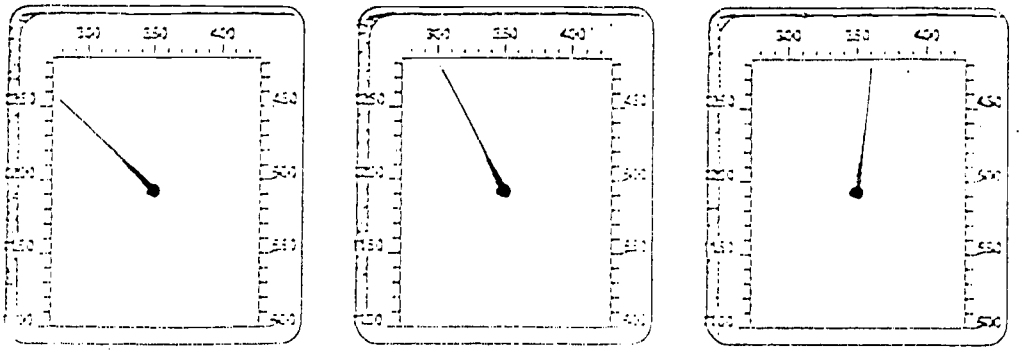
Tire B: 40 pounds
Tire C: 110 pounds



Activity 29 - Reading and Interpreting Thermometers

Thermometers measure temperature. Thermometers measure temperature in either Fahrenheit (F) or Celsius (C) readings. One common thermometer is a clinical thermometer. A clinical thermometer is used by doctors' offices, medical clinics, and hospitals. Clinical thermometers measure body temperature.

Directions: Now let's practice reading thermometers. Here is a baking scenario. The Nabisco bakery has been having problems with certain products baking properly. After five unacceptable batches, the employees to do a test to determine if the oven is malfunctioning. Read the temperature on each thermometer below. Then record the temperatures in the space provided.



A B C

Time	Thermostat Setting	Actual Temperature
1. 7:45 A.M.	A. 325°F	A.
2. 9:45 A.M.	B. 375°F	B.
3. 2:15 P.M.	C. 450°F	C.

Activity 30 - Reading and Interpreting Potentiometer

<u>You Need to Know</u>:
Potentiometer charts are used by employees in the Mixing Department. A Potentiometer is a gauge on the mixing machine that prints out a snapshot of what is happening as the dough is being made. This print out helps employees to analyze the texture of the dough. The texture of the dough is very important to the production process. This chart allows employees to determine the how tight or loose a dough may be. For example, the read-out may show a high resistance. The problem may be too much flour or too much water.

A sample of a cookie dough guideline is attached. The chart shows three stages of the process. In the Cream-Up stage the sugar and oils are being mixed at the start of the process. The second stage is the Shortening Cream-Up is all liquid, oils are mixed. Then the flour is mixed in the dough mix stage.

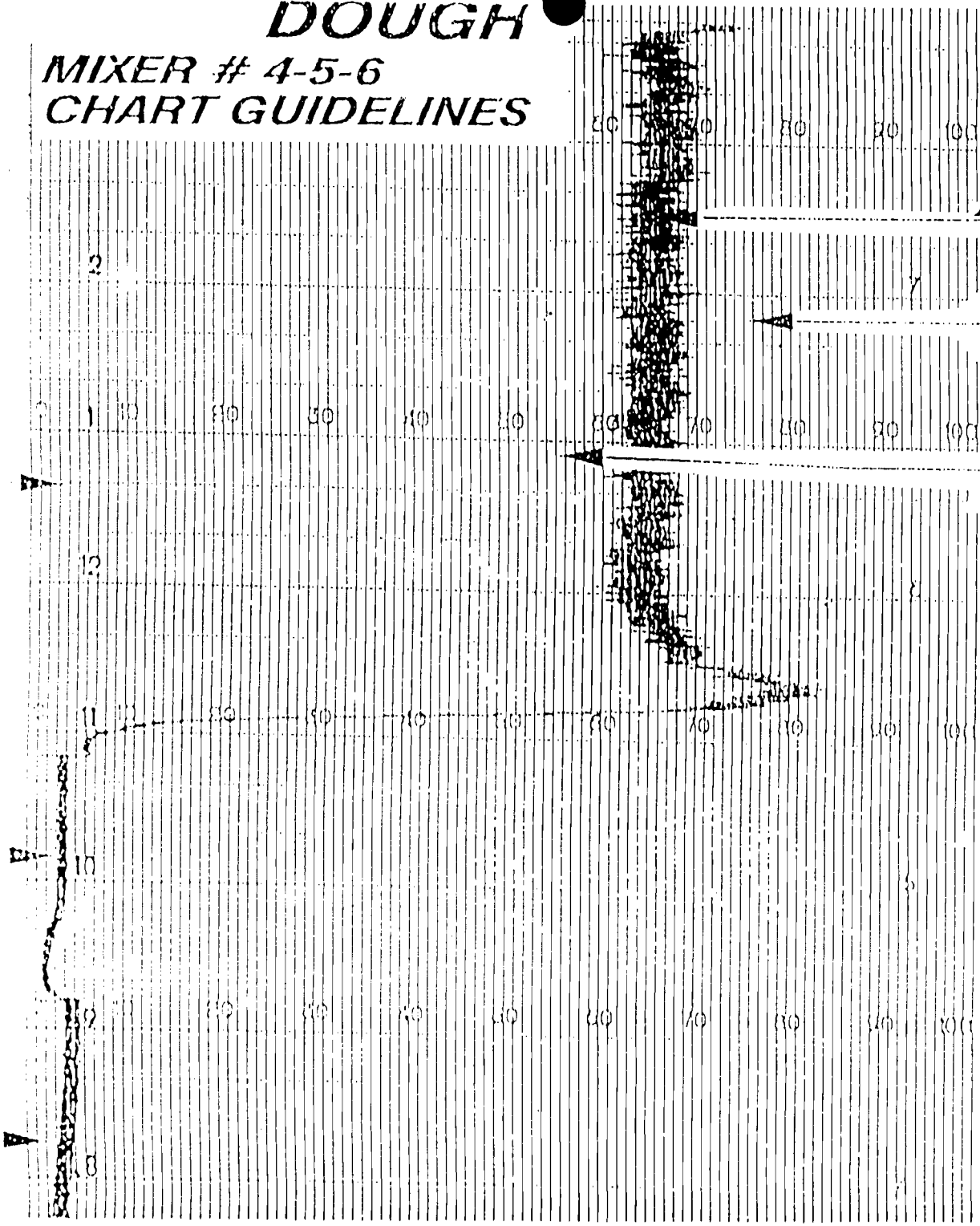
When the reading the chart, the vertical (up and down lines) is a representation of the time the dough has been mixing. The horizontal lines is a representation of the resistance of the dough. If the resistance is charted above or below the control limits, a supervisor is called. In the case some products, a dough with soft resistance is more acceptable. Employees monitor charts on the mixer at regular intervals.

Directions: Now you know how a Potentiometer Charts is used in the Mixing Department. Now think of other charts or tables you use on the job. Write the name of the chart and its use in the spaces provided.

Chart Name	*Chart is used to...*

DOUGH

MIXER # 4-5-6
CHART GUIDELINES



AIM POINT 65

UCL LIMITS 75
CALL SUPERVISOR

LCL LIMITS 55
CALL SUPERVISOR

DOUGH MIX

SHORTENING
CREAM UP

CREAM UP

USING MEAL

1

Activity 31 - Understanding the Purpose of Control

1. Interpret data using charts and make decisions based on the data.
3. Plot data points on charts.

Materials Needed: Pencil, Attached handout of decision rules

You Need to Know:

Nabisco employees have to make decisions on a daily basis about improving their work processes. They do this by using Process Operating Guidelines (POG). They use control charts to collect facts and data. Then they decide what should be changed to improve the quality of the product. Data collection is very important because it helps employees identify the causes of problems and monitor the production process.

What kind of problems might occur during the production process? The list of possibilities is great. However, a few are listed below:

- dough temperature out of control
- dry weights out of control
- stack heights out of control

In order to get a handle on what temperatures are acceptable for the doughs, an employee will take samples of dough at particular times during a shift. The data collected is plotted on a control chart manually or by computer. Once the data is collected, employees use standard decision rules to make decisions about the production process. In this activity, you will plot data manually and learn to read a computer generated chart.

Directions: Look at the sections of a control chart that are outlined on the attached pages. You will be guided through the process of manually completing a control chart.

CONTROL CHART NO—5260-E

DATE: 9/16/95 | PRODUCT: #019 | SHIFT: 2 | ATTRIBUTE: Wet Weights | LINE NO.: 1 | OPER: Danny #14962

TIME	3:30	4:00	4:30	5:00	5:35	6:00	6:25	7:00	7:30	8:00	8:30	9:00	9:30	10:00	10:30	11:00
ANALYSIS E 1	74	72	69	70	72	76	76	70	73	71	68	75	71	70	70	74
ANALYSIS M 2	69	69	72	74	71	75	72	74	70	75	69	74	72	75	69	67
ANALYSIS W 3	67	65	68	65	68	65	67	66	70	66	73	64	67	64	67	69
4																
5																
6																
SUM Σ	210															
AVERAGE $\bar{X}$	70															
RANGE R	7															

UCL 73
72
AIM 71
70
69
68
LCL 67

UCL 9
RANGE 6
3
1

ASSIGNABLE CAUSE LOG

ACTION	CAUSE

DECISION RULES

1	IN RED
2 OF 3	IN YELLOW (ALL ON SAME SIDE OF AIM)
5	IN A ROW (ALL ON SAME SIDE OF AIM)
5	IN A ROW IN AN UPWARD OR DOWNWARD TREND (BETWEEN CONTROL LIMITS)

1015

INVESTIGATE/REACT/DOCUMENT

Directions Continued: The top part of the control chart includes the following: the date (September 15, 1995) , product name (Product #019), shift number (2) , the type of data being collected (attribute), production line number (1), and the operator's name (Denner).

In this case, wet weights are being monitored for Product #019. Denner collects data or samples every half-hour, starting at 3:30 p.m. His samples are collected from three conveyor beit areas, the East, Middle, and West. Reading down the row, under the 3:30 p.m., his weights were 74, 69, and 67. He does the same procedure for the rest of the samples. Look at the times the samples were taken. Did he take all samples on time?
Yes___ No___

After taking the samples, Denner computed an average of the samples. for example, at 3:30 p.m., he added 74+69+67=210. Then he divided 210 by 3 to get an average of 70. After obtaining his average, Denner computed the range by subtracting the highest number from the lowest, 74-67 = 7. Now help Denner out by computing the average and range of the rest of the samples. Use the exact numbers, do not round off.

Denner knows that the target (aim) weight is 70. The aim is also called the control limit. If all weights were hitting the aim, then he has a really good control of the process. However, some variation is expected in the process, but within acceptable limits. The Upper Control Limit is 72, meaning no weights should average above this limit. The Lower Control Limit is 67, so no average should weigh less than 67. Ideally, the points plotted, representing the collected data, should fall randomly between the upper and lower control limits, fluctuating above, below, and on the aim or target line. Therefore, Denner continues to monitor his process by plotting the data points to determine how his process is running.

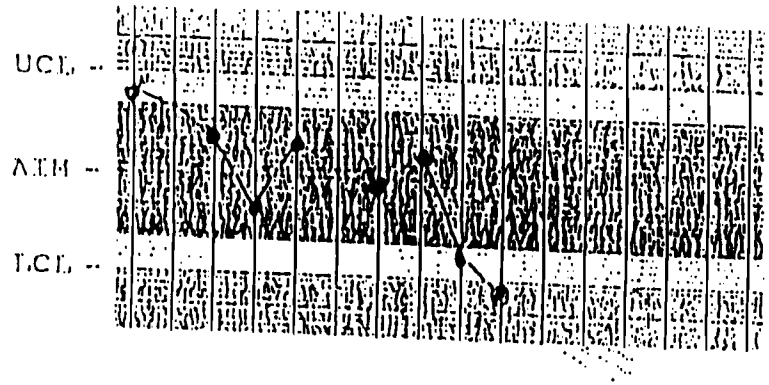
Let's help Denner out by plotting the average and range of the wet weights. The first five have been plotted for you. After plotting the points, draw lines to connect the data points (dots). Look at the results. Denner would analyze the results and apply decision rules when necessary.

DECISION RULES

As you monitor the process, watch for these examples. If any of the examples below occur on your control chart, investigate immediately and take action if necessary.

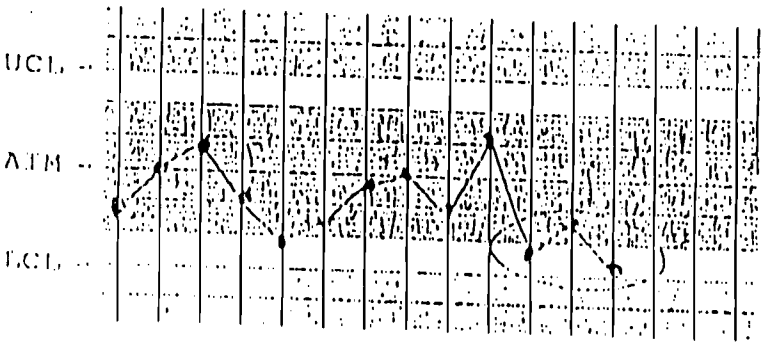
1. POINT BEYOND UPPER OR LOWER CONTROL LIMIT

When a point is plotted above the upper control limit, or below the lower control limit, adjust the process immediately. Take a recheck and continue this procedure until point is within the acceptable limits. Plot all checks.



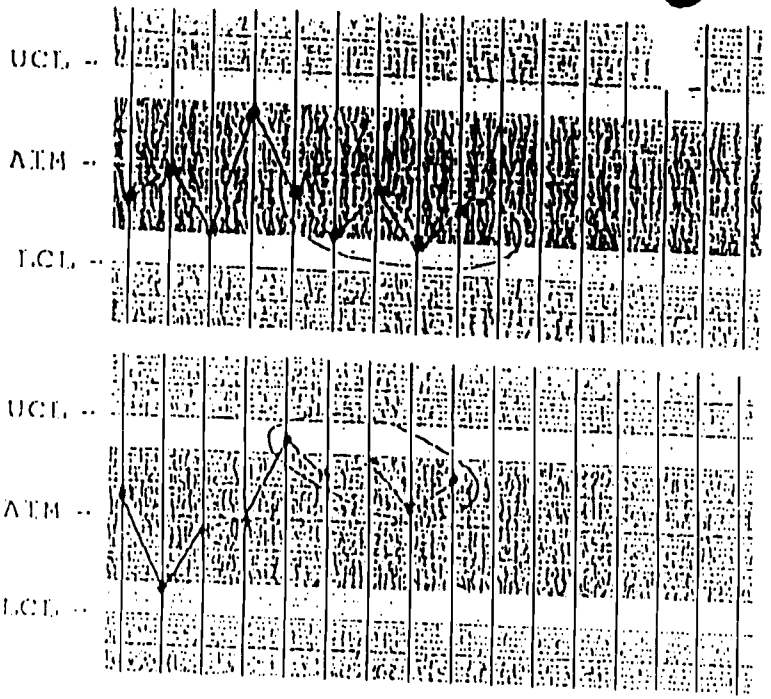
2. 2 OUT OF 3 POINTS IN YELLOW

When 2 points out of 3 fall in the yellow, on the same side of the aim line, a shift may be forming. Check for possible causes and notify your supervisor. Make adjustments if instructed. Take a recheck if any adjustment is made and continue this process until the points fall nearer the aim.



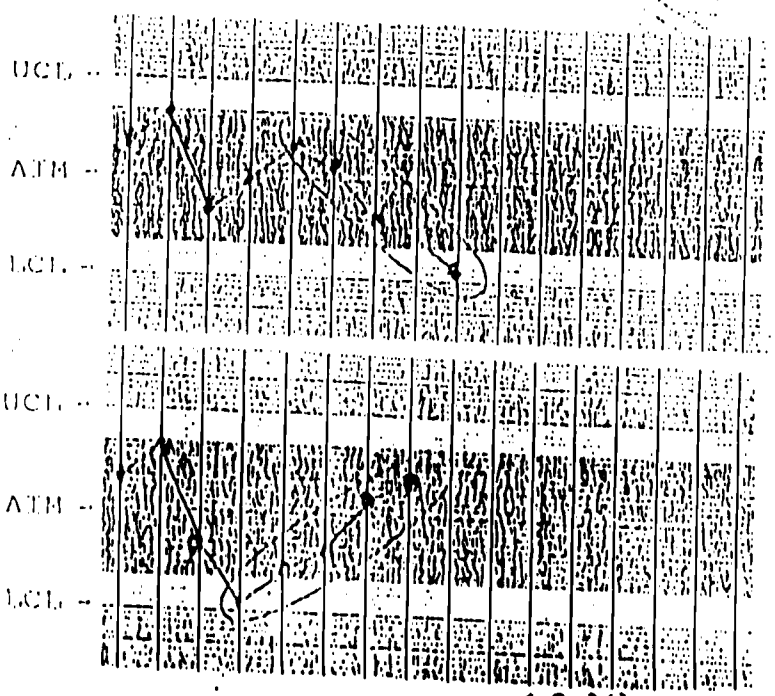
3. SHIFT OR RUN

When 5 or more points in a row are plotted between the aim line and either the upper or lower control limits, adjust the process and recheck immediately. Check for any changes such as in temperatures, raw materials, or parts wearing out. Continue to monitor the process making adjustments and rechecks to ensure the shift has been corrected.

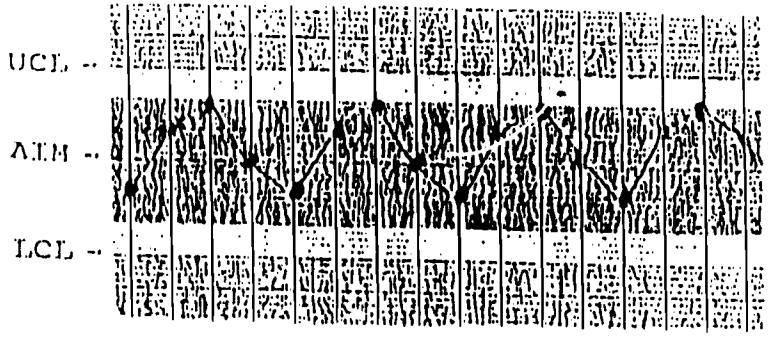


4. TREND

A trend is forming when 5 or more plotted points in a row form an upward or downward pattern between the upper and lower control limits. The trend may cross the aim line. If this happens, notify your supervisor.



