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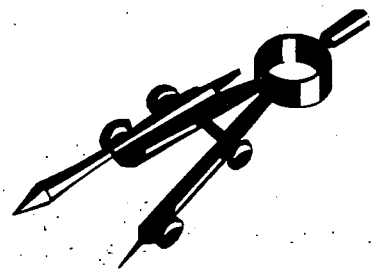
ABSTRACT

The purpose of the Idaho Direct Mathematics Assessment (DMA) is to measure Idaho students' mathematical problem-solving skills, including their ability to apply basic skills to problem-solving situations as stated in the Idaho Achievement Standards document. Problem solving is valued as an essential tool for success in a complex, modern world. The DMA provides valuable information about students' basic skill levels and their ability to effectively apply and communicate mathematical processes and strategies, creative thinking, and decision-making. The data collected as a result of this assessment assists in the development of curriculum and instructional strategies and improves student achievement. This document provides the DMA fourth grade assessment toolkit for educators to use in their classrooms. Essential knowledge, processes, and skills for fourth grade students are listed. Scoring information is also provided. (ASK)

4TH GRADE

DIRECT MATHEMATICS ASSESSMENT



TOOLKIT

REVISED 2000

DR. MARILYN HOWARD
SUPERINTENDENT OF PUBLIC INSTRUCTION
FOR THE STATE OF IDAHO

Standards on the internet: www.sde.state.id.us/osbe/exstand.htm

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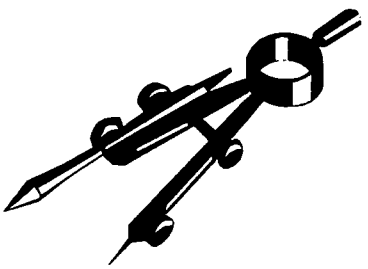

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Idaho Direct Mathematics Assessment

Toolkit

Developed by the Idaho Direct Mathematics Assessment Steering Committee

Adams, Karla	Post Falls High School	Post Falls
Andersen, Dan	Sacajawea Junior High School	Caldwell
Anderson, Bev	Hawthorne Junior High School	Pocatello
Arnold, Phil	Garden Valley Elementary	Garden Valley
Berget, Kathy	Priest River Elementary	Sandpoint
Edmonson, Cathy	Lewiston School District	Lewiston
Harris, Kathy	Vallivue High School	Caldwell
Horsley, Deborah F.	Malad Elementary	Malad
Kerby, Ryan	New Plymouth School District	New Plymouth
Lamm, Phyllis	Gooding Elementary	Gooding
Lawler, Rob	Vallivue High School	Nampa
McWilliam, Carole, Ph.D.	Pocatello School District	Pocatello
Mink, Nicol	Park Intermediate	Weiser
Nelson, Julie	White Pine Elementary	Burley
Otten, Bob	Sunny Ridge Elementary	Nampa
Parker, Kit	South Junior High School	Boise
Preussner, Sue	Rocky Mountain Middle School	Idaho Falls
Rodwell, D'Ann	Wilson Elementary	Caldwell
Scanlon, Carla	Hailey Elementary	Hailey
Schmidt, Jill	Centennial Elementary	Lewiston
Seaman, Ron	Moscow Junior High School	Moscow
Sheppeard Debbie	Challis High School	Challis
Smith, LaRon	State Department of Education	Boise
Stanley, Jennifer	Sugar-Salem Junior High	Sugar City
Stromberg, John M.	Filer Middle School	Filer
Tanner, Joan	Horseshoe Bend Elementary	Horseshoe Bend
Tiel, Sally	Department of Education	Boise
Triplett, Marlene	Retired	Culdesac
Verrill, Ginger	A.H. Bush Elementary	Idaho Falls
Walen, Sharon	Boise State University	Boise
West, Arlinda	Buhl Middle School	Buhl
West, Lamar	Aberdeen Middle School	American Falls
Westover, Charlet	Theresa Bunker Elementary	Idaho Falls
White, Leora	West Middle School	Nampa
White, Pat	Executive Director, Triangle Coalition	Washington DC
White, Willean	Carberry Intermediate	Emmett
Wiseman, Mel	Meadows Valley Junior/Senior High	New Meadows
Yrjana, Juanita	Kellogg Middle School	Kellogg

Susan Harrington
Mathematics/Science Coordinator
State Department of Education
PO Box 83720
Boise, ID 83720-0027
TEL (208) 332-6932
E-mail sharring@sde.state.id.us

Tom C. Farley
Bureau Chief
Federal Programs

Carolyn Mauer
Bureau Chief
Curriculum and Accountability

Dr. Marilyn Howard
State Superintendent
of Public Instruction

Direct Mathematics Assessment
4th Grade Toolkit

Table of Contents

Section I

General Information

- ✓ Purpose
- ✓ Introduction
- ✓ Direct Assessment Terms
- ✓ Calculator Usage
- ✓ Types of Prompts

PURPOSE STATEMENT

The purpose of the *Idaho Direct Mathematics Assessment (DMA)* is to measure Idaho students' mathematical problem-solving skills, including their ability to apply basic skills to problem-solving situations as stated in the Idaho Achievement Standards document. Problem solving is valued as an essential tool for success in a complex, modern world. The DMA will provide valuable information about students' basic skill levels and their ability to effectively apply and communicate about mathematical processes and strategies, creative thinking, and decision-making. The data collected as a result of this assessment will assist in the development of curriculum and instructional strategies, and will improve student achievement.

Introduction

Assessment is one of the guidance systems of education. Assessment, to be fully utilized, must advance education by:

- measuring what students know--record the status of education
- expressing what students should know--support curriculum goals
- enhancing learning
- providing insight for how curriculum should be taught--support good instructional
- practices

The use of standardized tests such as the Iowa Test of Basic Skills (ITBS) allows us to measure math skills. The Direct Mathematics Assessment (DMA) has been developed to support Idaho's instruction and curriculum goals in mathematics. Standardized tests and the DMA are complementary assessments that meet different needs:

Standardized Tests

- reflect national standards
- measure skills
- rank students according to national norms
- provide a measure of student growth in math skills over the years

Direct Mathematics Assessments

- reflect goals and curriculum objectives as established by the State of Idaho
- assist in building conceptual bridges between skills and processes
- measure a student's demonstrated
  - ability to solve problems and select appropriate processes
  - level of thinking and cognitive development
  - communication of mathematical processes and strategies
  - accuracy
- encourage creative thinking, decision-making, and mathematical application and connections
- provide a mechanism to improve instruction by analyzing student results

In the final analysis, this Idaho Direct Mathematics Assessment is a means to improve instruction and student achievement.