5. PERIODICITY
When the points you have plotted form a repeating pattern, notify your supervisor.



The decision rules are summarized on the bottom right corner of the control chart. After reading about the decisions, summarize in the blanks below, what decision should be made about this process.

Summary of Decision_____

_____

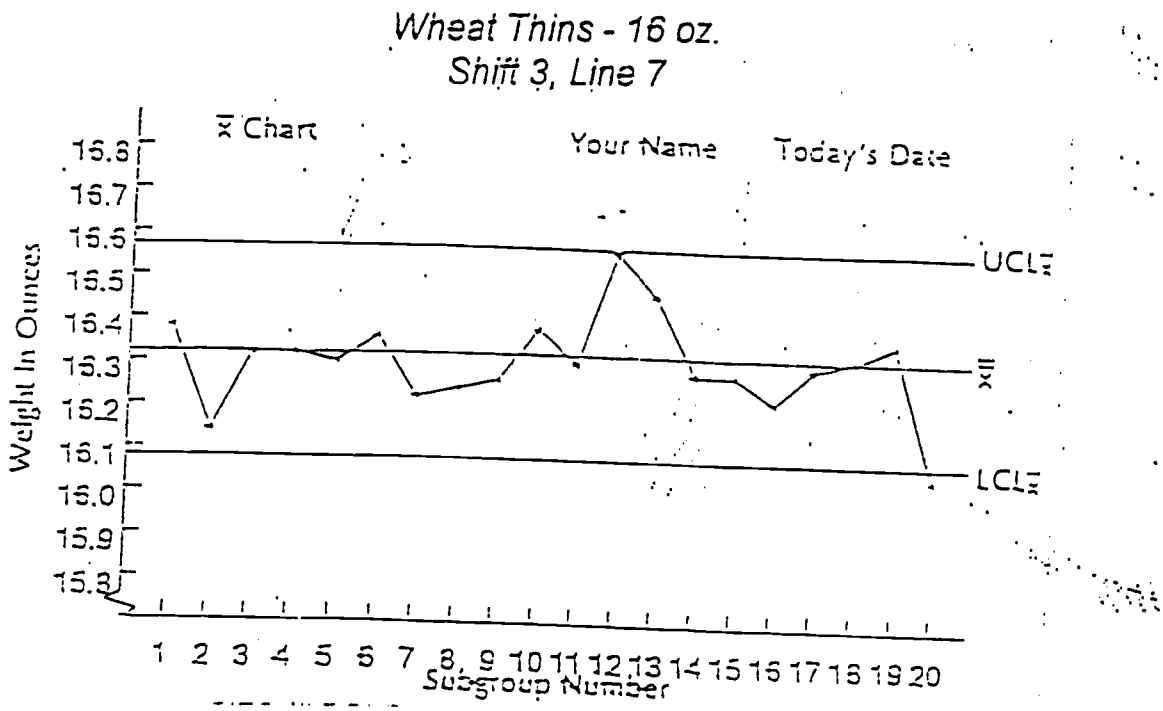
_____

_____

Activity 31, Continued

Directions: Use the decision rule handout to determine which rule each of the example charts represent.

Chart #1- Decision Rule_____



Line: Oreo

Chart #2 - Decision Rule_____

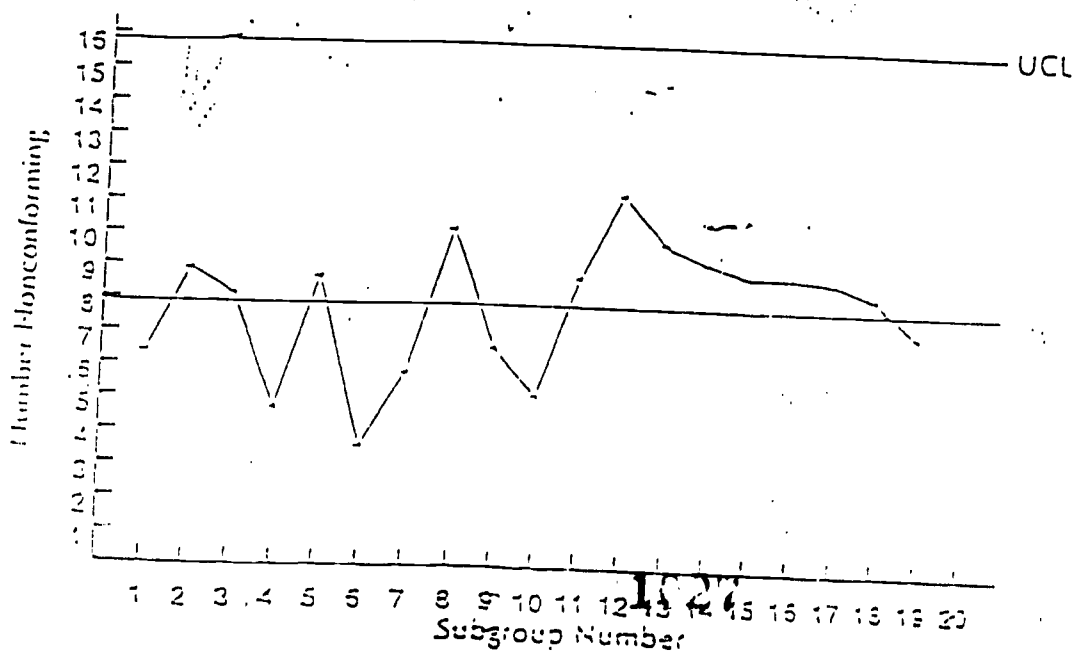
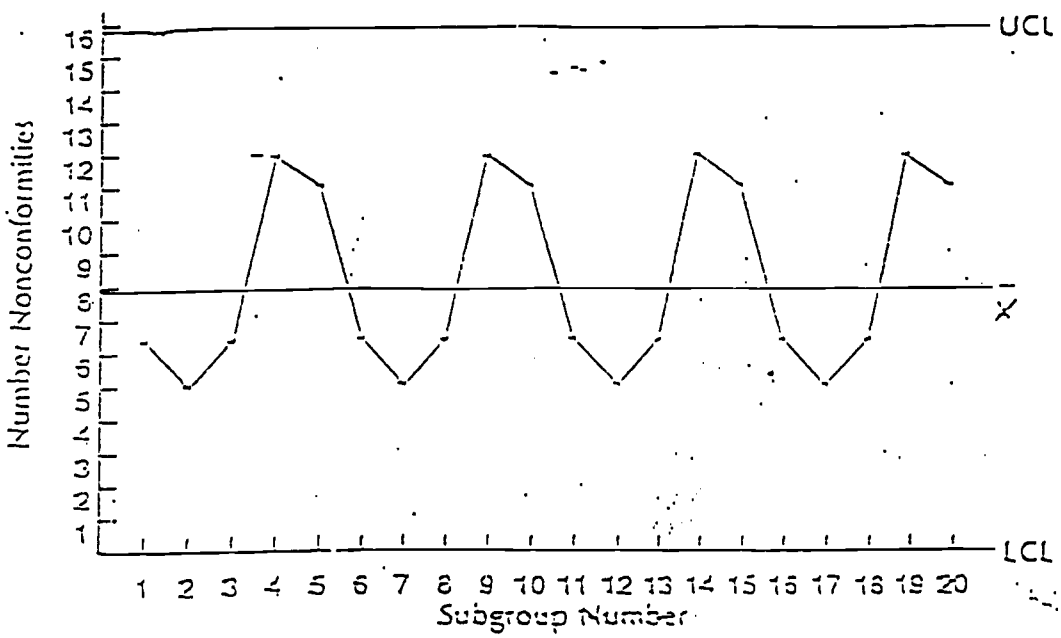


Chart #3 - Decision Rule_____

Line: Chips Ahoy!



Activity 31 - Understanding and Using Control Charts

Material Needed: Blank Control Chart

Directions: Plot the range on a blank control chart for the following scenario. You are making Cheese Nips and the weight samples are ranging between .5 and 1.5. The lower control limit for range is 0. The upper control limit for this chart is 2. Plot the ranges below on the control chart.

.5
.7
.8
.1
1.0
1.5
1.2
.9
1.5
.6
.6
.5
1.5
.4
1.3
1.4

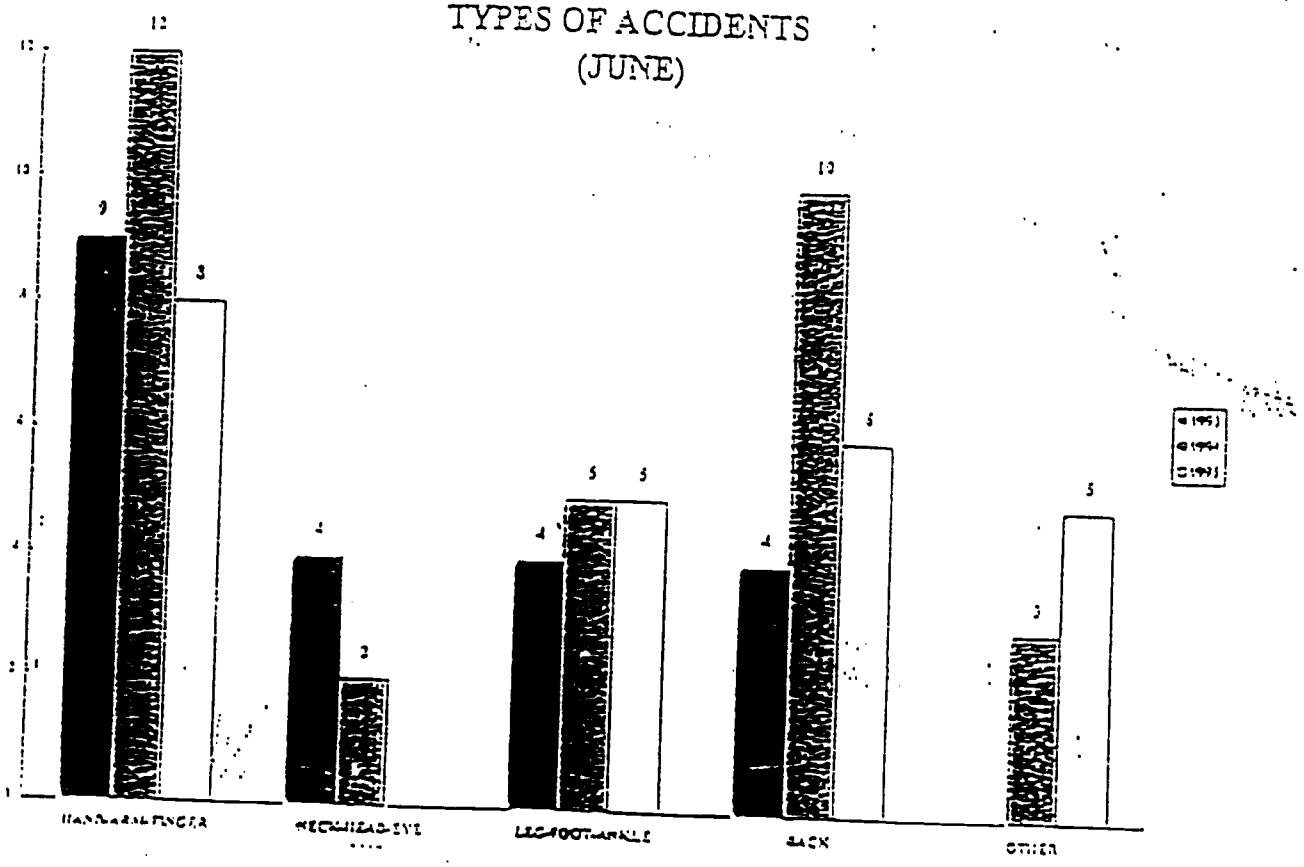
Activity 32 - Using Graphs & Charts in the Workplace Review

Objective (s): Participants will be able to

1. Understand trends relationships and decision making.

Material Needed: Pencil

Directions: Read the graphs and charts below. Use the tips you've learned in this module to answer the questions.



1. What is the title of this graph?_____

2. What type of data is represented on the x-axis?_____

3. What type of units are represented on the y-axis?_____

4. Is this a vertical graph? Yes____ No____

5. In what two years were the leg-foot-ankle accidents the same?
_____

6. What conclusion can you draw about the graph regarding the number of accidents that have occurred in June of 1994?_____

7. Compare the number of back accidents over the three year period?
_____

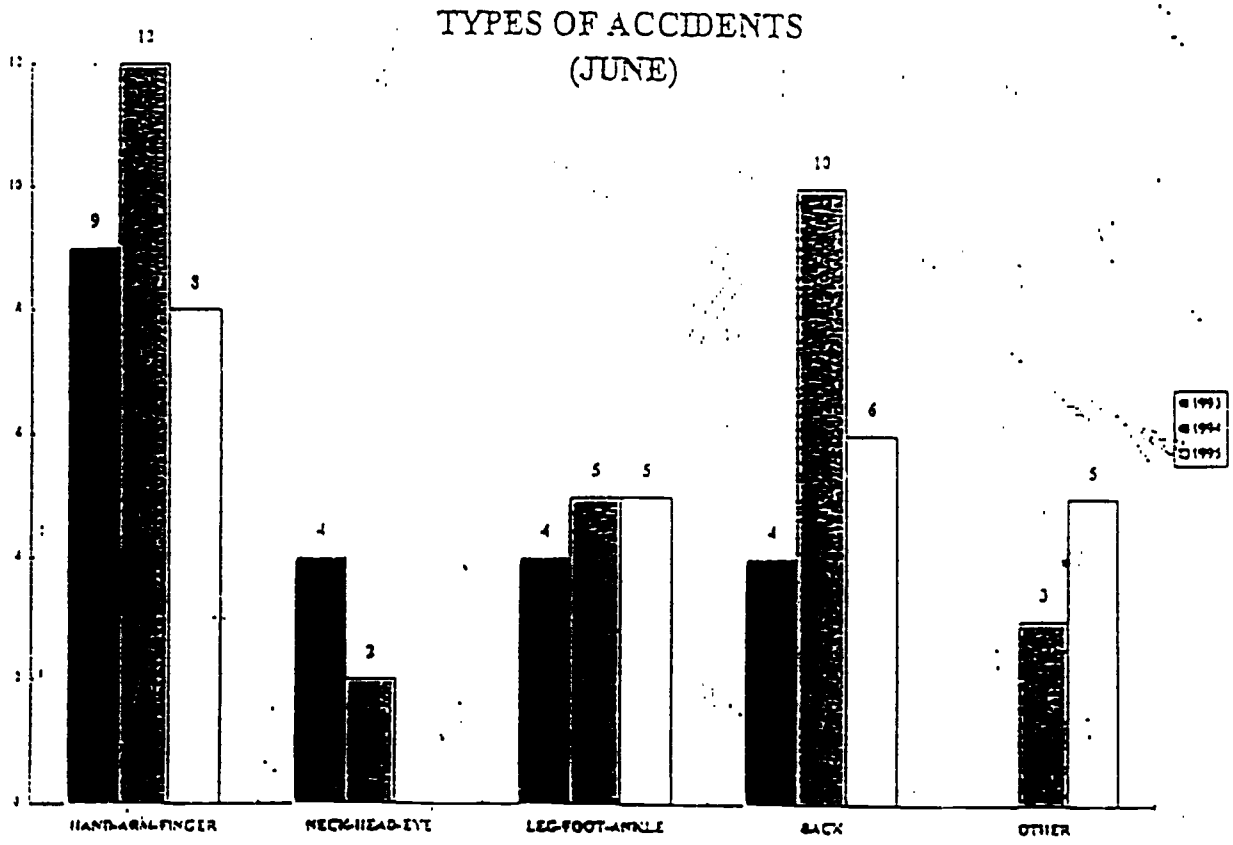
Activity 32 - Using Graphs & Charts in the Workplace Review

Objective (s): Participants will be able to

1. Understand trends relationships and decision making.

Material Needed: Pencil

Directions: Read the graphs and charts below. Use the tips you've learned in this module to answer the questions.