Process of DMA development

- emphasizes cognitive development, synthesization of knowledge of basic skills, accuracy, and ability to apply information through problem solving
- assesses concepts and skills selected from a provided list

Expected technology

- 4th grade - no calculators
- 8th grade - calculator availability expected

Process of DMA scoring

- assesses problem solving skills--did the student:
  - understand problem
  - select an appropriate strategy
  - show willingness to consider different strategies
  - use a systematic process
  - show perseverance
  - check work/justify answer
  - accurately solve the problem
- evaluates student performance holistically using a scoring standard
- emphasizes process and justification of answers
- accepts multiple appropriate processes and solutions

Direct Assessment Terms and Definitions

THE ASSESSMENT

Direct or performance assessments enable students to demonstrate knowledge by using it effectively to create a product, solve a problem, or complete a task. A direct assessment differs from a conventional test in the same way a written test of driving rules differs from an on-the-road driving test, which replicates typical daily driving.

A ***prompt*** is a directive to a student to undertake a performance or task. A prompt typically includes a short vignette and questions or tasks related to the information in the vignette.

SKILLS

Open-ended thinking involves responding to a problem with either many possible correct answers, or one in which the best answers can be obtained in many ways. Open-ended responses are not simply a matter of taste, but are based on the logical soundness of a viewpoint, as well as whether they meet selected standards.

Descriptors are sets of indicators to help determine a student's level of achievement in a direct assessment. Descriptors direct scorers where to look within an assessment in order to make the best judgment or evaluation. Descriptors empirically describe traits of work, which scorers do and do not value. (i.e., processes, strategies)

Process refers to steps a student takes to reach an answer, and may include strategies, decisions, reasoning, and communication. Assessing processes requires scorers to explicitly judge beyond what can be inferred from the end product. Scorers must, however, keep in mind the importance of determining whether a final product or performance meets required standards.

Traits are more specific details to help judge a performance or assessment. (i.e., computation, labels)

SCORING

Scoring standards or rubrics provide guidelines to assist in determining scores. Scoring standards list descriptors, describe traits assessed, and help scorers assign the product to a scale using terms that summarize indicators of work.

Anchor papers or main range finders provide a mid-range sample (not high, not low) of each level of performance on the scoring scale.

Holistic scoring is based on an overall impression of an assessment. Scorers attempt to match an overall impression to point scale descriptors to determine a final score.

Point scales enable comparisons, but also summarize the most telling and important hallmarks within a range. Unlike conventional tests that rate students on a 100-point scale (usually percent correct), performance assessments typically use a four-, five-, or six-point scale.

Calculator Usage

The appropriate use of technology is encouraged in the classroom. 541.03.a

Fourth Grade: Calculators will not be allowed on the DMA.

The fourth-grade assessment will be purposely designed so that calculators will not be necessary. Therefore, calculators will not be used on the fourth-grade assessment.

The use of a calculator is still appropriate in the fourth-grade classroom (i.e., number patterns, guess and check, real-life applications, and investigations).

Eighth Grade: Calculators will be expected to be available for students to use on the DMA.

The eighth grade assessment is designed with real-life problems and this can be more effectively assessed when students do have access to calculators. Districts should ensure that a calculator is available for each student to use while taking this assessment. Students are allowed to use any model or type of calculator.

The use of calculators has made it possible for assessments to use realistic data, and solutions are designed to have decimal and fraction answers. Students must decide when and how to use values and apply appropriate operations. Prompts have more intense problems, which can be solved by a greater variety of mathematical techniques. Given the more diverse and technical problems, it may be difficult for a student to complete the assessment in the allowed time without the use of a calculator.

About the Assessment

Of the five test items included in each assessment most will begin with a problem situation followed by a series of related questions. All students are required to solve the first test item located on the front-page. This test item is designed to assess broad-based problem-solving strategies using basic computation skills.

On the remaining three pages of the assessment, students will select three of the four remaining test items. These test items cover a wide range of identified Idaho Achievement Standards. This allows students to choose test items that best demonstrate their mathematical abilities. A list of the standards and the mathematical terms and vocabulary that may be included on the assessment can be found in this Toolkit.

The test items are targeted for students performing at grade level. Some portions of a test item may be designed for students to demonstrate advanced thinking skills. Thus, there may be portions of some test items that all students will not complete. This will not necessarily prevent them from receiving a satisfactory score on the Direct Math Assessment.

Section II

Essential Knowledge, Processes, and Skills

- ✓ Mathematics Terms and Vocabulary
- ✓ Content and Skills
- ✓ Problem Solving Strategies

Mathematics Terms and Vocabulary
(Midyear Fourth Grade)

A
- add

B
- bar graph

C
- calendar
- Celsius
- cent
- centimeter
- change (money)
- chart
- circle
- circle graph
- column
- combination
- compare
- computer
- cup

D
- data
- day
- decimal
- degree (Fahrenheit)
- diagram
- difference
- digit
- dime
- divide
- dollar
- double

E
- equal
- equal sign
- equation
- estimate
- even number

F
- factor
- Fahrenheit
- foot
- fraction

G
- gallon
- graph
- greater than

H
- half dollar
- half hour
- hour
- hour hand
- hundred

I
- inch

K
- kilometer

L
- less than
- line graph
- liter

M
- meter
- mile
- minus sign
- minute
- minute hand
- multiply
- nickel

N
- number line
- number sentence

O
- odd number
- operation (computations)
- order
- ounce

P
- parallel
- pattern
- penny
- per
- pictograph
- pie graph
- pint
- place value
- plane figure
- plus sign
- pound
- product

Q
- quart
- quarter

R
- rectangle
- regroup (borrow, carry)
- right angle
- rounding
- row
- ruler

S
- sequence
- side
- square
- subtract
- sum
- symbol

T
- table
- tally mark
- thermometer
- thousand
- total
- triangle
- triple
- twice

W
- whole number

Y
- yard
- yardstick

Possible Targeted Content and Skills

With references to Achievement Standards

For midyear 4th grade assessment, prompts will be restricted as indicated in italics.

- **Basic Arithmetic, Estimation and Accurate Computations**

1. Understand numbers and counting. *(including money)* 540.01.a
2. Know whole number place value. 540.01.d
3. Name and write large numbers. *(less than one million)* 540.01.d
4. Add/subtract whole numbers. *(values less than 100,000)* 540.02.a
5. Multiply whole numbers. *(whole numbers by single digits)* 540.02.a
6. Know the basic multiplication facts. *(up to 10 times 10)* 540.02.b
7. Estimate and/or use exact numbers, as appropriate and necessary, in product calculation 540.03.a
8. Divide whole numbers. *(basic concept of division by integers, not necessarily the division algorithm)* 540.02.a
9. Know the basic division facts. *(10 times table)* 540.02.a
10. Compare and order fractions. *(compare halves, thirds, fourths and eighths)* 540.01.a
11. Compare and order decimal numbers. *(with money through hundredths)* 540.01.a
12. Relate decimals to money. *(through hundredths)* 540.01.b
13. Add/subtract money. *(through hundredths)* 540.02.d
14. Count and show amounts of money. 540.01.a-c
15. Multiply using money. *(using single digits)*
16. Divide using money. *(basic concept without algorithm)*
17. Demonstrate making change.

- **Mathematical Reasoning and Problem Solving**

1. Select strategies appropriate for solving a problem. 541.01.a
2. Select and use appropriate operation. 541.01.b
3. Make predictions and decisions based on observations. 541.01.c
4. Use a variety of methods such as words, numbers, symbols, charts, graphs, tables, diagrams, and models to explain mathematical reasoning.541.02.a
5. Select the appropriate means to communicate mathematical information. 541.04.a
6. Use appropriate notations and terms. 541.04.b

- **Concepts and Principals of Measurement**

1. Estimate and measure lengths. 542.01.a
2. Measure and work with temperature. *(Fahrenheit only)*
3. Apply estimation and measurement of weight/mass, length and capacity to real-world and content problems using actual measuring devices and express the results in both US customary and metric units. 542.01.a
4. Tell time using both digital and analog clocks to the nearest minute. 542.01.d
5. Identify relationships among seconds, minutes and hours to solve real-world problems. 542.01.e
6. Use a calendar.
7. Know AM and PM. 542.02.f
8. Determine elapsed time. 542.01.e

- **Concepts and Language of Algebra**

1. Use symbols (boxes or letters) to represent numbers. 543.01.a
2. Use symbols (<, >, =) to express relationships. 543.01.b
3. Compare relative values of whole numbers. 543.01.e

- **Concepts and Principals of Geometry**

1. Describe, model, draw and classify shapes *(circles, square, rectangle, triangle)*. 544.01.a
2. Extend and create geometric patterns. 544.01.f

- **Data Analysis, Probability and Statistics.**

1. Collect, order, and display data in tables, charts and graphs; e.g., bar graphs, tally chards and pictographs in order to answer a question or test a hypothesis. 545.02.a
2. State and justify conclusions from information found in tables, graphs and charts. 545.01.a

- **Functions and Mathematical Models**

1. Extend patterns and identify a rule that generates the pattern. 546.01.a
2. Discover, describe, and generalize patterns by using manipulatives, numbers, and graphic representations. 546.01.b
3. Compare or contrast. 540.01.a
4. Classify and Sort. 545.02.a
5. Solve problems by finding a pattern. 546.01.b
6. Recognize and generate patterns. 546.01.a
   Explain your reasoning. 541.02.a
7. Evaluate evidence and draw conclusions. 545.01.a and 541.04.a

Achievement Standards can be obtained on the internet at: http://www.sde.state.id.us/osbe/exstand.htm

Suggested Problem-Solving Strategies To Teach Your Class

(Fourth Grade)

When a student encounters a math problem that they can't immediately solve, have them try one or more of the following:

1. Use objects.
2. Use a graph, table, drawing or patterns.
3. Draw a picture.
4. Look for a pattern.
5. Make a list or table.
6. Work backwards.
7. Tell or write a story.
8. Solve multiple-step problems.
9. Determine reasonable answers.
10. Solve problems with more than one answer.

Problem-solving strategies should be integrated throughout all of the content strands.

Section III

Scoring

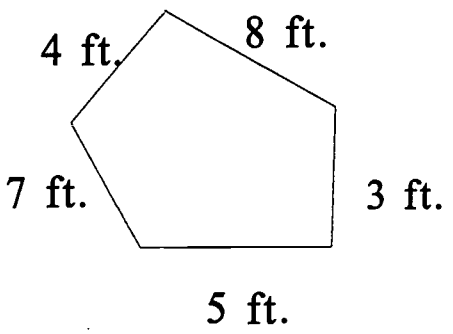
- ✓ Two Ways to Evaluate Student Learning
- ✓ Idaho Scoring Standard
- ✓ 2000 Assessment
- ✓ 2000 Main Rangefinders

Two Ways To Evaluate Student Learning

Here is how two methods of evaluation assess the same content strand. The first seeks the right answer. The second measures understanding concepts.

Standardized Test

What is the perimeter of the pentagon below:



a) 70 ft.
b) 27 ft
c) 3360
d) 5 ft
e) none of the above

In this example, the student may successfully answer the question without understanding any of the terms or underlying mathematics involved. Many students would be able to correctly guess the answer.

For those students who do know the terms and concept, basic addition is the only skill this problem assesses, as it is the only one required to answer the question.

Direct Assessment (Open-Ended)

Draw a pentagon with a perimeter of 73 feet and label the lengths of each side.

This prompt represents an open-ended problem. The student may answer the question in a variety of ways. The response will give greater insight about the student's understanding of perimeter and pentagon. The strategies and processes he\she uses will also reveal the sophistication of their thinking skills. This type of question does not ignore computation but integrates it into finding a solution.

Idaho Direct Mathematics Assessment Scoring Standard

⑤ Advanced

A score of *5* indicates that the student demonstrates advanced understanding of the problem/situation presented. The student recognizes the situation and is able to determine which processes will best solve it. A *5* paper demonstrates higher-order thinking skills and exhibits above grade-level processes for determining solutions. A score of *5* indicates that the student completes the processes appropriately, determines the solutions accurately, and communicates effectively.

⑤ *papers exhibit <u>most</u> of the following:*

* Advanced proficiency of basic skills
* Advanced understanding of situations
* Advanced mathematical vocabulary, use of symbols and communication skills
* Higher-order thinking skills (analysis, synthesis, and evaluation)
* Appropriate processes accurately completed
* Effective problem-solving strategies
* Minimal or non-existent errors
* Innovation and creativity

④ Proficient

A score of *4* indicates that the student demonstrates thorough understanding of the problem/situation presented. Responses demonstrate a high level of thinking, but not advanced for grade level. Demonstrated problem-solving strategies are correct, although there may be some computational or surface errors which do not interfere with correct processes. Structure of responses is clearly defined and adaptable. A *4* paper exhibits proficient mathematical achievement at grade level.

④ *papers exhibit <u>most</u> of the following:*

* Proficiency in basic skills
* Thorough understanding of situations
* Effective mathematical vocabulary, use of symbols and communication skills
* Adaptable processes
* Effective problem-solving strategies
* Few computational or surface errors
* Defendable solutions
* Clearly defined structure

③ Satisfactory

A score of *3* indicates that the student is performing at grade-level in mathematics. Student responses exhibits evidence of understanding the problem/situation presented, and he/she adequately communicates about them. Basic thinking skills and purposes are apparent. Problem-solving strategies and process development are evident. A *3* paper exhibits satisfactory achievement at grade level, in spite of occasional computational or surface errors.