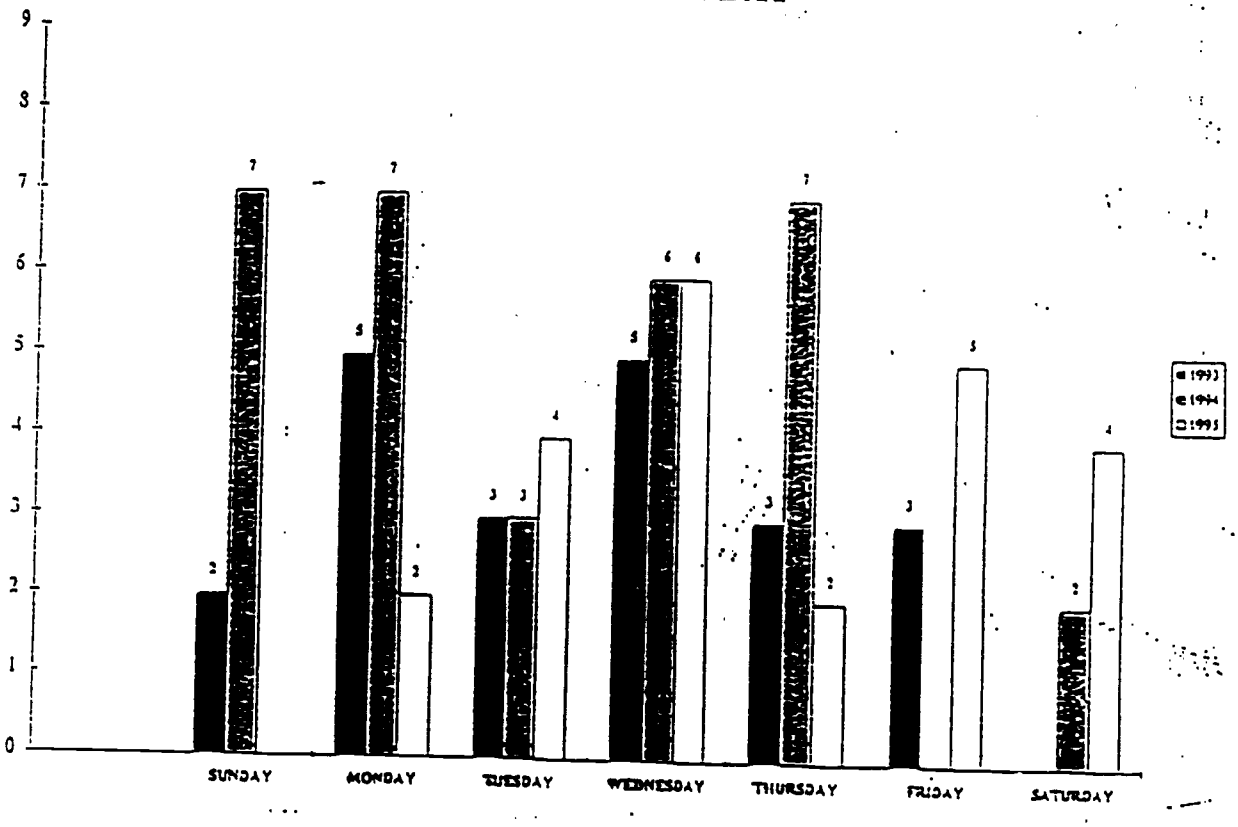


1. What is the title of this graph?_____

2. What type of data is represented on the x-axis?_____

3. What type of units are represented on the y-axis?_____

ACCIDENTS BY DAY



1. In 1994, which days show the same number of accidents per day?

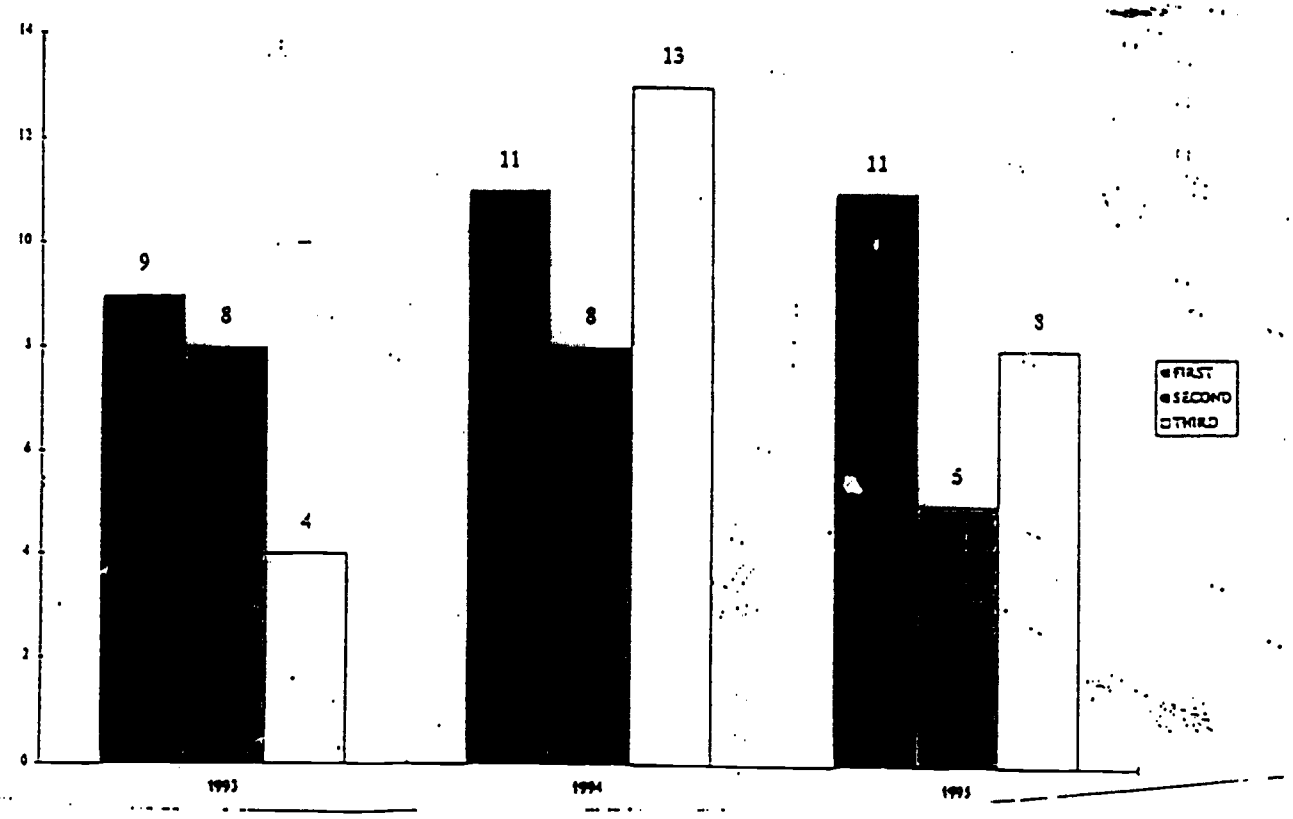
_____

2. In 1993, which day show the least amount of accidents per day?

_____

3. In 1995, there were accidents no recorded accidents on Sunday? (circle one) T or F

ACCIDENTS BY SHIFT



1. Which shift has recorded the highest number of accidents in 1994?
_____

2. Based on the data how would you summarize the accidents by shift over the time periods indicated?_____

Directions: Read the table below. Answer the questions.

DEPARTMENT	HOURS	JUNE ACCIDENTS	Y-T-D ACCIDENTS	JUNE LW D	Y-T-D LWD
MAINT.	23000	0	4	0	0
MIXING	16360	2	1	0	1
BAKING	16800	0	2	0	1
PACKING	62745	1	3	0	2
ENVIRON.	6609	0	0	0	0
WAREHOUSE	1345	0	0	0	0
SALARIED	20209	0	1	0	1
TOTAL	147068	3	11	0	5

1. According to the table, the Packing Department recorded the highest number of hours? (circle one) T or F

2. What was the total number of hours for all departments?_____

3. What was the June accident rate for the Mixing Department?_____

4. What is the Y-T-D Accident Rate for this facility?

_____

Directions: Look at the computer print outs of various data collected by Nabisco employees as they monitor the production process. Then answer the questions.

Chart #1 Product A

1. What are the upper and lower control limits shown on the chart?

   _____

2. The first sample on August 11 was at 7:40 a.m. Express that time in military time._____

3. In your own words, explain what information you understand is being shown in this chart?_____ _____

   _____

Product A, Shift 2, August 7-11, % Moisture

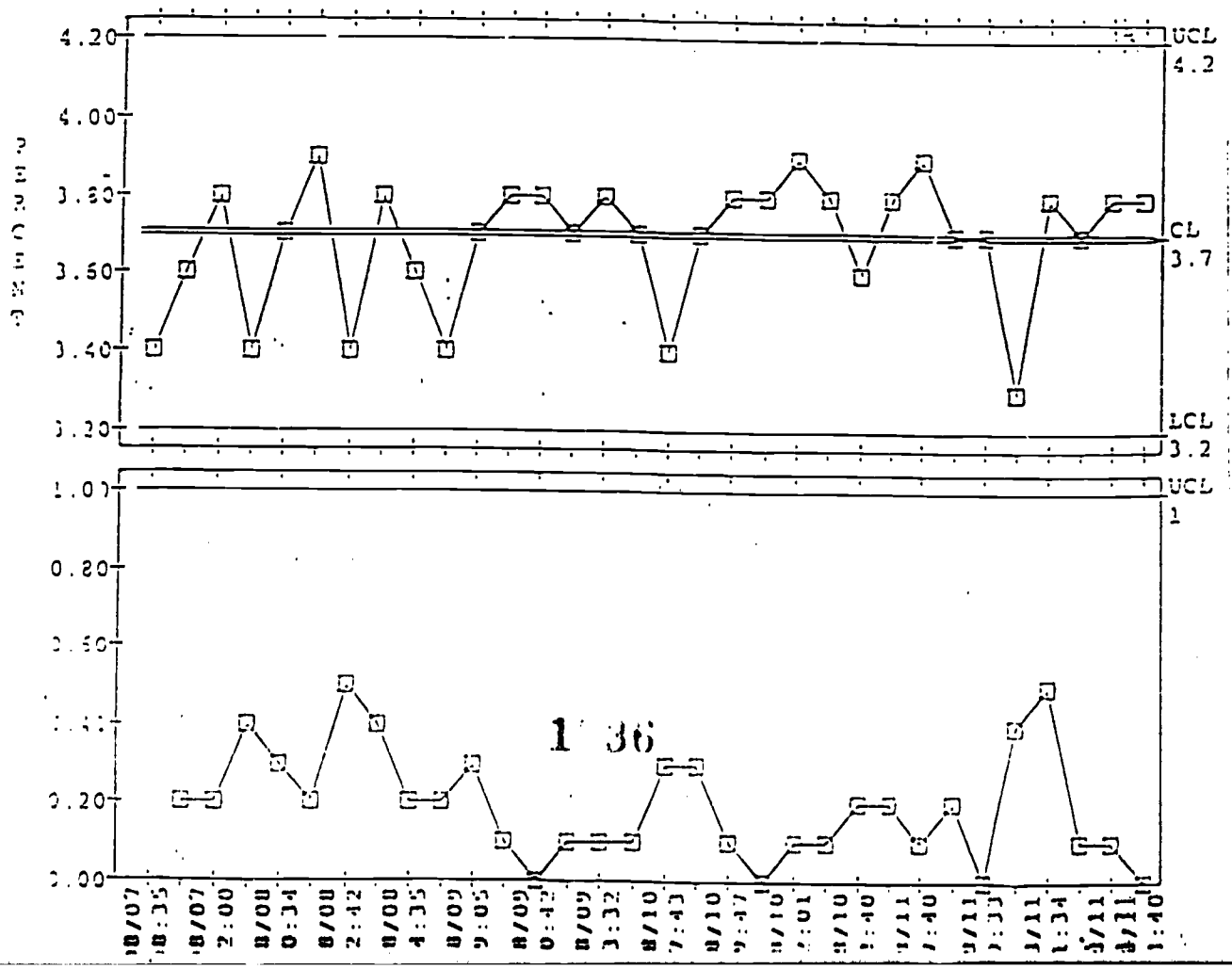
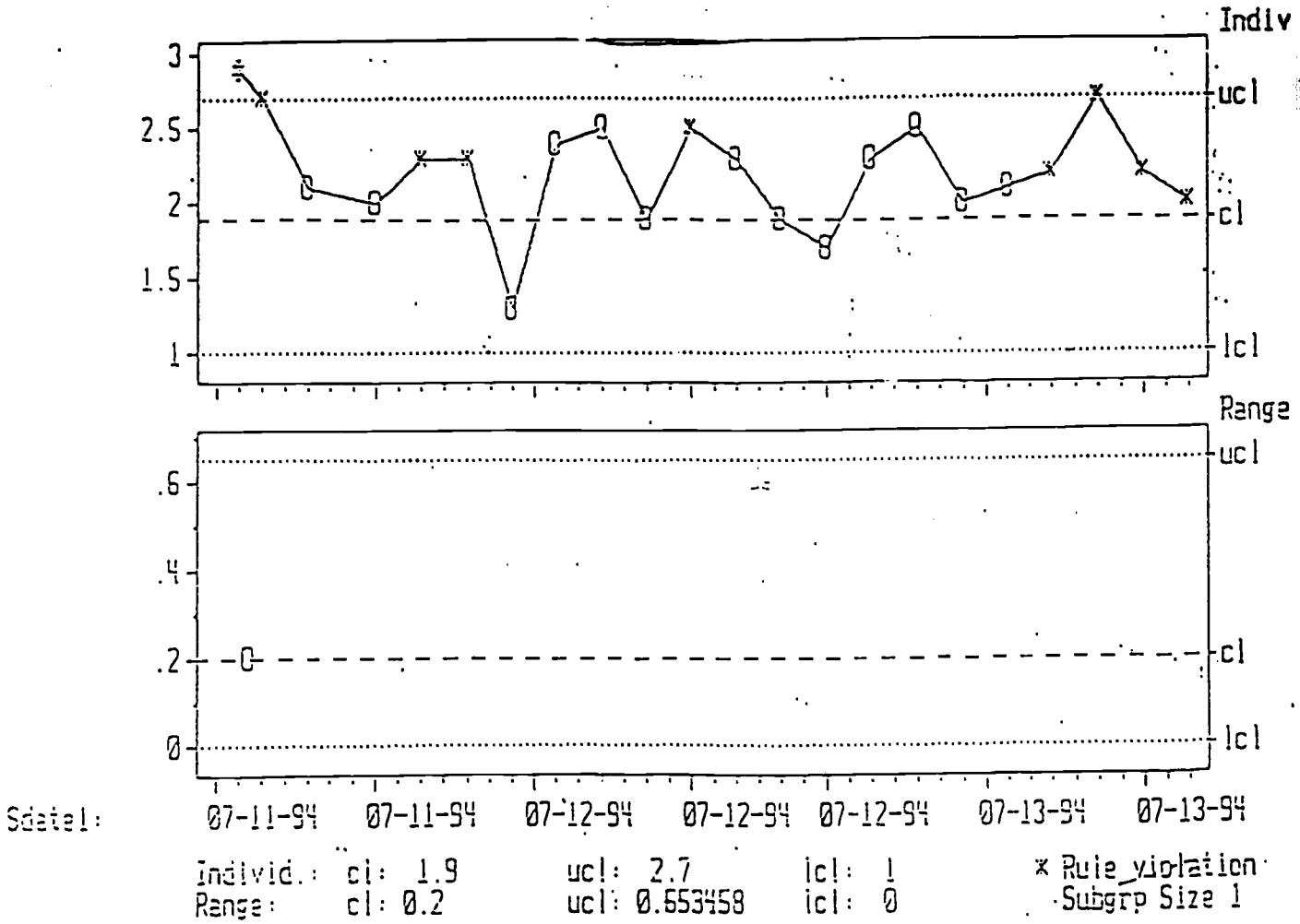


Chart #2

Product B, Shift 3, July 11-13, % Moisture



1. What is the upper control limit shown on the chart?

   _____

2. According to the data on the chart, numerous rule violations occurred. True____ False____

3. What symbol represents a rule violation on this chart?_____

   _____

4. In your own words, explain what information you understand is being shown in this chart?_____

Activity: 1 - Workplace Vocabulary

Objective(s):
1. Recognize and read workplace vocabulary words.
2. Change information from one form (syllables) to another form (full word).
3. Transfer information accurately.

Materials Required:
1. Workplace Vocabulary Lists

You need to know:

1. Syllables are parts of words. (Syl-la-bles)
2. Some words have only one syllable. For example: salt
3. Most words have more than one syllable.
   For example: sodium = so-di- um
4. Most of the time, syllables need to have a vowel to help them make the sounds that distinguish words from each other.
   The vowels are: a, e, i, o, u and sometimes y.

Directions:
1. Look at the list of workplace words and phrases on the opposite page.
2. The words and phrases have been separated into syllables.
3. Try to sound out or read the syllables.
4. Say the syllables together until you think you recognize the word or phras Have you heard the word before?
5. Write the word or phrase (group of words) you recognize in the space ne to the syllables of the word.
6. What other vocabulary words can you think of from your work area?
7. Add those words to the list. Ask for help if you need it.

Activity: - Workplace Vocabulary (continued)

Syllable	Word	Syllable	W
1. ad-just-ments			
2. a-ver-age			
3. con-trol charts			
4. de-part-ment			
5. dough build-up			
6. dough edg-es			
7. dough hop-per			
8. dough sam-ples			
9. gra-vi-ty			
10. guage rol-ler			
11. mal-func-tion			
12. mon-i-tor			
13. o-ven-hand			
14. re-si-due			
15. salt hop-per			
16. salt read-ing			
17. suc-tion hose			

Workplace Vocabulary - Sanitor/Utility

Syllables	Word
o ver heads	
sa ni tize	
fil ter bags	
brea ther bags	
mag ne tic se pa ra tor	
flo ta tion u nit	
mez za nine	
sif ter tail ings	
con ta mi na tion	
in fes ta tion	
pher mone	
fu mi ga tion	
phos tox in	
me thyl	
py re thrum	
gas tech	
mo dule	
re si du al spray	
ha zar dous ma te ri al	
ex haust	
fork lift	
flo ta tion u nit	
in ven to ry sheet	
cer ti fi ca tion	

Syllable	Word
e le va tor	pits
mag ni fy ing	glass
e mer gen cy	kit
neu tra lize	
a ci dic	
pes ti cide	
meal grin ders	
che mi cal sub stan ces	
phy si cal ha zard	
e mer gen cy pro ce dures	
pro tec tive e quip ment	
safe ty man u al	
ha zard com mu ni ca tion	
com bus ti ble	
cor ro sive	
car ci no gen	
ha zar dous in gre di ent	
flam ma ble	
per mis si ble ex po sure lim it	
dis po sa ble	
dis in fec tant	
res pi ra tor	
cer ti fied ap pli ca tor	

Activity: 1 - Workplace Vocabulary

Objective(s):

1. Recognize and read workplace vocabulary words.
2. Change information from one form (syllables) to another form (full word).
3. Transfer information accurately.

Materials Required:

1. Workplace Vocabulary Lists

You need to know:

1. Syllables are parts of words. (Syl-la-bles)
2. Some words have only one syllable. For example: salt
3. Most words have more than one syllable.
   For example: sodium = so-di-um
4. Most of the time, syllables need to have a vowel to help them make the sounds that distinguish words from each other.
   The vowels are: a, e, i, o, u and sometimes y.

Directions:

1. Look at the list of workplace words and phrases.
2. The words and phrases have been separated into syllables.
3. Try to sound out or read the syllables.
4. Say the syllables together until you think you recognize the word or phrase. Have you heard the word before?
5. Write the word or phrase (group of words) you recognize in the space next to the syllables of the word.
6. What other vocabulary words can you think of from your work area?
7. Add those words to the list. Ask for help if you need it.