③ *papers exhibit <u>most</u> of the following:*

* Basic understanding of grade-level skills
* Basic understanding of situations
* Satisfactory mathematical vocabulary, use of symbols and communication skills
* Appropriate use of problem-solving strategies
* Occasional computational or surface errors
* Adequate solutions and processes
* Recognizable structure

② Developing

A score of *2* indicates that the student is progressing toward grade level in mathematics. Although the student struggles to communicate effectively, responses do exhibit limited evidence of understanding. Although basic thinking skills and purposes are apparent, computational skills, problem-solving strategies, and process development are limited. Frequent surface errors and lack of structure detract from mathematical achievement at grade level.

② *papers exhibit <u>most</u> of the following:*

* Development toward proficiency of basic skills
* Limited understanding of situations
* Limited mathematical vocabulary, use of symbols and communication skills
* Limited use of problem-solving strategies
* Frequent computational or surface errors
* Limited process development
* Limited structure

① Minimal

A score of *1* indicates that the student demonstrates significant difficulty with basic mathematics concepts as well as with implementing problem-solving strategies. Although the student may attempt to solve most problems, computational skills, basic thinking skills, structure, and process development are severely lacking. Frequent errors and lack of communication skills are obvious. Development toward grade-level proficiency is not evident.

① *papers exhibit <u>most</u> of the following:*

* Minimal development of basic skills
* Minimal understanding of presented situations
* Inadequate mathematical vocabulary, use of symbols and communication skills
* Minimal use of basic thinking skills
* Lack of process development
* Minimal problem-solving strategies
* Numerous computational errors
* Inappropriate processes
* Significant lack of structure

⓪ Insufficient

A score of zero indicates that the paper shows insufficient evidence of minimal development toward proficiency or are blank or illegible.

2000 Idaho Fourth Grade Direct Mathematics Assessment

Welcome to the 2000 Idaho Direct Mathematics Assessment. Your teacher will read the entire test to you before you begin. Do not use a calculator on this assessment.

❶ Andrea went to the grocery store for her mother. Her mother gave her $6.00 to spend. She bought a dozen eggs for $0.96, a gallon of milk for $2.40, and a pound of tomatoes for $1.96.

a. How much money did she spend altogether? Show how you found your answer.

b. Andrea gave the clerk $6.00. How much change will she get back? Show how you found your answer.

c. When Andrea got home with the dozen eggs, she separated them into three equal groups. How many eggs were in each group? Show how you found your answer.

d. If Andrea wanted to buy three gallons of milk, how much money would she need to spend? Show how you found your answer.

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

❷ The school band is selling candy bars to raise money for new uniforms. Sam is in the band and has 195 candy bars to sell. He sells 20 candy bars on the first day and 25 candy bars on the second day. On the third day he sells 5 more candy bars then he sold on the second day. On the fourth day he sells 5 more candy bars than he sold on the third day. This pattern continues until all of the candy bars are sold.

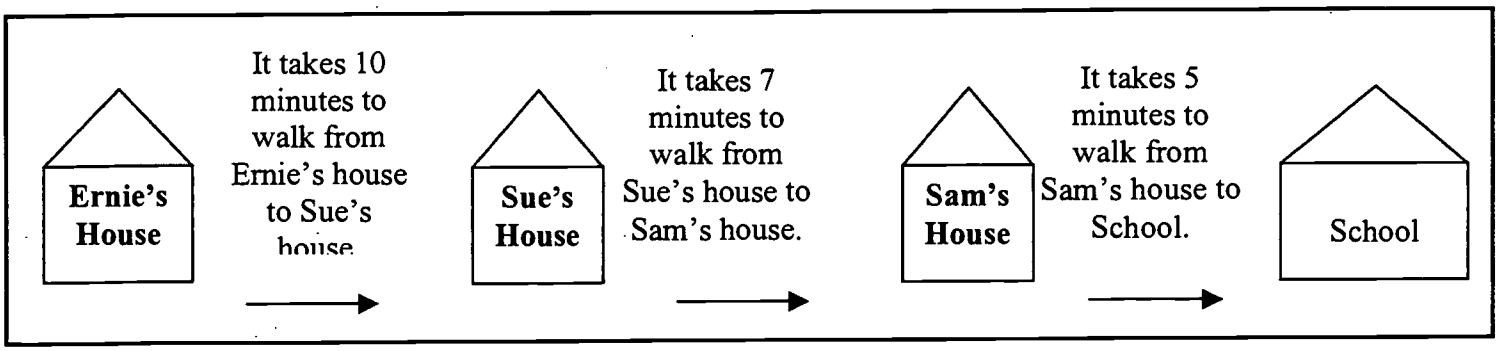
a. Fill in the chart below. You should include the day, the number of candy bars sold that day, and the number of candy bars that Sam would have left to sell at the end of each day. Part of the chart is filled in for you.

Day	1	2					
Number of Candy Bars Sold	20	25					
Number of Candy Bars Remaining	175						

b. What is the total number of candy bars sold on the first, second, third, and fourth days combined? Show how you found your answer.

c. How many days did it take Sam to sell all 195 candy bars? Explain how you found your answer.

❸ Ernie, Sue, and Sam walk to school.



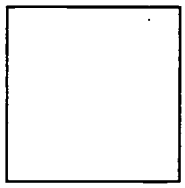
a. **Ernie** leaves his house, walks past Sue's house, walks past Sam's house, and then walks to the school. How long does it take Ernie to walk to school? Show how you found your answer.

b. If **Ernie** leaves his house at 7:50 a.m., what time will he reach school? Show or explain how you found your answer.

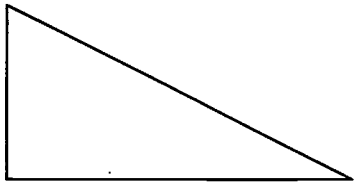
c. School starts at 8:30 a.m., when will **Sue** need to leave home to have 5 minutes to play before school starts? Show or explain how you found your answer.

❹

a. Draw one straight line to make **two rectangles** out of this square.



b. Is there more than one-way to correctly draw the line in part a?
If your answer is yes, draw at least one example below.



c. Draw one straight line to make **two triangles** out of this triangle.

d. Is there more than one-way to correctly draw the line in part c?
If your answer is yes, draw at least one example below.

---

❺ A kitten climbed the stairs to the second floor of a house. First, it went up 8 steps and got scared so it came down 5 steps. Feeling very brave, the kitten went up 6 steps, back down 2, and then up 3 steps to the very top of the stairs.

a. In the space below draw a picture, graph, or diagram that shows the path the kitten took to the second floor.

b. How many steps are there in this set of stairs? Explain how you found your answer.

Direct Math Assessment

Fourth Grade

MAIN RANGEFINDER 5

❶ Andrea went to the grocery store for her mother. Her mother gave her $6.00 to spend. She bought a dozen eggs for $0.96, a gallon of milk for $2.40, and a pound of tomatoes for $1.96.

a. How much money did she spend altogether? Show how you found your answer.

$2.40
1.96
+ .96
$5.32 altogether

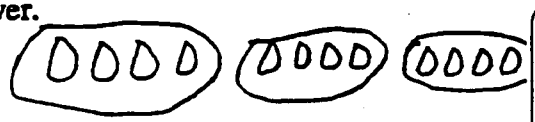
b. Andrea gave the clerk $6.00. How much change will she get back? Show how you found your answer.

$6.00
- 5.32
$0.68 back

c. When Andrea got home with the dozen eggs she separated them into three equal groups. How many eggs were in each group? Show how you found your answer.

4 × 3 = 12

3 | 12 | 4 R 0
-12
0



4 eggs in each group

Effective problem-solving strategies

d. If Andrea wanted to buy three gallons of milk, how much money would she need to spend? Show how you found your answer.

$2.40
× 3
$7.20 to spend

Advance proficiency of basic skills

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

❷ The school band is selling candy bars to raise money for new uniforms. Sam is in the band and has 195 candy bars to sell. He sells 20 candy bars on the first day and 25 candy bars on the second day. On the third day he sells 5 more candy bars than he sold on the second day. On the fourth day he sells 5 more candy bars than he sold on the third day. This pattern continues until all of the candy bars are sold.

a. Fill in the chart below. You should include the day, the number of candy bars sold that day, and the number of candy bars that Sam would have left to sell at the end of each day. Part of the chart is filled in for you.

Day	1	2	3	4	5	6	
Number of Candy Bars Sold	20	25	30	35	40	45	
Number of Candy Bars Remaining	175	150	120	85	45	0	

Appropriate processes accurately completed

175 − 25 = 150 ; 150 − 30 = 120 ; 120 − 35 = 85 ; 85 − 40 = 45 ; 45 − 45 = 0

b. What is the total number of candy bars sold on the first, second, third, and fourth days combined? Show how you found your answer.

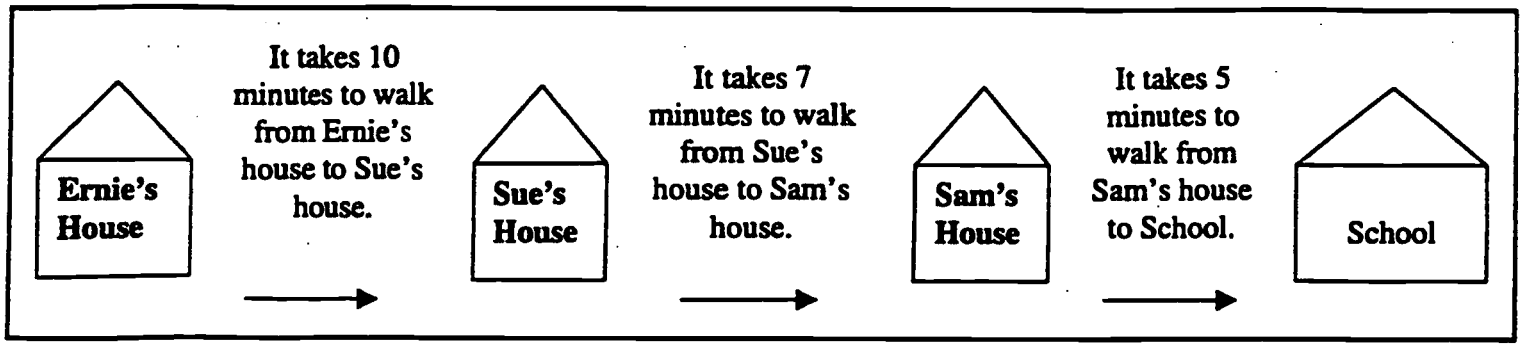
35
30
25
+20
110 candy bars

c. How many days did it take Sam to sell all 195 candy bars? Explain how you found your answer.

6 because the pattern is skiping by 5's and o
day 5 he had to sell 45 candy bars then on day 6 he sold
candy bars.

Advanced communication skills

❸ Ernie, Sue, and Sam walk to school.



a. **Ernie** leaves his house, walks past Sue's house, walks past Sam's house, and then walks to the school. How long does it take Ernie to walk to school? Show how you found your answer.

$$\begin{array}{r} {}^{1}10 \\ 7 \\ +\ 5 \\ \hline 22 \text{ minutes} \end{array}$$

b. If **Ernie** leaves his house at 7:50 a.m., what time will he reach school? Show or explain how you found your answer.

Higher order of thinking skills

$$\begin{array}{r} 7:50 \text{ a.m.} \\ +\ :22 \\ \hline 7:72 \end{array} = 8:12 \text{ a.m.}$$

Ernie will get to school at 8:12 a.m.

c. School starts at 8:30 a.m. When will **Sue** need to leave home to have 5 minutes to play before school starts? Show or explain how you found your answer.

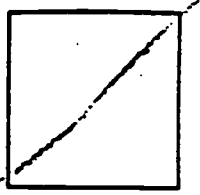
$$\begin{array}{r} 8:{}^{2}30 \text{ a.m.} \\ -\ :17 \\ \hline 8:13 \text{ a.m.} \end{array}$$

e will need to leave at 8:13 a.m.

$$\begin{array}{r} 7 \\ +\ 5 \\ \hline 12 \text{ minutes to walk to school} \\ +\ 5 \text{ miutes to play} \\ \hline 17 \text{ minutes to get to school} \end{array}$$

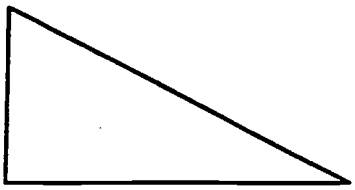
4

a. Draw one straight line to make **two rectangles** out of this square.



b. Is there more than one way to correctly draw the line in part a?
If your answer is yes, draw at least one example below.

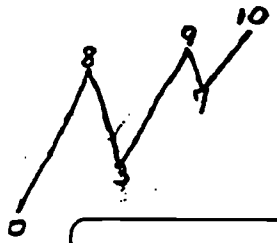
c. Draw one straight line to make **two triangles** out of this triangle.



d. Is there more than one way to correctly draw the line in part c?
If your answer is yes, draw at least one example below.

5 A kitten climbed the stairs to the second floor of a house. First it went up 8 steps and got scared so it came down 5 steps. Feeling very brave, the kitten went up 6 steps, back down 2, and then up 3 steps to the very top of the stairs.

a. In the space below draw a picture, graph, or diagram that shows the path the kitten took to the second floor.



Adaptable process

b. How many steps are there in this set of stairs? Explain how you found your answer. 10 because if you subtract 5 from 8 it equals 3 then add 6 from 3 it equ 9 and subtract 2 from 9 it equals 7 then add 3 from 7 it equals 1

27

Direct Math Assessment

Fourth Grade
MAIN RANGEFINDER 4

❶ Andrea went to the grocery store for her mother. Her mother gave her $6.00 to spend. She bought a dozen eggs for $0.96, a gallon of milk for $2.40, and a pound of tomatoes for $1.96.

a. How much money did she spend altogether? Show how you found your answer.