Activity: 1 - Workplace Vocabulary (continued)

Syllable	Word	Syllable	Word

Activity: 2 - Abbreviations and Symbols (continued)

_____	1	a.
_____	2	b.
_____	3	c.
_____	4	d.
_____	5	e.
_____	6	f.
_____	7	g.
_____	8	h.
_____	9	i.
_____	10	j.
_____	11	k.
_____	12	l.
_____	13	m.
_____	14	n.
_____	15	o.
_____	16	p.
_____	17	q.
_____	18	r.
_____	19	s.
_____	20	t.
_____	21	u.
_____	22	v.
_____	23	w.
_____	24	x.
_____	25	y.
	26	z.

Activity: 2 - Abbreviations and Symbols

Objective(s):

1. Recognize workplace abbreviations and acronyms commonly used.
2. Change information from one form (whole word) to another form (abbreviation)

Materials Required:

Pen or pencil

You need to know:

1. Abbreviations are a short way to write a word.
2. Most abbreviations are made by taking some of the letters out of a word.
3. Some abbreviations are very different from their words.
4. Acronyms are a special kind of abbreviation. Acronyms are words that are made from the first letters of a phrase. Example: WOW stands for War on Waste at the Richmond Nabisco Facility.

Directions:

1. On the next page, put the letter of the abbreviation next to the correct word.

2. Can you think of any abbreviations used in your work area?

3. Add them to the list.

Abbreviations and Symbols

____ 1. Good Manufacturing Procedures	a. MSDS
____ 2. Material Safety Data Sheet	b. OSHA
____ 3. Occupational Safety and Health Administration	c. GMP

Activity: 3 - Personal Word Bank

Objective(s):

1. Transfer information from a source to a document and proofread.
2. Compile and maintain personal word bank of terms, abbreviations and acronyms.

Materials Required:

1. Completed workplace vocabulary list
2. Personal word bank sheets

Directions:

1. Put a check by all the words on your vocabulary list that you need to learn more about.

2. Write the words and their abbreviation (if they have one) in your personal word bank on the page. You can get more sheets as you need them.

3. Proofread (check) the words to be sure you spelled them correctly.

4. Read the headings for each of the columns in the word bank.

5. Fill in the spaces with as much as you now know about each of your words.

6. Each day, add more information to your word bank as you learn more about your words.

7. Each day, add words that you need to learn more about to your word bank. Talk to your facilitator about how many words you should add to your word bank each day.

PERSONAL WORD BANK

WORD	ABBREVIATION OR ACRONYM	WHERE SEEN? (LABEL, FORM, SIGN)	WHERE HEARD? JOB OR DEPT. USED IN	WHAT IS IT?

Activity: 4 - Reading Safety Guidelines

Objective(s):

1. To recognize key words in safety rules.
2. To use logic in completing the meaning of safety rules.
3. To transfer information and proofread.

Materials Required:

1. Nabisco Safety Guidelines Sheet
2. Word List

You need to know:

1. To do any kind of job or task right, you have to know what the terms mean that are being used in the job.
2. You can understand many terms just by the context (the setting in which a word is used).
3. When you come across a new word, underline it or write it down. But don't think about the meaning of the word yet.
4. Read the sentence and understand the idea that is presented.
5. Once you understand the context, guess at the meaning of the new word. Many times you'll be right!

Activity: 4 - Reading Safety Guidelines (continued)

Directions:

1. Read the word list below. Ask for help with words you don't know.

2. Read the rules on the opposite page carefully. Think about the clues you get in each rule. Ask for help with words you don't know.

3. Think about the meaning of each of the rules and then fill in the spaces with a word from the list. Use each word only once.

4. Read the completed rules.

5. Do the rules make complete sense now? Ask for help if you need it.

6. Add any words you had trouble with to your word bank.

Word List

clogs	lounges	medical	extinguisher
minor	qualified	non-skid	fork lifts
spills	littering	production	recommend
posted	prohibited	equipment	open-toed
unsafe	operating	supervision	transporters
smoking	committee	training	safety signs
jewelry	emergency	evacuation	operate

Activity: 4 - Reading Safety Guidelines (continued)

In addition to the key essential safety rules, the following safety guidelines also apply to the Richmond Facility:

1. Observe all _____ and/or restrictions.
2. _____ is only permitted in the following areas: cafeteria, lounges and offices where posted.
3. Only _____ operators are permitted to _____ transporters, forklifts, etc., for their intended use.
4. High-heels, _____, moccasins, sandals, and _____ shoes are _____ while at work. Safe, _____ soles in good condition are _____ for all employees.
5. Report and/or clean up _____ immediately to prevent falls. _____ is prohibited.
6. _____ may not be worn in _____ areas. The only exception is wedding bands.
7. Stop and check for _____ and other moving equipment prior to entering all walkways.
8. Broken/damaged _____ (stools, ladders, etc.) must not be used and must be reported to _____ at once for corrective action.
9. All "Safe _____ Procedures" (chemical handling, confined space entry, machine/equipment operation, etc.), as covered in a _____ class or as _____, must be followed.
10. Always be alert to _____ conditions and practices. Notify supervision or a member of the safety _____ of any unsafe condition and/or unsafe act immediately.
11. Know the location of the nearest _____ phone, fire _____, fire exit, and know the facility _____ procedure.
12. Report all injuries, regardless of how _____, to your immediate supervisor and/or the _____ department.

The above safety rules and expectations apply to the Richmond Facility and are not all inclusive.

Activity: 4 - Reading Safety Guidelines (continued)

In addition to the key essential safety rules, the following safety guidelines also apply to the Richmond Facility:

1. Observe all **safety signs** and/or restrictions.
2. **Smoking** is only permitted in the following areas: cafeteria, lounges and offices where posted.
3. Only **qualified** operators are permitted to **operate** transporters, forklifts, etc., for their intended use.
4. High-heels, **clogs**, moccasins, sandals, and **open-toed** shoes are **prohibited** while at work. Safe, **non-skid** soles in good condition are **recommended** for all employees.
5. Report and/or clean up **spills** immediately to prevent falls. **Littering** is prohibited.
6. **Jewelry** may not be worn in **production** areas. The only exception is wedding bands.
7. Stop and check for **fork lifts** and other moving equipment prior to entering all walkways.
8. Broken/damaged **equipment** (stools, ladders, etc.) must not be used and must be reported to **supervision** at once for corrective action.
9. All "Safe **Operating** Procedures" (chemical handling, confined space entry, machine/equipment operation, etc.), as covered in a **training** class or as **posted**, must be followed.
10. Always be alert to **unsafe** conditions and practices. Notify supervision or a member of the safety **committee** of any unsafe condition and/or unsafe act immediately.
11. Know the location of the nearest **emergency** phone, fire **extinguisher**, fire exit, and know the facility **evacuation** procedure.
12. Report all injuries, regardless of how **minor**, to your immediate supervisor and/or the **medical** department.

The above safety rules and expectations apply to the Richmond Facility and are not all inclusive.

Activity: 5 - Reading Safety Rules

Richmond Bakery/Distribution Center
Safety Rules and Expectations

The Richmond Facility makes every effort to provide you with working condi-tions that are pleasant and safe. However, you have a personal responsibility as well by following established safety rules and expectations in order to protect yourself and your co-workers from bodily injury. Neglect of your responsibility towards safety and violation of company safety rules cannot be allowed. This is the only way to make our facility a safer and healthier place to live.

The following are KEY ESSENTIAL Safety rules which must be strictly followed. Failure to do so will result in disciplinary action, up to and including discharge.

1. Safety devices and guards may not be removed or bypassed without proper authorization.
2. Compliance with Richmond's Lockout Program is expected of all employees.
3. No one shall at any time, without proper authorization, clean operating equipment within arm's length of any pinch point, conveyor roller or unguarded pulley, chain or sprocket.
4. Only authorized, trained personnel may operate machinery or mechanical equipment. No one shall activate powered equipment without confirming visually or audibly that no one is within arm's length of any moving machinery parts and that all existing guards are in place.
5. Personal protective equipment issued by the company must be worn at all times in areas or jobs where required.
6. No one shall work on or maintain any electrical panel, switch, light fixture, or outlet without de-energizing and locking and tagging out such equipment. No employee shall at any time work on electrical systems above 480V.
7. Air hoses are to be used only for equipment cleaning and not for personal cleaning.
8. No one shall work at heights above six (6) feet (except on a ladder) without some sort of fall restraint.

Activity: 5 - Richmond Bakery Safety Rules - Part I

Objective(s):

1. Read and interpret safety rules.

Materials Required:
Safety Rules and Expectations Handout

Directions:
1. Read the safety handout on the opposite page.

2. Underline any words that you don't know and add those words to your word bank.

3. Ask for help on words that you do not recognize and cannot sound out by yourself.

4. The sentences below are a summary of the rules on the opposite page. Read them carefully.

5. Put the number of the rule by its summary below.

6. Turn this page and check your answers.

_____a. Don't work on electrical current that is more than 480V.
_____b. Be sure no one is close enough to touch any moving parts of a machine before turning the machine on.
_____c. Don't climb higher than six (6) feet above the floor without a railing around you unless you're on a ladder.
_____d. Use air hoses only to clean equipment; not to clean you.
_____e. Get approval to take safety guards off.
_____f. Only approved employees may use machinery.
_____g. Get approval to clean equipment that is within arm's length to a pinch point, conveyor roller or unguarded pulley, chain or sprocket.
_____h. Know and keep the lockout rules.
_____i. Always use your safety equipment while on the job.

Activity 5: Answers
a-6, b-4, c-8, d-7, e-1, f-4, g-3, h-2, i-5

Activity: 6 - Reading to Interpret Richmond Bakery Safety Rules - Part 1

Objective(s):

1. Read and interpret safety rules.
2. Summarize safety rules in the form of a sign.
3. Assign an appropriate color to each safety sign.

Materials Required:

1. Completed Activity 5 materials
2. Blank signs
3. Sign words

Directions:

1. Read the signs on the opposite page.

2. Review the bakery safety rules from Activity 5.

Activity: 6 - Reading to Interpret Richmond Bakery Safety Rules - Part 2

Directions: (continued)

3. Use the blank spaces below to create a safety sign for each of the bakery rules.

4. Choose from the signs and words on the opposite page or use your own words.

5. Be sure the sign you make for each rule is a good summary of that rule.

6. After you make the signs, think about the best color for each sign to be. Write the name of the color on the sign.

7. Discuss with your group where you think the signs should be placed in the bakery. Refer to the rules.

Rule 1			Rule 6
Rule 2			Rule 7
Rule 3			Rule 8
Rule 4			Bonus Rule ☺
Rule 5			Bonus Rule☺

Actvity: 6 - Reading to Interpret Richmond Bakery Safety Rules - Part 2 - Signs

HOLD	CAUTION RESTRAINT NEEDED	AUTHORIZED PERSONNEL ONLY
THINK	STOP HIGH VOLTAGE - 480V	HIGH VOLTAGE
DANGER	STOP ! VOLTAGE > 480V	DO NOT ENTER
KEEP OUT	OBEY LOCKOUT	LOOK OUT FOR TRUCKS
LUNCH BREAK	AUTHORIZED USE ONLY	HANDLE WITH CARE
MACHINE #	APPROVED CLEANING ONLY	LOAD LIMITS _____ LBS.
MISSION	NO SMOKING	RETURN TO STORAGE
TARE 575	REJECTED	CAUTION - HIGH VOLTAGE
FRAGILE	STAY AWAY - MOVING PARTS	EQUIPMENT USE ONLY
FIRE EXIT	KEEP HANDS CLEAR	SAFETY GEAR REQUIRED
DANGER - HOT	QUALITY FIRST	STOP - LOOK - LISTEN •ON
DO NOT SHIP	NO. _____ SHIPPERS	DO NOT REMOVE
DO NOT USE	KEEP GUARD IN PLACE	STOP HIGH VOLTAGE LOCKOUT

1059

READING

Activity - Oreo Story

Objective - To have participants practice reading comprehension skills.

Directions - 1. Read the newspaper article on the next page.

2. Answer the following questions about the article.

True or False

_____ 1. The most popular way to eat Oreos is with milk.

_____ 2. The second most popular way to eat Oreos is with coffee.

_____ 3. Generally, most women prefer to twist their Oreos while most of the dunkers are men.

_____ 4. Many Oreos eaters eat the cookies with peanut butter.

_____ 5. A majority of people who twist their Oreos eat the frosted side first.

_____ 6. After twisting, dunking and nibbling Oreos, the other most popular way to eat Oreos is whole.

_____ 7. Fewer than 100,000 people participated in this survey.

_____ 8. The people who participated in this survey filled out a post card and sent it in.

_____ 9. Which of the graphs on the following page best illustrates the way Americans prefer to eat their Oreos. (Put the letter in the blank.)

Callers tell of twisting, dunking, nibbling Oreos

BY KAREN SHEDELER
KNIGHT-RIDDER NEWSPAPERS

DO WE KNOW how to eat our Oreos or what?

Well, OK, a third of us know you're supposed to twist.

Hey, it's a fact.

More than 174,000 people called a toll-free telephone number to register their opinions on the way to eat Oreos, obviously making the poll highly scientific. "Plus or minus some decimal point," agreed Mikki Barrows, who is on the Nabisco public relations team. "Pinpoint accuracy."

Those who called were asked to choose among twisting, dunking, nibbling or "other." If they chose "other," their comments were recorded. Some, you don't want to know about (Oreos and horseradish).

"We discovered that Americans as a whole prefer to twist by 35 percent, followed by dunking at 30 percent. Nibbling came in last at 16 percent. And 'other' methods actually came in third at 19 percent," Barrows said.

Women twist; men dunk. Except in El Paso, Texas, and Springfield, Mo., where it's the other way around. "We don't know what to make of that," Barrows said.

In Chicago, they dunk. And "every significant city in Pennsylvania registers as a dunking city."

The nibblers are Norfolk; Oklahoma City; Savannah, Ga.; and Kingsport-Johnson City, Tenn.

Tipster and Salt Lake City are among the places people prefer those "other" methods.

"The most popular 'other' was probably eating them whole. One pop," Barrows said.

And lots of people have to have their Oreos with something, Barrows found in reading the 28,000 transcribed "other" replies. "Of course, the No. 1 combination obviously was Oreos and milk." Obviously. The second most popular was Oreos and peanut butter.

Peanut butter?

"That's what I said, and I never in a million years would have tried it," said Barrows, who — in the name of job dedication — did. "And you know, it's actually quite good."

The peanut butter group fell into two subspecies: Those who use the Oreo like a chip and the peanut butter like a dip, and those who crack open the cookie, spread a precise amount on one side and put the cookie back together.

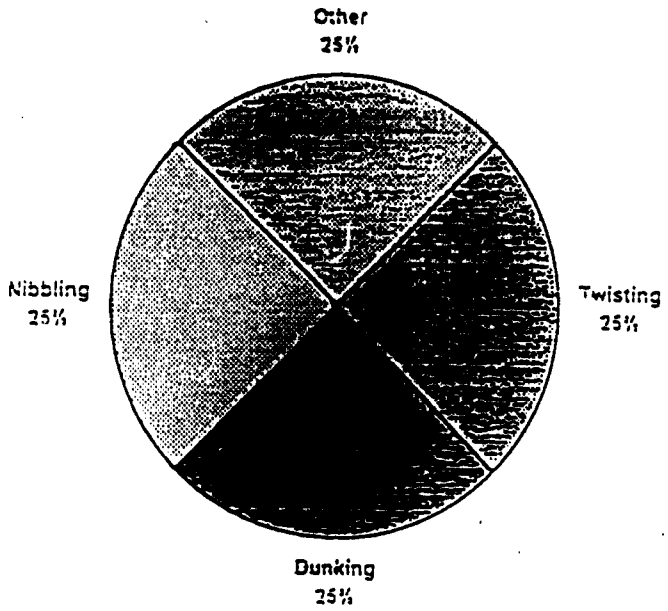
Also among the other combinations: Oreos with salsa. Oreos with beer. Oreos with coffee. And the aforementioned horseradish. "I think we had a list of 60 different things. . . . And no, I haven't tried hardly any of them." Barrows eats his Oreos "the good, old-fashioned way: three bites. Three even bites. No twisting, no dunking."

Nabisco didn't bother to ask twisters which side of the cookie should be eaten first — the plain side or the frosting side. "We figured this was enough information to compile this year," Barrows said. "We are thinking about doing further study next year."

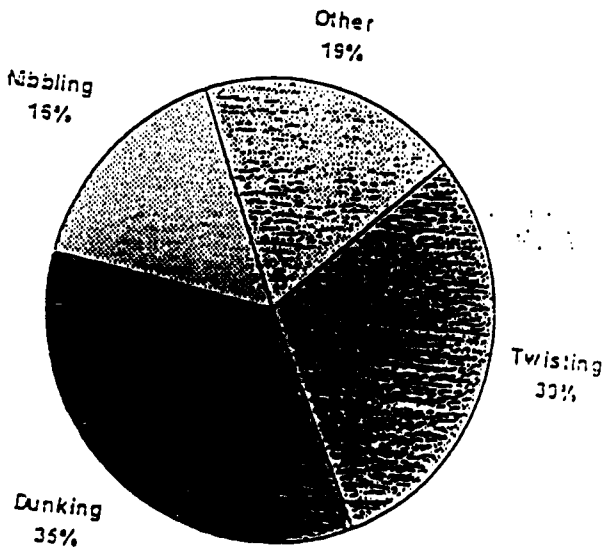
In the informal poll, dunking was the second-most popular method of eating Oreos.

In Chicago, they dunk. The nibblers are Norfolk; Oklahoma City; Savannah, Ga.; and Kingsport-Johnson City, Tenn.

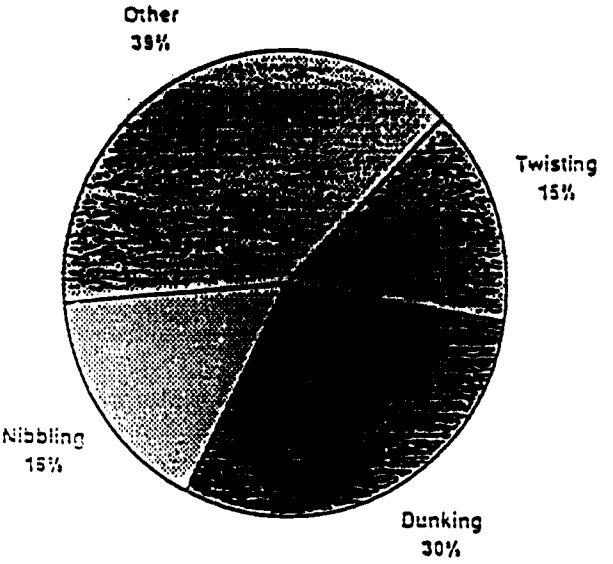
A.