Proficiency in basic skills

2 1
2.40
+ 1.96
96
5.32

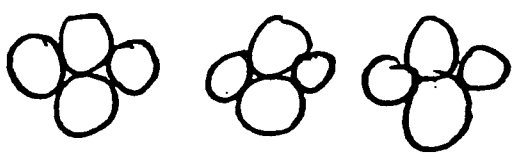
$5.32

b. Andrea gave the clerk $6.00. How much change will she get back? Show how you found your answer.

5 9 10
6.00
- 5.32
.68

68¢

c. When Andrea got home with the dozen eggs she separated them into three equal groups. How many eggs were in each group? Show how you found your answer.



4 egg's in each group.

d. If Andrea wanted to buy three gallons of milk, how much money would she need to spend? Show how you found your answer.

Thorough understanding of situation

2.40
+ 2.40
+ 2.40
7.20

$7.20

25 28

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

❷ The school band is selling candy bars to raise money for new uniforms. Sam is in the band and has 195 candy bars to sell. He sells 20 candy bars on the first day and 25 candy bars on the second day. On the third day he sells 5 more candy bars than he sold on the second day. On the fourth day he sells 5 more candy bars than he sold on the third day. This pattern continues until all of the candy bars are sold.

a. Fill in the chart below. You should include the day, the number of candy bars sold that day, and the number of candy bars that Sam would have left to sell at the end of each day. Part of the chart is filled in for you.

Day	1	2	3	4	5	6	
Number of Candy Bars Sold	20	25	30	35	40	45	
Number of Candy Bars Remaining	175	150	120	85	45	0	

Thorough understanding of situation

b. What is the total number of candy bars sold on the first, second, third, and fourth days combined? Show how you found your answer.

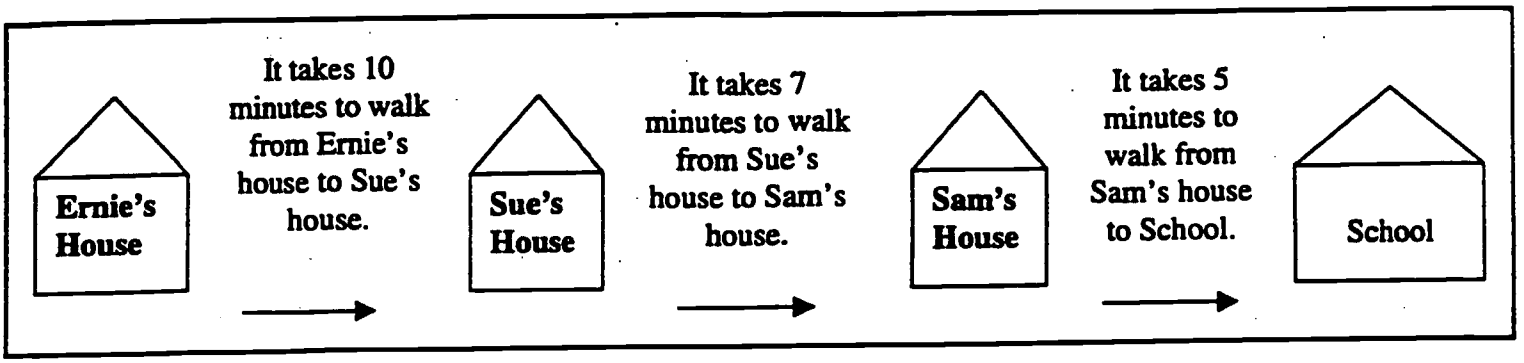
20
+25
30
35
110

110 candyba

c. How many days did it take Sam to sell all 195 candy bars? Explain how you found your answer.

It took Sam 6 days to sell 195 cand
I just went 20, 25, 30, 35, 40, 45 unti
he was out of candybars.

❸ Ernie, Sue, and Sam walk to school.



a. **Ernie** leaves his house, walks past Sue's house, walks past Sam's house, and then walks to the school. How long does it take Ernie to walk to school? Show how you found your answer.

$$\begin{array}{r} {\scriptstyle 1} \\ 10 \\ +\ 7 \\ +\ 5 \\ \hline 22 \end{array}$$

22 min.

b. If **Ernie** leaves his house at 7:50 a.m., what time will he reach school? Show or explain how you found your answer.

8:02 am

Demonstrated problem solving strategies although there is an error

c. School starts at 8:30 a.m. When will **Sue** need to leave home to have 5 minutes to play before school starts? Show or explain how you found your answer.

Clearly defined structure

$$\begin{array}{r} {\scriptstyle 7} \\ +5 \\ \hline 12 \end{array}$$

$$\begin{array}{r} 8.18 \\ -\ 5 \\ \hline 8.13 \end{array}$$

She will need to leve at 8:13 am. to have 5 minutes to Play.

rs.

4

a. Draw one straight line to make two rectangles out of this square.

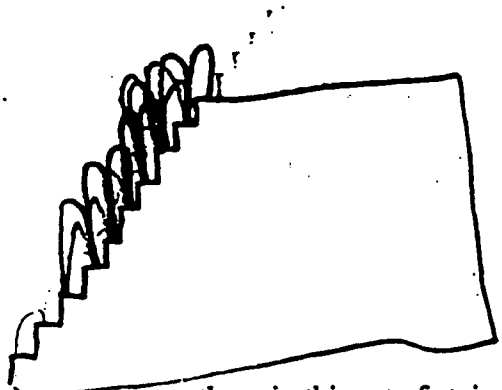
b. Is there more than one way to correctly draw the line in part a? If your answer is yes, draw at least one example below. NO

c. Draw one straight line to make two triangles out of this triangle.

d. Is there more than one way to correctly draw the line in part c? If your answer is yes, draw at least one example below. NO

5 A kitten climbed the stairs to the second floor of a house. First it went up 8 steps and got scared so it came down 5 steps. Feeling very brave, the kitten went up 6 steps, back down 2, and then up 3 steps to the very top of the stairs.

a. In the space below draw a picture, graph, or diagram that shows the path the kitten took to the second floor.



Effective problem solving strategies

Adaptable processes

b. How many steps are there in this set of stairs? Explain how you found your answer.

There are 10 steps to the second floor. I Just went 8-5+6-2+3=10 steps

8
- 5
+ 6
- 2
+ 3
10 steps

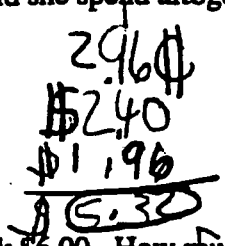
Defendable solution

Direct Math Assessment

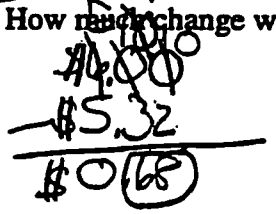
Fourth Grade
MAIN RANGEFINDER 3

❶ Andrea went to the grocery store for her mother. Her mother gave her $6.00 to spend. She bought a dozen eggs for $0.96, a gallon of milk for $2.40, and a pound of tomatoes for $1.96.

a. How much money did she spend altogether? Show how you found your answer.



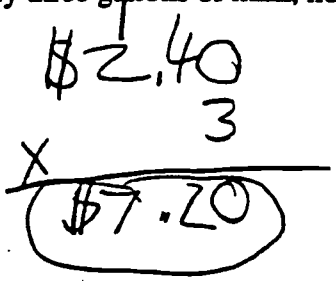
b. Andrea gave the clerk $6.00. How much change will she get back? Show how you found your answer.



c. When Andrea got home with the dozen eggs she separated them into three equal groups. How many eggs were in each group? Show how you found your answer.

Adequate solutions and process. Showed grouping rather than dividing

d. If Andrea wanted to buy three gallons of milk, how much money would she need to spend? Show how you found your answer.



Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

❷ The school band is selling candy bars to raise money for new uniforms. Sam is in the band and has 195 candy bars to sell. He sells 20 candy bars on the first day and 25 candy bars on the second day. On the third day he sells 5 more candy bars than he sold on the second day. On the fourth day he sells 5 more candy bars than he sold on the third day. This pattern continues until all of the candy bars are sold.

a. Fill in the chart below. You should include the day, the number of candy bars sold that day, and the number of candy bars that Sam would have left to sell at the end of each day. Part of the chart is filled in for you.

Day	1	2	3	4	5	6	7
Number of Candy Bars Sold	20	25	30	35	40	45	50
Number of Candy Bars Remaining	175	170	165	160	155	150	145

Recognizable structure although process is wrong

b. What is the total number of candy bars sold on the first, second, third, and fourth days combined? Show how you found your answer.

20
25
30
+35
110

c. How many days did it take Sam to sell all 195 candy bars? Explain how you found your answer.

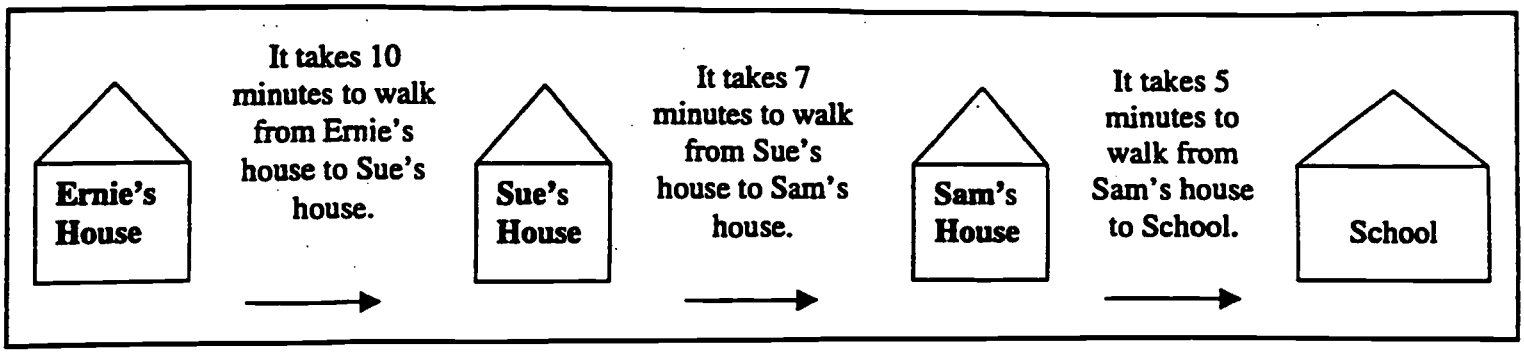
30
+ 7
37 days

1. 145 2. 140 3. 135 4. 130 5. 125, 6. 120 7. 115, 8. 110 9. 105, 10. 100, 11. 95, 12. 90 13. 85 14. 80 15. 75 16. 70 17. 65, 18. 60 19. 55 20. 50, 21. 45, 22. 40 23. 35 24. 30 25. 25 26. 20, 27. 15, 28. 10 29. 5, 30

Limited use of problem solving strategies

33

❸ Ernie, Sue, and Sam walk to school.



a. **Ernie** leaves his house, walks past Sue's house, walks past Sam's house, and then walks to the school. How long does it take Ernie to walk to school? Show how you found your answer.

10 min
7 min
+ 5 min
22 min

b. If **Ernie** leaves his house at 7:50 a.m., what time will he reach school? Show or explain how you found your answer.

7:50 min
+ 22 min
$7:7\,\mathcal{L}$

Inappropriate communication skills

Adequate solution although not useable for this problem

c. School starts at 8:30 a.m. When will **Sue** need to leave home to have 5 minutes to play before school starts? Show or explain how you found your answer.

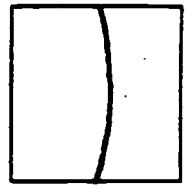
8:30
− 5
8:25

Yes

Basic understanding of problem although not all data used

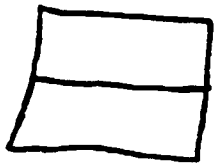
4

a. Draw one straight line to make **two rectangles** out of this square.

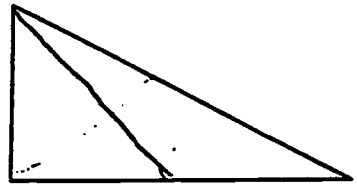


b. Is there more than one way to correctly draw the line in part a?
If your answer is yes, draw at least one example below.

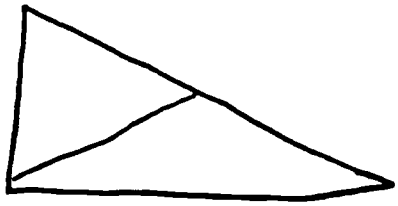
Basic understanding of grade level skills



c. Draw one straight line to make **two triangles** out of this triangle.



d. Is there more than one way to correctly draw the line in part c?
If your answer is yes, draw at least one example below.



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5 A kitten climbed the stairs to the second floor of a house. First it went up 8 steps and got scared so it came down 5 steps. Feeling very brave, the kitten went up 6 steps, back down 2, and then up 3 steps to the very top of the stairs.

a. In the space below draw a picture, graph, or diagram that shows the path the kitten took to the second floor.

b. How many steps are there in this set of stairs? Explain how you found your answer.

Direct Math Assessment

Fourth Grade
MAIN RANGEFINDER 2

❶ Andrea went to the grocery store for her mother. Her mother gave her $6.00 to spend. She bought a dozen eggs for $0.96, a gallon of milk for $2.40, and a pound of tomatoes for $1.96.

a. How much money did she spend altogether? Show how you found your answer.

2.40
1.96
+ 96
5.32

5.32

b. Andrea gave the clerk $6.00. How much change will she get back? Show how you found your answer.