Other
25%
Nibbling
25%
Twisting
25%
Dunking
25%

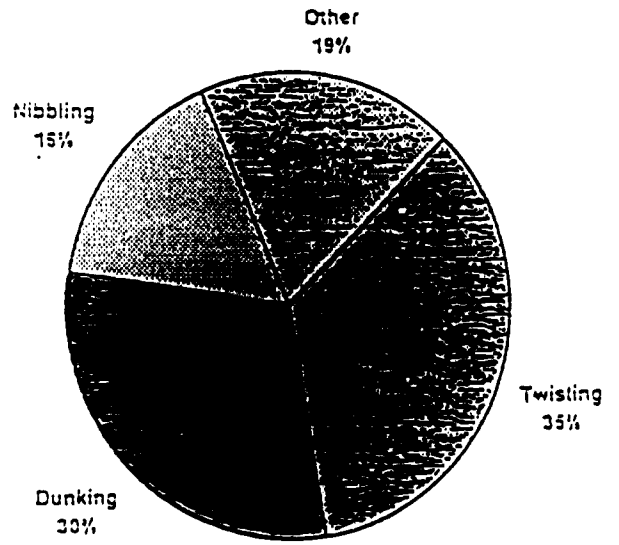
B.


Other
19%
Nibbling
16%
Twisting
30%
Dunking
35%

C.


Other
35%
Twisting
15%
Nibbling
15%
Dunking
30%

D.


Other
19%
Nibbling
15%
Twisting
35%
Dunking
30%

Reading Comprehension - Reading MSDS

Activity 1- Becoming Familiar with a Material Data Safety Sheet (MSDS)

Objective (s): This activity will enable participants

1. To understand the importance of a MSDS sheet.

2. To become familiar with a MSDS sheet.

Material Needed: pencil

Directions: Read the paragraph below. Think about the information you are reading. Consider what important points are presented. Then answer the questions. You may refer back to the paragraph, if you missed some details in reading.

Material Data Sheets are Important

In some work environments it is necessary for employees to handle or use hazardous chemicals. For example, at Nabisco the Environmental Health & Safety Department's Sanitation and Utility Technicians use various chemicals to sanitize areas and equipment. To succeed in doing a good and safe job, the technicians must understand how to use chemicals in a safe way. That's why the hazardous chemicals have their very own Material Safety Data Sheet (MSDS). MSDS are very important to Nabisco employees because they provide written information (or data) about how to use, handle, and store the chemical safely. Each MSDS may look a little different, but they all give the same basic information. If a sanitation employee has questions about a MSDS sheet, he/she should ask a supervisor. The sheet has the following sections:

1. Chemical Identification
2. Hazardous Ingredients
3. Physical Data
4. Fire & Explosion Data
5. Health Hazards
6. Reactivity Data
7. Spill or Leak Procedures
8. Special Protection
9. Special Precautions

Questions: Please fill in the blank or check the correct answer.

1. After reading the paragraph, what is your definition of a MSDS sheet?_____

2. What are the major sections of a MSDS sheet?_____
_____
_____

3. Why are MSDS sheets important?_____
_____
_____

4. If an employee has a question about a MSDS sheet, who should he/she ask?_____

5. Why do you think it is important to read a MSDS sheet?
_____

6. Every hazardous chemical used at Nabisco has a MSDS sheet that is organized in the same way? True____ False____

7. The MSDS sheet tells you how to use_____, _____ and _____the chemical safely.

8. What can you find out by reading a MSDS Sheet?_____
_____

9. Most MSDS sheets have nine basic sections of information.
True____ False____

Activity 2 - Understanding the Contents of the MSDS Sheets

Objective (s): This activity will enable participants

1. The become familiar with the contents of MSDS.

2. To understand how most material data sheets are organized.

Materials Needed: MSDS sheet contents handout, MSDS with missing section names, pencils

Directions: Read the handout about the sections of a MSDS sheet. Notice the names of the sections in BOLD face type.

Contents of a Material Safety Data Sheet

The MSDS for each hazardous chemical in your work area tells you how to use, handle, and store the chemical safely. Each MSDS may look a little different, but all give you the same basic information. Read the information below to learn more about what's included in the different sections of a MSDS sheet. If you have any specific questions, you can check with your supervisor.

Chemical Identification. The first section of the MSDS helps you identify the chemical. It lists the name of the chemical, any trade names, and the chemical manufacturer's name and address. This section may also list an emergency telephone number.

Hazardous ingredients. This section lists what's in the chemical that can harm you. It also lists the concentration of the chemical to which you an safely be exposed, often listed as the ***permissible exposure limit (PEL)*** or the *threshold limit value (TLV)*. These safe exposure limits are usually figured for average exposures over a typical work shift.

Physical Data. This section describes the chemical's appearance, odor, and other characteristics, ***percent volatile***, for instance, is how much of the chemical evaporates at room temperature. It can be harmful if inhaled. Respiratory protection or extra ventilation may be needed.

Contents of a Material Safety Data Sheet

Fire & Explosion Data. Here you can find at what temperature the chemical ignites called the ***flash point.*** If a chemical is **flammable**, it **ignites below 100°F. If it's *combustible*** **it ignites at 100°F or above.** This section also lists **extinguishing media** - what will put out the fire safely- such as water spray, foam, or other type fire extinguisher.

Health Hazards. This section lists symptoms of overexposure, such as skin rash, burn, headache, or dizziness. It also tells you first aid and emergency procedures in case of overexposure, such as flushing your exposed skin running water for 15 minutes. It may also list any medical conditions that can be aggravated by exposure to the chemical.

Reactivity Data. Here you'll find whether the chemical "reacts" with materials or conditions. ***Incompatibility*** lists the materials, such as water or other chemicals, that cause the chemical to burn, explode, or release dangerous gases. ***Instability*** lists the environmental conditions, such as heat or direct sunlight, that cause a dangerous reaction.

Spill or Leak Procedures. This section tells you what to use to clean up an accidental spill or leak. No matter what the chemical is, always notify your supervisor right away. Before cleaning up a chemical spill, you may need to wear respiratory protection, gloves, safety goggles, or protective clothing. This section may also include notes on how to dispose of the chemical safely.

Contents of a Material Safety Data Sheet

Special Protection. Here you'll find a listing of any personal protective equipment (respiratory protection, gloves, eye protection) you need to work safely with the chemical. If protective equipment is needed, this section may list the specific types that are recommended, such as full-face mask respirator, rubber gloves, and chemical safety goggles.

Special Precautions. This section lists any other special precautions to follow when handling the chemical. This may include what to have nearby to clean up a spill or put out a fire, and what safety signs to post near the chemical. This section also lists any other health and safety information not covered in other parts of the MSDS.

Activity 3 - Identifying & Understanding the Contents of a MSDS Sheet

Objective (s): This activity will enable particpants

1. To become familiar with the contents of a MSDS.

2. To understand how most material data sheets are organized.

Material Needed: Sheets with missing section names, pencils

Directions: Use the handout you just READ from Activity 2 about the contents of MSDS sheets. Now, fill in the missing section names on the MSDS sheets provided.

Material Safety Data Sheet

H&R
Haarmann & Reimer
A MILES INC. COMPANY
75 Diamond Road
Springfield, New Jersey 07

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

Hazard Present: : Hazard
Health: 1 0 = None
Flammability: 0 1 = Slight
Reactivity: 0 2 = Moderate
3 = Serious
4 = Severe

I.

A. PRODUCT NAME : 263092 DARITEEN NCF-247M(COLORED)

B. CHEMICAL NAME : ENZYME MODIFIED CHEDDAR CHEESE (PROCESSED CHEESE T

C. CLASSIFICATION : FLAVOR MATERIAL

D. CAS NO. : NA

II.

A. FLASH POINT (CC / DEG F) : NF

B. EXTINGUISHING MEDIA : (Y) H2O FOG; (Y) FOAM; (Y) CO2; (Y) DRY CHEM

C. SPECIAL PROCEDURES/UNUSUAL HAZARDS : USE SELF CONTAINED BREATHING APPARATUS. FIRE WILL GENERATE CO, CO2, AND SMOKE.

D. STABILITY : STABLE UNDER NORMAL CONDITIONS OF STORAGE AND USE.

E. CONDITIONS/MATERIALS TO AVOID : AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

F. HAZARDOUS POLYMERIZATION POTENTIAL : NONE.

III.

A. EYE : SAFETY GLASSES

B. SKIN : OIL/SOLVENT RESISTENT GLOVES.

C. RESPIRATORY : RESPIRATORY : NOT REQUIRED

D. OTHER : USE IN A WELL VENTILATED AREA.

E. EXPOSURE LIMITS : NOT ESTABLISHED.

Material Safety Data Sheet

H&R
Haarmann & Reimer
A MILES INC. COMPANY
77 Downs Road
Somerset, New Jersey 0

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

PRODUCT : 263C92

Hazard Present:
Health: 1
Flammability: 0
Reactivity: 0

Hazard
0 = Min
1 = Sli
2 = Mod
3 = Ser
4 = Sev

IV.

A. INHALATION EXPOSURE : REMOVE TO FRESH AIR.

B. EYE CONTACT : FLUSH WITH WATER FOR 15 MINUTES. CONSULT PHYSICIAN IRRITATION CONTINUES.

C. SKIN CONTACT : WASH WITH SOAP AND WATER.

D. OTHER : NONE.

V.

A. INGREDIENTS(S) POSING HAZARD : NOT APPLICABLE.

B. ROUTE OF EXPOSURE AND EFFECTS OF OVEREXPOSURE : PROLONGED OR REPEAT CONTACT MAY CAUSE SKIN IRRITATION. MAY CAUSE EYE IRRITATION.

VI.

A. APPEARANCE AND ODOR : CREAM COLORED PASTE

B. PHYSICAL PROPERTIES : NF

VII.

A. SPILLS AND LEAKS : COLLECT ONTO INERT ABSORBENT. PLACE INTO A SUITABLE CONTAINER.

B. DISPOSAL : DISPOSE OF IN ACCORDANCE WITH LOCAL REGULATIONS.

VIII.

KEEP CONTAINERS TIGHTLY CLOSED, STORE IN A COOL DRY AREA AWAY FROM HEAT AND DIRECT SUNLIGHT.

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name AJINOMOTO CO., INC.	Emergency Telephone Number NJ OFFICE : 201-433-1212
Address (Number, Street, City, State, and ZIP Code) TOKYO, JAPAN	Telephone Number for Information NJ OFFICE : 201-433-1212
	Date Prepared 3-26-91
	Signature of Preparer (optional)

Section II —

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
MONOSODIUM L-GLUTAMATE MONOHYDRATE (MONOSODIUM GLUTAMATE)				

Section III — Physical/Chemical Characteristics

Boiling Point	SOLID	Specific Gravity (H_2O = 1)	1.62
Vapor Pressure (mm Hg.)	28.1025*	Melting Point	450 F 232 C
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	NONE

Solubility in Water
17g/100g H_2O at 25°C

Appearance and Odor
WHITE OR ALMOST WHITE NEEDLES OR POWDER WITH A SLIGHT PEPTONE ODOR

Section IV —

Flash Point (Method Used) NOT ESTABLISHED	Flammable Limits NON-FLAMMABLE	LEL	UEL

Extinguishing Media
IF INVOLVED IN FIRE, WATER OR CO_2 MAY BE USED

Special Fire Fighting Procedures
NONE SPECIAL. NONE NORMALLY REQUIRED

Unusual Fire and Explosion Hazards

Section V —

Stability	Unstable		Conditions to Avoid
	Stable X		DECOMPOSES AT TEMPERATURES ABOVE 375°

Incompatibility (*Materials to Avoid*) NONE REPORTED

Hazardous Decomposition or Byproducts NONE

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	NONE

Section VI —

Route(s) of Entry: Inhalation? Skin? Ingestion? X

Health Hazards (*Acute and Chronic*)

GENERALLY RECOGNIZED AS SAFE

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated? NO

Signs and Symptoms of Exposure

NONE. EXCESSIVE CONTACT MAY CAUSE EYE IRRITATION.

Medical Conditions Generally Aggravated by Exposure

NONE

Emergency and First Aid Procedures NON-TOXIC SUBSTANCE. FLUSH EYE WITH PLENTY OF WATER---

AND GET MEDICAL ATTENTION IF LARGE AMOUNT IS INGESTED

Section VII —

Steps to Be Taken in Case Material Is Released or Spilled

ORDINARY. NO HAZARD RESULTS FROM SPILLAGE.

Waste Disposal Method SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR

RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH INTO SEWER.

Precautions to Be Taken in Handling and Storing

STORE UNDER NORMAL CONDITIONS OF TEMPERATURE AND HUMIDITY IN CLOSED

Other Precautions CONTAINERS.

Section VIII —

Respiratory Protection (*Specify Type*) UNNECESSARY OR APPROVED NUISANCE MASK.

Ventilation	Local Exhaust DUST EXHAUST SYSTEM		Special
ORDINARY	Mechanical (General)		Other

Protective Gloves UNECESSARY, NOT REQUIRED Eye Protection NON SPECIFY (CHEM. GOGGLE

Other Protective Clothing or Equipment NONE

Work Hygienic Practices NONE

Activity 4 - Becoming Familiar with the Contents of a MSDS Sheets

Objective (s): This activity will enable participants

1. To practice reading different MSDS Sheets.

2. To practice indentifying the sections of the MSDS Sheets.

Materials Needed: MSDS sheets, color highlighters

Directions: Read through the MSDS sheets provided. Pay close attention to the section names. Use different color highlighters to mark the sections of the sheet as directed by the chart below. You may recognize two of the sheets from Activity 3. However, this time all of the section names are on the sheets.

MSDS Sheet Section		Highlighter Color
1.	Chemical Identification	Red
2.	Hazardous Ingredients	Green
3.	Physical Data	Blue
4.	Fire & Explosion Data	Red
5.	Health Hazards	Green
6.	Reactivity Data	Blue
7.	Spill or Leak Procedures	Red
8.	Special Protection	Green
9.	Special Precautions	Blue

Material Safety Data Sheet

Haarmann & Reimer
A MILES INC. COMPANY
70 Diamond Road
Springfield, New Jersey 07081

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

Hazard Present: Hazard Ra
0 = Insignific
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

I. IDENTIFICATION

A. PRODUCT NAME : 263092 DARITEEN NCF-247H(COLORED)

B. CHEMICAL NAME : ENZYME MODIFIED CHEDDAR CHEESE (PROCESSED CHEESE TYP

C. CLASSIFICATION : FLAVOR MATERIAL

D. CAS NO. : NA

III. FIRE, EXPLOSION, AND REACTIVITY DATA

A. FLASH POINT (CC-/-DEG-F) : NF

B. EXTINGUISHING MEDIA : (Y) H2O FOG; (Y) FOAM; (Y) CO2; (Y) DRY CHEMIC

C. SPECIAL PROCEDURES/UNUSUAL HAZARDS : USE SELF CONTAINED BREATHING APPARATUS. FIRE WILL GENERATE CO, CO2, AND SMOKE.

D. STABILITY : STABLE UNDER NORMAL CONDITIONS OF STORAGE AND USE.

E. CONDITIONS/MATERIALS TO AVOID : AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

F. HAZARDOUS POLYMERIZATION POTENTIAL : NONE.

III. PROTECTION INFORMATION AND EQUIPMENT

A. EYE : SAFETY GLASSES

B. SKIN : OIL/SOLVENT RESISTENT GLOVES.

C. RESPIRATORY : RESPIRATORY : NOT REQUIRED

D. OTHER : USE IN A WELL VENTILATED AREA.

E. EXPOSURE LIMITS : NOT ESTABLISHED.

Material Safety Data Sheet

H&R®
Haarmann & Reimer
A MILES INC. COMPANY
75 Diamond Road
Somerset, New Jersey 0873

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

PRODUCT : 263092

Hazard Present : Hazard Ra
Hearn: 1
Flammability: 0
Reactivity: 0
0 = Insignifi
1 = Slight
2 = Moderat
3 = Serious
4 = Severe

IV. EMERGENCY FIRST AID

A. INHALATION EXPOSURE : REMOVE TO FRESH AIR.

B. EYE CONTACT : FLUSH WITH WATER FOR 15 MINUTES. CONSULT PHYSICIAN IF IRRITATION CONTINUES.

C. SKIN CONTACT : WASH WITH SOAP AND WATER.

D. OTHER : NONE.

V. HEALTH HAZARD DATA

A. INGREDIENTS(S) POSING HAZARD : NOT APPLICABLE.

B. ROUTE OF EXPOSURE AND EFFECTS OF OVEREXPOSURE : PROLONGED OR REPEATE CONTACT MAY CAUSE SKIN IRRITATION. MAY CAUSE EYE IRRITATION.

VI. PHYSICAL DATA

A. APPEARANCE AND ODOR : CREAM COLORED PASTE

B. PHYSICAL PROPERTIES : NF

VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

A. SPILLS AND LEAKS : COLLECT ONTO INERT ABSORBENT. PLACE INTO A SUITABLE CONTAINER.

B. DISPOSAL : DISPOSE OF IN ACCORDANCE WITH LOCAL REGULATIONS.

VIII. HANDLING AND STORAGE PROCEDURES

KEEP CONTAINERS TIGHTLY CLOSED, STORE IN A COOL DRY AREA AWAY FROM HEAT AND DIRECT SUNLIGHT.

Material Safety Data Sheet

Haarmann & Reimer C
A MILES INC. COMPANY
70 Diamond Road
Springfield, New Jersey 07081

In Case of Emergency Call:
CHEMTREC (800) 424-9300
For Other Information Call: (800) 422-1559

PRODUCT : 263092

Hazard Present
Health: 1
Flammability: 0
Reactivity: 0

Hazard Ratin
0 = Insignificant
1 = Slight
2 = Moderate
3 = Serious
4 = Severe

BEST COPY AVAILABLE

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: AJINOMOTO CO., INC.	Emergency Telephone Number: NJ OFFICE : 201-488-1212
Address (Number, Street, City, State, and ZIP Code): TOKYO, JAPAN	Telephone Number for Information: NJ OFFICE : 201-488-1212
	Date Prepared: 3-28-91
	Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
MONOSODIUM L-GLUTAMATE MONOHYDRATE (MONOSODIUM GLUTAMATE)				

Section III — Physical/Chemical Characteristics

Boiling Point	SOLID	Specific Gravity (H_2O = 1)	1.62
Vapor Pressure (mm Hg.)	26 @ 25°	Melting Point	450°F
Vapor Density (AIR = 1)	N/A	Evaporation Rate (Butyl Acetate = 1)	NONE

Solubility in Water: 17g/100g H_2O at 25°C

Appearance and Odor: WHITE OR ALMOST WHITE NEEDLES OR POWDER WITH A SLIGHT PEPTONE ODOR

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used): NOT ESTABLISHED	Flammable Limits: NON-FLAMMABLE	LEL	UEL

Extinguishing Media: IF INVOLVED IN FIRE, WATER OR CO_2 MAY BE USED

Special Fire Fighting Procedures: NONE SPECIAL, NONE NORMALLY REQUIRED

Unusual Fire and Explosion Hazards: NONE REPORTED

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		
	Stable	X	DECOMPOSES AT TEMPERATURES ABOVE 375°

Incompatibility (*Materials to Avoid*) NONE REPORTED

Hazardous Decomposition or Byproducts NONE

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	X	NONE

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Skin? Ingestion? X

Health Hazards (*Acute and Chronic*)

GENERALLY RECOGNIZED AS SAFE

Carcinogenicity: NTP? IARC Monographs? OSHA Regulated? NO

Signs and Symptoms of Exposure

NONE. EXCESSIVE CONTACT MAY CAUSE EYE IRRITATION.

Medical Conditions Generally Aggravated by Exposure

NONE

Emergency and First Aid Procedures NON-TOXIC SUBSTANCE. FLUSH EYE WITH PLENTY OF WATER AND GET MEDICAL ATTENTION IF LARGE AMOUNT IS INGESTED

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material Is Released or Spilled

ORDINARY. NO HAZARD RESULTS FROM SPILLAGE.

Waste Disposal Method SWEEP UP AND PLACE IN SUITABLE CLEAN, DRY CONTAINERS FOR RECLAMATION OR LATER DISPOSAL. DO NOT FLUSH INTO SEWER

Precautions to Be Taken in Handling and Storing STORE UNDER NORMAL CONDITIONS OF TEMPERATURE AND HUMIDITY IN CLOSED CONTAINERS

Other Precautions

Section VIII — Control Measures

Respiratory Protection (*Specify Type*) UNNECESSARY OR APPROVED NUISANCE MASK

Ventilation			
	Local Exhaust DUST EXHAUST SYSTEM		Special
ORDINARY	Mechanical (*General*)		Other

Protective Gloves UNECESSARY, NOT REQUIRED | Eye Protection NON SPECIFY (CHEM. GOGGLE

Other Protective Clothing or Equipment NONE

Work/Hygienic Practices NONE

Material Safety Data Sheet
Required under USDL Safety and Health Regulations for Shipyard Employment (29 CFR 1915)

U.S. Department of Labor
Occupational Safety and Health Administration

OMB No. 1218-00
Expiration Date 05/31/

Section I

Manufacturer's Name: Lyoferm, Inc.	Emergency Telephone Number: (317) 359-9578
Address (Number, Street, City, State, and ZIP Code): 3862 E. Washington St. Indianapolis, IN 46201	Chemical Name and Synonyms:
	Trade Name and Synonyms: "Sour Start"
	Chemical Family: Carbohydrate and Protein — Formula: Cultu

Section II - Hazardous Ingredients None

Paints, Preservatives, and Solvents	%	TLV (Units)	Alloys and Metallic Coatings	%	TLV (Units)
Pigments			Base Metal		
Catalyst			Alloys		
Vehicle			Metallic Coatings		
Solvents			Filler Metal Plus Coating or Core Flux		
Additives			Others		
Others					

Hazardous Mixtures of Other Liquids, Solids or Gases	%	TLV (Units)
N/A		

Section III - Physical Data

Boiling Point (°F)	N/A	Specific Gravity (H_2O=1)	N/A
Vapor Pressure (mm Hg.)	N/A	Percent Volatile by Volume (%)	(% Moisture) 7%
Vapor Density (Air=1)	N/A	Evaporation Rate	=1)
Solubility in Water	Complete		
Appearance and Odor	Off-white powder with typical flour odor		

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used): N/A	Flammable Limits: N/A	Lel	Uel

Extinguishing Media: Water, CO_2, Dry chemical

Special Fire Fighting Procedures: N/A

Unusual Fire and Explosion Hazards: None

Section V - Health Hazard Data

Threshold Limit Value

N/A

Effects of Overexposure

N/A

Emergency First Aid Procedures

None relating to this product

Section VI - Reactivity Data

Stability	Unstable		Conditions to Avoid N/A
	Stable	x	

Incompatability (Materials to Avoid)

N/A

Hazardous Decomposition Products

N/A

Hazardous Polymerization	May Occur		Conditions to Avoid N/A
	Will Not Occur	x	

Section VII - Spill or Leak Procedures

Steps to be Taken in Case Material is Released or Spilled

Wipe, sweep, vacuum

Waste Disposal Method

Normal dry waste disposal

Section VIII - Special Protection Information

Respiratory Protection (Specify Type)

Ventilation	Local Exhaust: Not needed	Special
	Mechanical (General)	Other

Protective Gloves: Not needed

Eye Protection: Not needed

Other Protective Equipment

Section IX - Special Precautions

Precautions to be Taken in Handling and Storing

No special precautions

Other Precautions

N/A

Activity 5 - Identifying the Contents of a Material Safety Data Sheet (MSDS)

Objective (s): This activity will enable particpants

1. To practice identifying the sections of MSDS Sheets.

Materials Needed: MSDS Sheets

Directions: Answer these questions noting what section of a MSDS Sheet you would find the information. Remember that most MSDS sheets have nine sections. Some information such as regulatory information or how to transport the mateiral maybe included in the special precautions or a separate section. Put the letter that corresponds to the correct section of the MSDS in the space provided.

a. Chemical Identification (General Information)
b. Hazardous Ingredients
c. Physical Data
d. Fire & Explosion Data
e. Health Hazards (Toxicity Information)
f. Reactivity Data
g. Spill or Leak Procedures
h. Special Protection
i. Special Precautions (Regulatory & Transport Information)

1.____What special protection should be worn when handling chemicals?

2.____How to clean up a chemical spill?

3.____What conditions may make a chemcical explode?

4.____Where and how to store a particular chemical?

5.____Is the chemical hazardous to may health?

6.____Who is the manufacturer of the chemical?

7.____What kind of a chemcial am I working with?

8.____What extra precautions should I take when handling a chemical?

9.____What other kind of name the chemical may be called on the market?

10.____What is the make-up or ingredients of a particular chemical?

Activity 6 - Working with MSDS Sheets

Objective (s): This activity will enable participants

1. To practice reading MSDS Sheets.

Materials Needed: Pencil, MSDS Sheet for Limonene, Sodium Chloride and Solution S0636, PA-2.

Directions: Read and MSDS sheets provided. Notice the names of the sections as you read these sheets. Then answer the questions below for each of the products below.

Limonene

1. What is the this product's boiling point?_____

2. In what section did you find the boiling point information?_____
   _____

3. What precautions should be takens when handling and storing this product?_____
   _____
   _____

4. What is the extinguishing media for this product?_____

5. In what section did you find information about theextinguishing media?_____

Sodium Chloride

1. Is this product regulated under OSHA Hazard Communication Standard?_____

2. This product can be described as a white crystalline solid with slight halogen odor? Yes____ No_____

3. What kind of medical conditions can be aggravated by exposure to this product?_____

4. What steps should be taken if this product is released or spilled?_____
_____
_____

5. Gloves, goggles, and protective clothing must be worn when handling this chemical? True____ False____

Solution S0636, PA,2

1. What is the precautionary label on this solution?_____
_____

2. Does this solution have color? Yes____ No____

3. This solution is regulated by OSHA. True____ False____

4. What is the spill control or recovery for this solution?_____
_____

MATERIAL SAFETY DATA SHEET : FRESH FORCE PAGE : 01

(073480-0110P -3011455-1740) DATE OF ISSUE 01/16/88 | SUPERSEDES 12/02/87

SECTION I - GENERAL INFORMATION

CHEMICAL NAME & SYNONYMS
N/A
TRADE NAME & SYNONYMS
FRESH FORCE

CHEMICAL FAMILY
ORANGE TERPENE SOLUTION
FORMULA
X<--MIXTURE

MANUFACTURERS NAME:
MANTEK, DIVISION OF NCH CORP.

ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE)
BOX 152170
IRVING, TEXAS 75015

PREPARED BY:	PRODUCT CODE NUMBER	EMERGENCY TELEPHONE NUMBER
C KERINS/CHEMIST	1740	214-435-1381

SECTION II- HAZARDOUS INGREDIENTS

THE HAZARDS PRESENTED BELOW ARE THOSE OF THE INDIVIDUAL COMPONENTS.

CHEMICAL NAME (INGREDIENTS) :
D-LIMONENE

HAZARD---->COMB/IRR.	TLV--->50 PPM	PEL-->N/E	2.
STEL(TWA)-->N/E	CAS#-->5989-27-5		

CHEMICAL NAME (INGREDIENTS) :
HEXYLENE GLYCOL

HAZARD---->IRR.	TLV--->25 PPM	PEL-->N/E	2.
STEL(TWA)-->N/E	CAS#-->107-41-5		

CHEMICAL NAME (INGREDIENTS) :
DIETHANOLAMINE SALT OF TALL OIL FATTY ACID

HAZARD---->IRR.	TLV--->N/E	PEL-->N/E	2.
STEL(TWA)-->N/E	CAS#-->61790-33-7		

CHEMICAL NAME (INGREDIENTS) :
TRIETHANOLAMINE SALT OF TALL OIL FATTY ACID

HAZARD---->IRR.	TLV--->N/E	PEL-->N/E	2.
STEL(TWA)-->N/E	CAS#-->68132-46-7		

FRESH FORCE

(CONTINUED) SECTION II- HAZARDOUS INGREDIENTS PAGE : 02

SECTION IIA - NON-HAZARDOUS INGREDIENTS

NON-HAZARDOUS INGREDIENT NAMES AND CAS NUMBERS ARE PROTECTED UNDER NJ TRADE SECRET REGISTRY # --409353-50059

SECTION III - PHYSICAL DATA

BOILING PT.(FAHRENHEIT)	375:F	SPEC GRAVITY (H2O=1)	0.35
VAPOR PRESSURE (MM HG).	5	COLOR	ORANGE
VAPOR DENSITY (AIR=1)	5	ODOR	ORANGE
PH @ 100%	@10%=8.5	CLARITY	TRANSPARENT
PERCENT VOLATILE BY VOLUME (%)	80	EVAPORATION RATE (BU AC = 1)	0.01
SOLUBILITY IN WATER	EMULSION		
VISCOSITY	SEMI-VISCOUS		

SECTION IV - FIRE AND EXPLOSION HAZARD

FLASH POINT (METHOD USED)
119:F T.C.C.
FLAMMABLE LIMITS
D-LIMONENE
LEL 0.7
UEL 6.1

EXTINGUISHING MEDIA "ALCOHOL"
X<--FOAM X<--FOAM X<--CO2 X<--DRY CHEMICAL <--WATER SPRAY <--OTHER

SPECIAL FIRE FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE IN THE POSITIVE PRESSURE MODE.

UNUSUAL FIRE & EXPLOSION HAZARDS
BURNING MAY PRODUCE OXIDES OF CARBON, SULFUR AND NITROGEN. VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL TO DISTANT IGNITION SOURCES AND FLASHBACK. DO NOT SPRAY A DIRECT STREAM OF WATER INTO PRODUCT AS FROTHING MAY OCCUR.

NFPA HAZARD RATING (0=INSIGNIFICANT 1=SLIGHT 2=MODERATE 3=HIGH 4=EXTREME)
1 <--HEALTH 2 <--FLAMMABILITY 0 <--REACTIVITY <--SPECIAL

THRESHOLD LIMIT VALUE :

NOT ESTABLISHED FOR MIXTURE. SEE SECTION II.

EFFECTS OF OVEREXPOSURE

ACUTE - (SHORT TERM EXPOSURE)

<>EYE CONTACT: CAUSES IRRITATION, REDNESS, TEARING, SEVERE DISCOMFORT, AND POSSIBLE CORNEAL INJURY.<>

-SKIN CONTACT: MAY CAUSE IRRITATION SEEN AS REDNESS, ITCHING, AND SWELLING. MAY CAUSE AN ALLERGIC SKIN REACTION.

- INGESTION: MAY CAUSE IRRITATION OF MOUTH AND THROAT, ABDOMINAL PAIN, NAUSEA, DIZZINESS, AND LOSS OF CONSCIOUSNESS. INGESTION AND SUBSEQUENT VOMITING OF THIS PRODUCT CAN LEAD TO ASPIRATION OF THE PRODUCT INTO THE LUNGS WHICH CAN CAUSE CHEMICAL PNEUMONITIS AND MAY BE FATAL.

INHALATION: MAY CAUSE IRRITATION OF THE RESPIRATORY TRACT SEEN AS COUGHING AND SNEEZING. MAY CAUSE ALLERGIC RESPIRATORY REACTION IF INHALED.

CHRONIC - (LONG TERM EXPOSURE)

#MAY AGGRAVATE EXISTING SKIN AND RESPIRATORY CONDITIONS.

+TARGET ORGANS: NONE KNOWN.

REPEATED EXPOSURE TO THIS PRODUCT MAY PRODUCE SKIN AND RESPIRATORY SENSITIZATION.

PRIMARY ROUTE OF ENTRY: <-- INHALATION <-- INGESTION X<-- ABSORPTION

EMERGENCY & FIRST AID PROCEDURES

INHALATION :

REMOVE FROM THE AREA TO FRESH AIR. SEEK MEDICAL ATTENTION IF RESPIRATORY IRRITATION DEVELOPS OR IF BREATHING BECOMES DIFFICULT.

EYE CONTACT:

IMMEDIATELY RINSE THE EYES WITH WATER, REMOVE ANY CONTACT LENSES AND CONTINUE FLUSHING FOR AT LEAST 15 MINUTES. HOLD THE EYELIDS APART TO ENSURE RINSING OF THE ENTIRE SURFACE OF THE EYES AND LIDS WITH WATER. GET IMMEDIATE MEDICAL ATTENTION.

SKIN CONTACT:

WASH AFFECTED AREAS WITH PLENTY OF SOAP AND WATER FOR SEVERAL MINUTES. REMOVE AND CLEAN CONTAMINATED CLOTHING AND SHOES. SEEK MEDICAL ATTENTION IF IRRITATION DEVELOPS.

INGESTION :

GIVE 3 TO 4 GLASSES OF WATER, BUT DO NOT INDUCE VOMITING. IF VOMITING OCCURS, GIVE FLUIDS AGAIN. GET IMMEDIATE MEDICAL ATTENTION IF DISCOMFORT.

NOTES TO PHYSICIAN :

SECTION VI - TOXICITY INFORMATION

PRODUCT CONTAINS CHEMICAL LISTED AS CARCINOGEN OR POTENTIAL CARCINOGEN BY:

IARC	NTP	OSHA	ACGIH	OTHER
<--YES	<--YES	<--YES	<--YES	<--YES
X<--NO	X<--NO	X<--NO	X<--NO	X<--NO

D-LIMONENE :
ORL-RAT LD50: 4400 MG/KG 3.
ORL-MUS LD50: 5600 MG/KG 3.
IPR-RAT LD50: 3600 MG/KG 3.
IVN-RAT LD50: 110 MG/KG 3.
DIETHANOLAMINE SALT OF TALL OIL FATTY ACID: NO DATA FOUND.
TRIETHANOLAMINE SALT OF TALL OIL FATTY ACID: NO DATA FOUND.
ETHYLENE GLYCOL:
SKN-RBT LD50: 9530 MG/KG 3.
ORL-RAT LD50: 8700 MG/KG 3.
IPR-RAT LD50: 1500 MG/KG 3.
EYE-RBT 50 MG SEV 3.
SKN-RBT 810 MG/24H MODERATE 3.
SKN-RBT 555 MG OPEN MILD 3.

SECTION VII - REACTIVITY DATA

	X<--STABLE	<--UNSTABL.	CONDITIONS TO AVOID
STABILITY			AVOID HEAT, HOT SURFACES, SPARKS AND OPEN FLAMES.

INCOMPATIBILITY (MATERIALS TO AVOID)
OXIDIZING AGENTS, REDUCING AGENTS, STRONG ACIDS AND BASES.
IODINE PENTAFLUORIDE:ETHYLENE CONTACT CAN BE EXPLOSIVE.

HAZARDOUS DECOMPOSITION PRODUCTS
OXIDES OF CARBON AND NITROGEN.

	WILL NOT	MAY	CONDITIONS TO AVOID
HAZARDOUS	X <--OCCUR	<--OCCUR	
POLYMERIZATION	NONE KNOWN.		

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
REMOVE ALL SOURCES OF IGNITION. DIKE AND COLLECT SPILL. ABSORB WITH AN INERT MATERIAL AND SWEEP, SCOOP, OR SHOVEL MATERIAL INTO A PROPERLY LABELED CONTAINER FOR DISPOSAL. CAUTION! SPILL CAN MAKE FLOOR SLIPPERY.

WASTE DISPOSAL METHOD
DISPOSE OF IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.

NEUTRALIZING AGENT
NONE KNOWN.

REQUIRED VENTILATION
GENERAL EXHAUST IS USUALLY ADEQUATE TO PREVENT AIRBORNE CONCENTRATIONS FROM EXCEEDING THE RECOMMENDED EXPOSURE LIMITS. IF THESE RECOMMENDED LIMITS ARE OR MAY BE EXCEEDED WHEN GENERAL EXHAUST IS USED, THEN LOCAL MECHANICAL EXHAUST WILL BE NECESSARY.

RESPIRATORY PROTECTION
A NIOSH/MSHA APPROVED RESPIRATOR IN POORLY VENTILATED AREAS AND/OR FOR EXPOSURE ABOVE THE ACGIH TLV OR OSHA PEL.

PROTECTIVE GLOVES
NEOPRENE FOR REPEATED OR PROLONGED CONTACT.

EYE PROTECTION
WEAR SAFETY GLASSES IF THE METHOD OF APPLICATION PRESENTS THE LIKELIHOOD OF EYE CONTACT.

OTHER PROTECTION
WEAR GENERAL DUTY WORK CLOTHING AND SHOES.
HAVE A SAFETY SHOWER AND EYE STATION IN WORK AREA

SECTION X - STORAGE AND HANDLING INFORMATION

STORAGE TEMPERATURE 100: F<--MAX 55: F<--MIN	INDOOR X	HEATED	REFRIGERATED	OUTDOOR

PRECAUTIONS TO BE TAKEN IN HANDLING & STORING
KEEP AWAY FROM HEAT AND FLAME.
KEEP CONTAINERS TIGHTLY CLOSED WHEN NOT IN USE.
ALL HANDLING EQUIPMENT AND DRUM SHOULD BE PROPERLY GROUNDED. DO NOT CUT WELD, BRAZE, OR SOLDER EVEN EMPTY CONTAINERS AS THEY MAY CONTAIN PRODUCT RESIDUE WHICH IS COMBUSTIBLE.

OTHER PRECAUTIONS
FOLLOW LABEL DIRECTIONS.
KEEP OUT OF REACH OF CHILDREN.
READ ENTIRE LABEL BEFORE USING PRODUCT.
AVOID EYE CONTACT AND EXCESSIVE BREATHING OF VAPORS.

SECTION XI - REGULATORY INFORMATION

CHEMICAL NAME	C.A.S. NUMBER	UPPER % LIMIT
N/A		

THOSE INGREDIENTS LISTED ABOVE ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SEC OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.
IF 'DUE (USE EXEMPTION)' APPEARS UNDER UPPER % LIMIT, END USERS ARE EXEMPT FROM NOTIFICATION BECAUSE THE PRODUCT IS USED AND LABELED FOR ROUTINE JANITORIAL WORK, OR THE PRODUCT IS USED AND LABELED FOR FACILITY GROUNDS MAINTENANCE (SUCH AS FERTILIZERS AND HERBICIDES), OR THE PRODUCT IS USED AND LABELED FOR MAINTAINING MOTOR VEHICLES.

CALIFORNIA PROPOSITION 65
WARNING: THIS PRODUCT CONTAINS THE FOLLOWING CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE (1) CANCER OR (2) BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM: NITRILOTRIACETIC ACID (1) AND ETHANOL (2) AS TRACE CONTAMINANTS.

SECTION XII - TRANSPORTATION - (FOR FUTURE USE)

APPLICABLE REGULATIONS
<--49 CFR <--IMCO <--TARIFF 6 D <--IATA <--MILITARY AIR (AFR 71-4)

SHIPPING NAME

HAZARD CLASS | ID NUMBER | REPORT QTY

LABELS | LIMITED QTY

UNIT CONTAINER

DOT SPS CONTAINER | NET EXPLOSIVE WT.

AEROSOL PROPELLANT(S)

SECTION XIII - REFERENCES

1. THRESHOLD LIMIT VALUES FOR CHEMICAL SUBSTANCES AND PHYSICAL AGENTS AND BIOLOGICAL EXPOSURE INDICES, ACGIH, 1990-1991.
2. OSHA PEL.
3. SAX'S DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS, 8TH EDITION, RICHARD J. LEWIS, SR.

*SHORT TERM EXPOSURE LIMIT (TWA) LISTED AS FINAL RULE LIMITS PUBLISHED IN THE FEDERAL REGISTER/VOL.54 NO.12, 1-19-89

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED
ACCURATE IN LIGHT OF CURRENT FORMULATION KNOWLEDGE. NO WARRANTY
IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THIS DATA
OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

MANTEK, DIVISION OF NCH CORP. ASSUMES NO RESPONSIBILITY
FOR PERSONAL INJURY OR PROPERTY DAMAGE CAUSED BY THE USE OF
OR DISPOSAL OF THE PRODUCT NOT MANUFACTURED BY THE COMPANY
PRODUCT LABELS. USERS ASSUME ALL RISKS ASSOCIATED WITH THE
UNRECOMMENDED USE, STORAGE, OR DISPOSAL OF THE PRODUCT.

CARGILL SALT

MATERIAL SAFETY DATA SHEET

I. GENERAL INFORMATION

TRADE NAME (COMMON NAME-OR SYNONYM)		C.A.S. NO(S)
Salt		7647-14-5
CHEMICAL NAME(S)	FORMULA	MOLECULAR WEIGHT
Sodium Chloride	NaCl	58.44
MANUFACTURER(S)-NAME-AND-ADDRESS Cargill Incorporated - Salt Division P.O. Box 5621 Minneapolis, MN 55440		GSA National Stock Number (General Services Admin. 6810-00-227-0437
CONTACT	PHONE NO.	DATE ISSUED	DATE REVISED
Director-Quality Admin.	(612) 742-5581	3/1/85	4/28/93

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components (Specific Chemical Identity; and/or Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	Percent (Optional)
None				

THIS PRODUCT IS NOT REGULATED UNDER:
- OSHA Hazard Communication Standard 29 CFR 1910.1200
- S.A.R.A. Title III

III. PHYSICAL/CHEMICAL CHARACTERISTICS

BOILING POINT (760mm Hg) (°C)	1465	SPECIFIC GRAVITY (H_2O=1)	2.16
VAPOR PRESSURE (mm Hg/747°C)	2.4	MELTING POINT (°C)	801
VAPOR DENSITY (Air=1)	NA	EVAPORATION RATE (Butyl Acetate=1)	NA
SOLUBILITY IN WATER (g/cc,%)	26.4		

APPEARANCE AND ODOR White crystalline solid with slight halogen odor.

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	
Not Applicable.	LEL NA	UEL NA

EXTINGUISHING MEDIA:
Not Applicable. This product is nonflammable.

SPECIAL FIRE-FIGHTING PROCEDURES/EQUIPMENT
Not Applicable.

UNUSUAL FIRE AND EXPLOSION HAZARDS
None

V. REACTIVITY DATA

STABILITY

Stable	X	Conditions To Avoid: Contact with strong acids.
Unstable		

INCOMPATABILITY (Materials to Avoid):
Becomes corrosive to metals when wet.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS:
May evolve chlorine gas when in contact with strong acids.

HAZARDOUS POLYMERIZATION

May Occur		Conditions To Avoid: Not Applicable.
Will Not Occur	X	

VI. HEALTH HAZARD DATA

ROUTE(S) OF ENTRY

Inhalation? May cause mild irritation of nose and throat.

Skin? Dust may cause mild irritation.

Ingestion? Ingestion of large amounts may cause gastrointestinal upset.

HEALTH HAZARDS (Acute And Chronic)
Ingestion of large amounts (greater than 0.1 pound) can cause gastrointestinal upset and irritation of the stomach.
No applicable information found for chronic systemic effects.

VI. HEALTH HAZARD DATA (Continued)

CARCINOGENICITY
NTP? Not listed as a carcinogen or mutagen.
IARC Monographs? Not listed as a carcinogen or mutagen.
OSHA Regulated? Not listed as a carcinogen or mutagen.
SIGNS AND SYMPTOMS OF EXPOSURE
Inhalation: Slight irritation of the nose; sneezing.
Skin Contact: Irritation; inflammation.
Ingestion: Nausea; vomiting.
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
In some cases of confirmed hypertension, ingestion may result in elevated blood pressure. (This applies only to salt-sensitive individuals.)
EMERGENCY AND FIRST AID PROCEDURES
Inhalation: If person breathes large quantities, remove to fresh air at once. If breathing stops, apply artificial respiration immediately.
Skin Contact: Remove clothing from affected area. Wash skin thoroughly. Rinse carefully. For eye contact, flush with water immediately, lifting eyelids occasionally.
Ingestion: Less than a few grams would not be harmful. For larger quantities, drink large amounts of water or milk.
EMERGENCY TELEPHONE NUMBERS: Daytime (612) 742-6581 Evenings (612) 476-1127

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Contain spills to prevent contamination of water supply or sanitary sewer system. Vacuum or sweep into containers for proper disposal.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE (Continued)

WASTE DISPOSAL METHOD For disposal of this material as a waste, act in accordance with all applicable Federal, state, and local waste management regulations.
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE Avoid humid or wet conditions as product will cake and become hard.
OTHER PRECAUTIONS Not Applicable.

VIII. CONTROL MEASURES

RESPIRATORY PROTECTION (Specify Type) NIOSH/MSHA approved respirator for particulates.	
VENTILATION	**Local Exhaust** Ventilate as required to maintain airborne particulates below occupational exposure limits.
	Mechanical (General) Dust collection equipment may be employed.
	Special/Other not applicable.
PERSONAL PROTECTIVE EQUIPMENT	
Protective Gloves Normal work gloves are adequate.	
Eye Protection Eyeglasses or goggles should be worn in dusty areas.	
Other Protective Clothing Or Equipment Protective clothing may be worn in dusty areas, but is generally not required.	
Work/Hygiene Practices Warm water showering and handwashing is suggested after working in extremely dusty areas.	

All statements, technical information and recommendations contained herein are, to the best of our knowledge, reliable and accurate; however, no warranty, either express or implied, is made with respect thereto, nor will any liability be assumed for damages resultant from the use of the material described.

It is the responsibility of the user to comply with all applicable federal, state, and local laws and regulations. It is also the responsibility of the user to maintain a safe workplace. The user should consider the health hazards and safety information provided herein as a guide and should take the necessary steps to instruct employees and to develop work practice procedures to ensure a safe work environment.

This information is not intended as a license to operate under, or a recommendation to practice or infringe upon any patent of this company or others covering any process, composition of matter or use.

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

SOLUTION S0636 PA-2

Emergency Telephone Number

Medical (800) 482-5378 (24 hours) (800) I-M-ALERT

SECTION 1 PRODUCT IDENTIFICATION

TRADE NAME: SOLUTION S0636 PA-2
DESCRIPTION: PA-2, very dilute aqueous solution of a quaternary amine

NFPA 704M/HMIS RATING: 0/0 HEALTH 0/0 FLAMMABILITY 0/0 REACTIVITY 0 OTHER
0=Insignificant 1=Slight 2=Moderate 3=High 4=Extreme

SECTION 2 HAZARDOUS INGREDIENTS

Our hazard evaluation of the ingredient(s) under OSHA's Hazard Communication Rule, 29 CFR 1910.1200 has found none of the ingredient(s) hazardous.

SECTION 3 PRECAUTIONARY LABEL INFORMATION

Do not take internally.

SECTION 4 FIRST AID INFORMATION

Flush contacted area with water.

SECTION 5 HEALTH EFFECTS INFORMATION

PRIMARY ROUTE(S) OF EXPOSURE: Eye, Skin

EYE CONTACT: Non-irritating.
SKIN CONTACT: Non-irritating.

SYMPTOMS OF EXPOSURE: A review of available data does not identify any symptoms from exposure not previously mentioned.

SECTION 6 TOXICOLOGY INFORMATION

TOXICITY STUDIES: No toxicity studies have been conducted on this product.

SECTION 7 PHYSICAL AND CHEMICAL PROPERTIES

COLOR: Colorless	FORM: Liquid	ODOR: Odorless
SOLUBILITY IN WATER:	Completely	
SPECIFIC GRAVITY:	1.0	ASTM D-1298
pH (NEAT) =	Neutral	ASTM E-70
FLASH POINT:	None	

NOTE: These physical properties are typical values for this product.

SECTION 8 FIRE AND EXPLOSION INFORMATION

FLASH POINT: None

EXTINGUISHING MEDIA: Not applicable

UNUSUAL FIRE AND EXPLOSION HAZARD: None

SECTION 9 REACTIVITY INFORMATION

INCOMPATIBILITY: None known

THERMAL DECOMPOSITION PRODUCTS: Not applicable

SECTION 10 PERSONAL PROTECTION EQUIPMENT

RESPIRATORY PROTECTION: Respiratory protection is not needed.

VENTILATION: General ventilation is recommended.

PROTECTIVE EQUIPMENT: Safety glasses should be worn when handling any liquid product.

SECTION 11 SPILL AND DISPOSAL INFORMATION

IN CASE OF TRANSPORTATION ACCIDENTS, CALL THE FOLLOWING 24-HOUR TELEPHONE NUMBER (800) I-M-ALERT or (800) 462-5378.

SPILL CONTROL AND RECOVERY:

Flush to laboratory drain or sewer with water.

DISPOSAL: If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261, since it does not have the characteristics of Subpart C, nor is it listed under Subpart D.

Flush to laboratory drain or sanitary sewer with water.

SECTION 12 ENVIRONMENTAL INFORMATION

If released into the environment, see CERCLA in Section 14.

SECTION 13 TRANSPORTATION INFORMATION

PROPER SHIPPING NAME/HAZARD CLASS MAY VARY BY PACKAGING, PROPERTIES,

SECTION 14 REGULATORY INFORMATION (CONTINUED)

Consult Section 11 for RCRA classification.

FEDERAL WATER POLLUTION CONTROL ACT, CLEAN WATER ACT, 40 CFR 401.15 (formerly Sec. 307), 40 CFR 116 (formerly Sec. 311):
None of the ingredients are specifically listed.

CLEAN AIR ACT, Sec. 111 (40 CFR 60), Sec. 112 (40 CFR 61, 1990 Amendments), Sec. 611 (40 CFR 82, CLASS I and II Ozone depleting substances):
This product does not contain ingredients covered by the Clean Air Act.

STATE REGULATIONS:

CALIFORNIA PROPOSITION 65:
This product does not contain any chemicals which require warning under California Proposition 65.

MICHIGAN CRITICAL MATERIALS:
This product does not contain ingredients listed on the Michigan Critical Materials Register.

STATE RIGHT TO KNOW LAWS:
This product does not contain ingredients listed by State Right To Know Laws.

SECTION 15 ADDITIONAL INFORMATION

None

SECTION 16 USER'S RESPONSIBILITY

This product material safety data sheet provides health and safety information. The product is to be used in applications consistent with our product literature. Individuals handling this product should be informed of the recommended safety precautions and should have access to this information. For any other uses, exposures should be evaluated so that appropriate handling practices and training programs can be established to ensure safe workplace operations. Please consult your local sales representative for any further information.

SECTION 17 BIBLIOGRAPHY

ANNUAL REPORT ON CARCINOGENS, U.S. Department of Health and Human Services, Public Health Service, PB 83-135855, 1983.

CASARETT AND DOULL'S TOXICOLOGY, THE BASIC SCIENCE OF POISONS, Doull, J.,

SECTION 13 TRANSPORTATION INFORMATION (CONTINUED)

AND MODE OF TRANSPORTATION. TYPICAL PROPER SHIPPING NAMES FOR THIS PRODUCT ARE:

ALL TRANSPORTATION MODES : PRODUCT IS NOT REGULATED DURING TRANSPORTATION

SECTION 14 REGULATORY INFORMATION

The following regulations apply to this product.

FEDERAL REGULATIONS:

OSHA'S HAZARD COMMUNICATION RULE, 29 CFR 1910.1200:
Based on our hazard evaluation, none of the ingredients in this product are hazardous.

CERCLA/SUPERFUND, 40 CFR 117, 302:
Notification of spills of this product is not required.

SARA/SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 (TITLE III) - SECTIONS 302, 311, 312 AND 313:

SECTION 302 - EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355):
This product does not contain ingredients listed in Appendix A and B as an Extremely Hazardous Substance.

SECTIONS 311 and 312 - MATERIAL SAFETY DATA SHEET REQUIREMENTS (40 CFR 370):
Our hazard evaluation has found that this product is not hazardous under 29 CFR 1910.1200.

Under SARA 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are: 500 pounds or the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SECTION 313 - LIST OF TOXIC CHEMICALS (40 CFR 372):
This product does not contain ingredients on the List of Toxic Chemicals.

TOXIC SUBSTANCES CONTROL ACT (TSCA):
The chemical ingredients in this product are on the 8(b) Inventory List (40 CFR 710).

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA), 40 CFR 261 SUBPART C & D:

SECTION 17 BIBLIOGRAPHY (CONTINUED)

Klaassen, C. D., and Admur, M. O., eds., Macmillian Publishing Company, Inc., N. Y., 2nd edition, 1980.

CHEMICAL HAZARDS OF THE WORKPLACE, Proctor, N. H., and Hughes, J. P., eds., J. P. Lipincott Company, N.Y., 1981.

DANGEROUS PROPERTIES OF INDUSTRIAL MATERIALS, Sax, N. Irving, ed., Van Nostrand Reinhold Company, N.Y., 6th edition, 1984.

IARC MONOGRAPHS ON THE EVALUATION OF THE CARCINOGENIC RISK OF CHEMICALS TO MAN, Geneva: World Health Organization, International Agency for Research on Cancer, 1972-1977.

PATTY'S INDUSTRIAL HYGIENE AND TOXICOLOGY, Clayton, G. D., Clayton, F. E., eds., John Wiley and Sons, N. Y., 3rd edition, Vol. 2 A-C, 1981.

REGISTRY OF TOXIC EFFECTS ON CHEMICAL SUBSTANCES, U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, 1983 supplement of 1981-1982 edition, Vol. 1-3, OH, 1984.

Title 29 Code of Federal Regulations Part 1910, Subpart Z, Toxic and Hazardous Substances, Occupational Safety and Health Administration (OSHA).

THRESHOLD LIMIT VALUES FOR CHEMICAL SUBSTANCES AND PHYSICAL AGENTS IN THE WORKROOM ENVIRONMENT WITH INTENDED CHANGES, American Conference of Governmental Industrial Hygienists, OH.

Information on this MSDS has changed. The changes are indicated by asterisks on the right side of only the changed sections. This is an updated MSDS as required by OHSA's Hazard Communication Rule 29 CFR 1910.1200.

PREPARED BY: Ricky A. Stackhouse PhD., Toxicologist
DATE CHANGED: 06/28/95 DATE PRINTED: 07/01/95

NALCO

MATERIAL SAFETY DATA SHEET

PRODUCT

Emergency Telephone Number

Medical (800) 462-5378 (24 hours) (800) 1-M-ALERT

Activity 1 - Reading Comprehension

Objective (s): This activity will enable participants

1. To practice reading and applying information.

Directions: Read the paragraph below and answer the questions. You may refer back to the paragraph.

The Environmental Protection Agency has particular standards for pesticide application in and around food manufacturing plants. Specific employees are trained in the principles of applying pesticides safely for man and the environment. They are taught about application equipment, methods of application and the basic of insecticides, rodenticides, and avicides. Insecticides are used to kill insects. Rodenticides kill rodents such as field mice and avicides are pesticides used to control birds. These employees are required to be certified in compliance with EPA's Standards of Certification. The certification exam is administered by the Virginia Department of Agriculture and Consumer Services. At Nabisco, the employees who are certified to conduct pesticide application are called Utility Technicians.

Utility Technicians are aware of the pests that are associated with food manufacturing plants. Some of those pests include birds, weeds, rodents, and insects. The type and pests most likely to occur will depend on both the geographical location of the food manufacturing plant and the type of food being processed. These pests are able to damage, destroy, and contaminate. They must be controlled to protect the quality of the Nabisco's product. If quality is not maintained, federal and state agencies have authority to seize food products or take other action.

Questions:

1. What would you say would be an appropriate theme for the paragraph above?_____
_____

2. What are the three kinds of pests that plague food manufacturing facilities?_____

3. The kind of pests that are associated with a manufacturing plant depends upon the location of the plant and what country it is located in? Check one: True ____ False____

4. What action can the state or federal agency take if food products are contaminated?_____

5. What can pests do to food manufacturing plants products?
_____

6. The individuals at Nabsico that are certified to conduct pesticide control are called (circle one) : a. Pesticide Agents
b. Utility Technicians c. Pesticide Applicants

7. Name three areas of training for those who apply pesticides in food manufacturing plants_____
_____

8. What kind of pesticide is used to control birds in a pest situation?_____

9. Rodenticides are used to control insects? True____ False____

Activity 2 - Reading Comprehension - Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information

Directions: Read the paragraph below and answer the questions.

Understanding Pesticide Control for Birds

There are many species of birds in the United States, but only three are considered pests around food manufacturing plants. They are the English Sparrows (sometimes called the House Sparrows), Pigeons, and Starlings. Since these birds live in such close proximity to man, one would wonder how they can be such a pest.

They are considered pests in a manufacturing situation because their droppings can contaminate food products. Simply put, they can spread diseases. Their droppings have been known to plug gutters, cause roofs to leak, and they carry mites that can bite people.

Pesticide technicians can contain these birds in three ways: (1) setting traps (2) shooting them (3) using avicides or other pesticides to control them.

Questions:

1. What are three ways Utility Technicians can control birds?
   _____, _____, _____

2. What is a common name for the English Sparrow?_____

3. Why are birds considered pests?_____

Activity 3 - Reading Comprehension--Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the descriptions below and answer the questions. Identify the pests described in the statements by filling in the blank with the correct letter.

A. English Sparrow
Grayish in color
3-4 inches long
Male has a black throat and small conical beak
Has an non-musical chirp and a creamy white egg

B. Pigeons
Varied colors
6-10 inches long
Fan shaped tail on take-off and landing
Head bobs and beak pointed down when walking
Voice is long, soft coo-oo-o
White eggs

C. Starlings
Body and wings gold-flecked
Large spear-like bills that are yellow or olive
Compact, short bodies, 4-7 inches long
Bluish green eggs

D. House Mouse (Mus Muscualus)
Weighs 1/2 to 3/4 oz.
Small head an body
Fur, silky, dusky gray

E. Norway Rate (Rattus Norvegicus)
Weights 10-17 oz.
Blunt Muzzle head, heavy thick body
Fur, coarse, normally red-brown
to gray brown

F. **Roof Rat (Rattus rattus)**
Weighs 8-12 oz.
Pointed Muzzle head, slender body
Fur, black and slate gray, tawny above,
gray white-below, tawny above, white to
lemon belly

G. German Cockroach
Most common and widespread
Small, about 3/4" long
Yellowish brown with two dark-brown stripes
behind head

H. American Cockraoch
Largest in the U.S.
Adults grow to 2"
Adults color is brown, the young
pale brown

Questions:

1. Common name is a House Sparrow?____
2. Bobs head when walking?_____
3. Has bluish green eggs?____
4. Most common cockroach?____
5. Has silky, dusty gray fur?____
6. Weighs 10 to 17 oz. and is a rodent?____
7. Grows up to 2" as an adult insect?_____
8. Has a pointed muzzle head and a slender body?____

Activity 4 - Following Directions Drawing

Objective - To have participants practice reading comprehension skills.

Directions - 1. Use a blank sheet of paper and follow the written directions below.

a. Draw a triangle with sides of equal length in the upper right corner.

b. In the center draw a square about an inch on each side.

c. Draw an arrow from the triangle to the square.

d. Below the square draw five lines, one below the other, each the same length as the side of the square.

e. Draw a circle in the lower left corner.

f. Make a dotted line from the circle to the second line below the square.

g. If the square is below the circle, color in the triangle.

h. If an even number of the lines below the square are not connected to any of the figures, place an X in the square.

Activity 5 - Reading Comprehension - Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the paragraph and answer the questions.

The First Step, Know Your Common Pests

The first step in investigating and solving your pest problem is to determine the species of the pests that is troubling your operation. We understand that there are different nationalities of people. Well, the same is true for pests. Pest control programs have to be designed to target specific pests. The rule of thumb is to fit the pesticide to the pest.

Questions:

1. What is the first step in solving your pest problem?_____
   _____

2. What is the rule of thumb in designing pest control programs?_____
   _____

3. General pest control programs are the most effective?
   True____ False_____

Activity 6 - Reading Comprehension - Pesticide Control

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the pest descriptions below and answer the questions. Identify the pest described by the statement by filling in the blank with the correct letter.

A. Ants
Large head, elbowed antennae
Narrow waist, no wings

B. Bed Bugs
Small rounded, dark brown
No wings, may be engorged with blood

C. Bees
Light brown if honey bees
with a hairy body

D. Booklice
Minute, place colored body
No wings

E. Boxelder Bugs
Bright red and black
Long antennae
Narrow head with peak

F. Carpet Beetles
Adults, small rounded, brown
Larvae elongate, brown body with long brown hairs

G. Centipedes
One pair of legs per body
segment, long antennae

H. **Millipedes**
Two pair of legs per body segment
Short antennae

I. **Fleas**
Adults, very small, laterally compressed
No wings
Bloodsucking parasite of warm-blooded animals

J. **Clothes Moths**
Adults, very small, pale white
Wings pale white, without spots

K. **Silverfish**
Small, pale gray, elongate
Antennae long, tail with long spines

L. **Ticks**
Adults, brown to dark brown
Sometimes with white spots, eight legs
Blood sucking parasites of mammals

M. **Saw-Toothed Grain Beetle**
A pantry pest
Adults, small, dark brown
with small spines on body region behind
head, love to infest flour

N. **Indian Meal Moth**
A pantry pest
Adult, two colored wings, pale
gray and redish brown
Love all grain products

O. **House Mouse**
Adults have small eyes and small feet
Tail is as long as the body
Adults are 2 1/2 to 3 1/2 in head and
body length

P. Moth Flies

Adults, small,oval shaped
Wings pointed and covered with hairs,
body small and full of hair

Questions:

1. These pests love gain products of all kinds?____
2. They have small eyes and small feet, and long tails?____
3. They do not have wings, narrow waist, and large head?____
4. They are bright read and black, with narrow head and peak?____
5. They're light brown and produce honey?____
6. They have one pair of legs per body part?____
7. Their wings are pointed and they are covered with hairs?____
8. They are blood sucking parasites of mammals?____
9. They have three long spines?____
10. The adults are usually brown, small and rounded?____

Activity 7 -Reading Comprehension

Objective: This activity will enable participants

1. To practice reading and applying information.

Directions: Read the paragraph below about fumigation. Then answer the questions.

What and Why of Fumigation

Fumigation is the process of distributing the pesticide chemicals called fumigants as a gas through space and materials. Fumigants are in the gas phase at effective temperatures, as compared to smokes, fogs, and aerosols which are dispersions of very fine particles or droplets.

The fumigation process requires that safety precautions, special equipment and specific knowledge. That is why individuals who do fumigation are required to have special licenses or permits. Only experienced and certified applicators should conduct fumigation.

Many factors affect the use and effectiveness of fumigants. The developmental stage and activity of a targeted pest is important. For example, active adult insects are easier to kill than inactive hibernating adults. The amount of free and open space in the area to be fumigated, the temperature, and the proximity of the product, the kind of product, the location of the pest within the product, and the structures to be fumigated all affect dosage and exposure period.

Temperature is the most important factor influencing the action of a fumigant on a pest. The dosage and exposure periods vary for most fumigants with the temperature. A fumigant gas should be spread evenly and quickly throughout the space to be treated. Therefore, air movement and diffusion is important.

(continued next page)

Sorption of fumigants is the association of the fumigant with the material and/or the surface being fumigated thus removing part of the fumigant from the vapor state. Both absorption and adsorption are reduced at higher temperatures. Adsorption is usually greater with fumigants of higher molecular weights and low vapor pressures.

As the moisture content of a commodity increases, it becomes more difficult for the fumigant to penetrate it. Adequate moisture, is required for the generation of some fumigants, and with living plants may reduce injury.

The condition of the structure and type of construction must be considered. Fumigation in vacuum chambers provides increased efficiency. Other general characteristics of the fumigants are important such as molecular weight boiling point, water, solubility and flammability.

Questions:

1. What are the general characteristics of fumigants that must be considered?_____
   _____

2. Is it more efficient to spray in vacuumed chambers?
   Yes___ No____

4. The temperature is the most important element to consider when using fumigants. True____ False____

5. Fumigants are chemical gases. True____ False___

Reading Comprehension - Fumigation

Activity 8 -Reading Comprehension

Objective: This activity will enable participants

1. To practice reading and applying information.

Materials Needed: Pencil, Chart handout on Fumigants Properties

Directions: Read the chart about the essential properties of fumigants that are commonly used in insect control. Then answer the questions.

Questions:

1. Which formula is usually used as an ingredient of nonflammable mixtures?_____

2. Which fumigant may be phytotoxic. It is safe for use on seeds but not recommended for fresh fruit or vegetables?

   _____

3. What is the boiling point of Sulfuryl Fluoride?_____

4. Which fumigants are nonflammable?_____

   _____

   _____

5. What is the molecular weight of Chloropicrin?_____

6. Is Hydrocyanic acid gas soluble in water? Yes____ No____

ESSENTIAL PROPERTIES OF FUMIGANTS

Name and Formula	Molecular Weight	Boiling Point (°C. at 760 mm. pressure)	Solubility in Water (g./100 ml.)
Acrylonitrile	53.06	77.0	7.5 at 25° C.
Carbon disulphide	76.13	46.3	0.22 at 22° C.
Carbon tetrachloride	153.84	77.0	0.08 at 20° C.
Chloropicrin	164.39	112.0	Insoluble at 20° C.
Ethylene dibromide	187.88	131.0	0.43 at 30° C.
Ethylene dichloride	98.97	83.0	0.87 at 20° C.
Ethylene oxide	44.05	10.7	Very soluble at 20° C.
Hydrocyanic acid gas	27.03	26.0	Very soluble at 20° C.
Methyl bromide	94.95	3.6	1.3 at 25° C.
Phosphine	34.04	-87.4	Very slightly soluble
Sulfuryl fluoride	102.06	-55.2	0.075 at 25° C.

1/ From Monro, Manual of Fumigation for Insect Control.

IN COMMON USE FOR INSECT CONTROL[1/]

Flammability (% by volume in air)	Commodities Treated and Remarks (Check labels for specific uses)
3-17	Tobacco and plant products; also for "spot" treatment. Injures growing plants, fresh fruits, and vegetables. Marketed with carbon tetrachloride.
1.25-44	Grain. Usually as ingredient of nonflammable mixtures.
Nonflammable	Only weakly insecticidal. Used chiefly in mixture with flammable compounds in grain fumigation to reduce fire hazard and aid distribution.
Nonflammable	Grains and plant products. Safe with seeds; injurious to living plants, fruit, and vegetables. Highly irritating lachrymator. Bactericidal and fungicidal.
Nonflammable	General fumigant. Particularly useful for certain fruit; may injure growing plants.
6-16	Seeds and grains. Usually mixed with carbon tetrachloride.
3-80	Grains, cereals, and certain plant products. Toxic at practical concentrations to many bacteria, fungi, and viruses. Strongly phytotoxic and affects seed germination.
6-41	General fumigant, but may be phytotoxic. Safe on seeds but not recommended for fresh fruit and vegetables.
Nonflammable	General fumigant. May be used with caution for nursery stock, growing plants, some fruit, and seeds of low moisture content.
Highly flammable	Grain fumigant; gas generated from tablets of aluminum phosphide.
Nonflammable	Wood destroying and household insects, but not for food or drug products. Phytotoxic but little effect on seed germination.

Betty just arrived home late from work and has to prepare a dessert to take to a PTA function tonight. She has only one hour to prepare the dessert and get to the school.

These are the items Betty has available to her:

5 lb. bag sugar	pie crust mix	1/2 lb. margarine
1 box salt	1 bottle vanilla extract	lemon extract
1 dozen eggs	1 can cream of tartar	1/2 box of Nilla Wafers
1 qt. milk	one large lemon	1/3 box of Ritz crackers
2 lb. bag flour	1 can cinnamon	1/2 dozen bananas

Read the recipes and the labels on the following pages and answer the following questions.

1. Does Betty have all the ingredients she needs to make each one of these desserts?

2. Does Betty have the right quantity of the ingredients that she needs to make each of these desserts?

3. Which recipe would require the most time to prepare?

4. What ingredients do the two recipes have in common?

5. According to the label, how many cookies are in the Nilla Wafers box?

6. According to the label, how many crackers are in the Ritz box ?

7. Which of the two desserts do you think Betty should make and why ?

Nilla WAFERS

ORIGINAL BANANA PUDDING

MAKES 16 (1/2 CUP) SERVINGS

3/4 cup granulated sugar
1/3 cup all-purpose flour
Dash of salt
4 eggs, separated, at room temperature
2 cups milk
1/2 teaspoon vanilla extract
35 to 45 NILLA Wafers
5 to 6 medium size fully ripe bananas, sliced
Reserve 1 banana and 10 to 12 NILLA Wafers for garnish.

Combine 1/2 cup sugar, flour and salt in top of double boiler. Stir in 4 egg yolks and milk; blend well. Cook, uncovered, over boiling water, stirring constantly until thickened. Reduce heat and cook, stirring occasionally, for 5 minutes. Remove from heat; add vanilla. Spread small amount on bottom of 1-1/2-quart casserole; cover with layer of NILLA Wafers. Top with layer of sliced bananas.

Pour about 1/3 of custard over bananas. Continue to layer wafers, bananas, and custard to make 3 layers of each, ending with custard. Beat egg whites until stiff but not dry; gradually add remaining 1/4 cup sugar and beat until stiff peaks form. Spoon on top of pudding, spreading to cover entire surface and sealing well to edges. Bake at 425°F. for 5 minutes or until delicately browned. Cool slightly or chill. Just before serving, garnish with banana slices, then NILLA Wafers upright around edge of dish, as pictured on package.

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Nilla Wafers..

- Low Cholesterol
- Low Saturated Fat

CONTAINS 5g FAT AND 5mg CHOLESTEROL PER SERVING

Nutrition Facts

Serving Size 8 cookies (30 g)
Servings Per Container About 11

Amount Per Serving		
Calories 140	Calories from Fat	
		% Daily Value
Total Fat 5g		7
Saturated Fat 1g		5
Polyunsaturated Fat 0g		
Monounsaturated Fat 1.0g		
Cholesterol 5mg		2
Sodium 105mg		4
Total Carbohydrate 24g		8
Dietary Fiber 0g		0
Sugars 12g		
Protein 2g		
Vitamin A 0%	•	Vitamin C 0
Calcium 2%	•	Iron 4%

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300m
Sodium	Less than	2400mg	2400
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: ENRICHED WHEAT FLOUR (C TAINS NIACIN, REDUCED IRON, THIAMI MONONITRATE [VITAMIN B.], RIBOFLAVIN [VI MIN B.]), SUGAR, VEGETABLE SHORTENI (PARTIALLY HYDROGENATED SOYBEAN O HIGH FRUCTOSE CORN SYRUP, WHEY, BUTT (PASTEURIZED CREAM, SALT, ANNATTO COLO EGGS, LEAVENING (BAKING SODA, CALCI PHOSPHATE), SALT, MONO-AND DIGLYCERI (EMULSIFIER), VANILLA EXTRACT, ARTIFIC FLAVOR.

This package is sold by weight, not by volur Packed as full as practicable by modern a matic equipment, it contains full net wei indicated. If it does not appear full w opened, it is because contents have set during shipping and handling.

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Mock Apple Pie

MAKES 8 SERVINGS

Pastry for two-crust 9-inch pie
35 RITZ Crackers, coarsely broken
(about 1 3/4 cups crumbs)
2 cups water
2 cups sugar
2 teaspoons cream of tartar
2 tablespoons lemon juice
Grated rind of one lemon
2 tablespoons BLUE BONNET
Vegetable Oil Spread
1/2 teaspoon ground cinnamon
(NO APPLES NEEDED)

Roll out half the pastry and line a 9-inch pie plate. Place crackers in prepared crust. In saucepan, over high heat, heat water, sugar and cream of tartar to a boil; simmer for 15 minutes. Add lemon juice and rind; cool. Pour syrup over crackers. Dot with spread; sprinkle with cinnamon. Roll out remaining pastry; place over pie. Trim, seal and flute edges. Slit top crust to allow steam to escape.

Bake at 425°F for 30 to 35 minutes or until crust is crisp and golden. Cool completely.

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A Guide to Daily Food Choices

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