Development toward proficiency

260

6.00
−2.40
4.40
1.96

2 1 16
3. 8 X
= 96
2.60

Computational error

c. When Andrea got home with the dozen eggs she separated them into three equal groups. How many eggs were in each group? Show how you found your answer.

4 egg's in each group divid

Not demonstrating algorithm

d. If Andrea wanted to buy three gallons of milk, how much money would she need to spend? Show how you found your answer.

7.20

2.40
+ 2.40
4.80
+ 2.40
7.20

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

~~2~~ The school band is selling candy bars to raise money for new uniforms. Sam is in the band and has 195 candy bars to sell. He sells 20 candy bars on the first day and 25 candy bars on the second day. On the third day he sells 5 more candy bars than he sold on the second day. On the fourth day he sells 5 more candy bars than he sold on the third day. This pattern continues until all of the candy bars are sold.

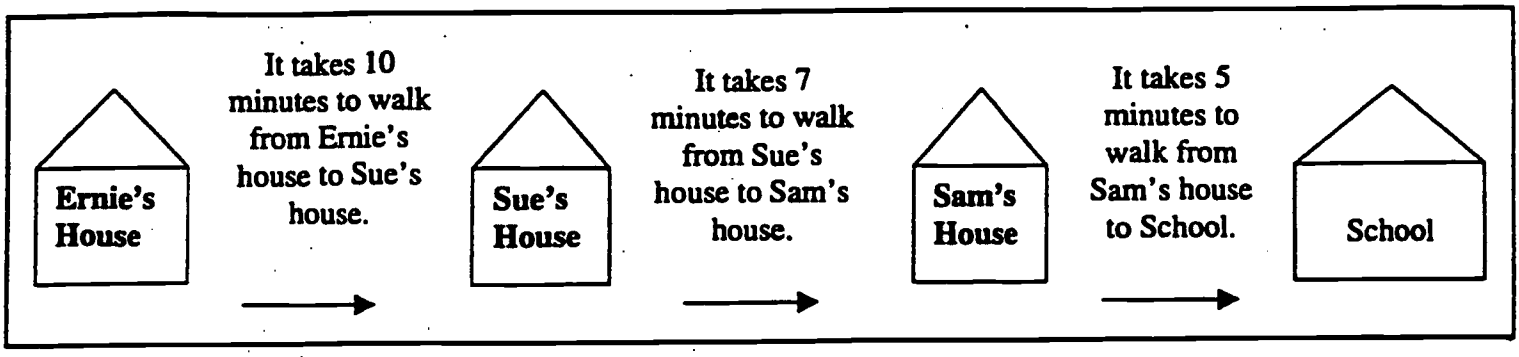
a. Fill in the chart below. You should include the day, the number of candy bars sold that day, and the number of candy bars that Sam would have left to sell at the end of each day. Part of the chart is filled in for you.

Day	1	2					
Number of Candy Bars Sold	20	25					
Number of Candy Bars Remaining	175						

b. What is the total number of candy bars sold on the first, second, third, and fourth days combined? Show how you found your answer.

c. How many days did it take Sam to sell all 195 candy bars? Explain how you found your answer.

❸ Ernie, Sue, and Sam walk to school.



a. **Ernie** leaves his house, walks past Sue's house, walks past Sam's house, and then walks to the school. How long does it take Ernie to walk to school? Show how you found your answer.

22 minutes

$$\begin{array}{r} {\scriptstyle 1} \\ 10 \\ 7 \\ +\ 5 \\ \hline 22 \end{array}$$

b. If **Ernie** leaves his house at 7:50 a.m., what time will he reach school? Show or explain how you found your answer.

Limited mathematical language and communication skills

$$\begin{array}{r} {\scriptstyle 1} \\ 7:50 \\ +\ 10 \\ \hline 7 \\ 5 \\ \hline 2 \end{array}$$

8:22

c. School starts at 8:30 a.m. When will **Sue** need to leave home to have 5 minutes to play before school starts? Show or explain how you found your answer.

Limited structure

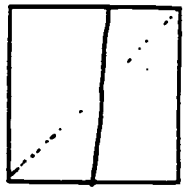
add from 7:00 to 8:25

38

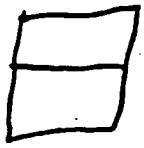
8:25

❹

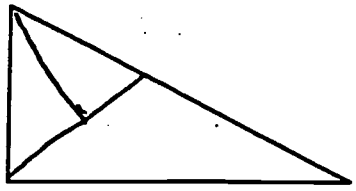
a. Draw one straight line to make **two rectangles** out of this square.



b. Is there more than one way to correctly draw the line in part a?
If your answer is yes, draw at least one example below.



c. Draw one straight line to make **two triangles** out of this triangle.



d. Is there more than one way to correctly draw the line in part c?
If your answer is yes, draw at least one example below.

Progressing toward grade level

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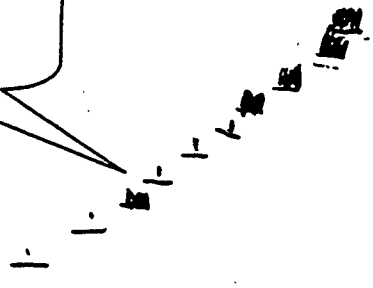
❺ A kitten climbed the stairs to the second floor of a house. First it went up 8 steps and got scared so it came down 5 steps. Feeling very brave, the kitten went up 6 steps, back down 2, and then up 3 steps to the very top of the stairs.

a. In the space below draw a picture, graph, or diagram that shows the path the kitten took to the second floor.

Limited use of problem solving strategies



b. How many steps are there in this set of stairs? Explain how you found your answer.

Limited understanding of situations

8
6
+ 5
3
2

24 steps

Fourth Grade
MAIN RANGEFINDER 1

❶ Andrea went to the grocery store for her mother. Her mother gave her $6.00 to spend. She bought a dozen eggs for $0.96, a gallon of milk for $2.40, and a pound of tomatoes for $1.96.

a. How much money did she spend altogether? Show how you found your answer. $6.00 $0.96 $2.40 $1.96 $3.50

Numerous computational errors

b. Andrea gave the clerk $6.00. How much change will she get back? Show how you found your answer. $3.30

c. When Andrea got home with the dozen eggs she separated them into three equal groups. How many eggs were in each group? Show how you found your answer. $3.50

d. If Andrea wanted to buy three gallons of milk, how much money would she need to spend? Show how you found your answer. $3.50

Minimal use of basic thinking skills

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

2 The school band is selling candy bars to raise money for new uniforms. Sam is in the band and has 195 candy bars to sell. He sells 20 candy bars on the first day and 25 candy bars on the second day. On the third day he sells 5 more candy bars than he sold on the second day. On the fourth day he sells 5 more candy bars than he sold on the third day. This pattern continues until all of the candy bars are sold.

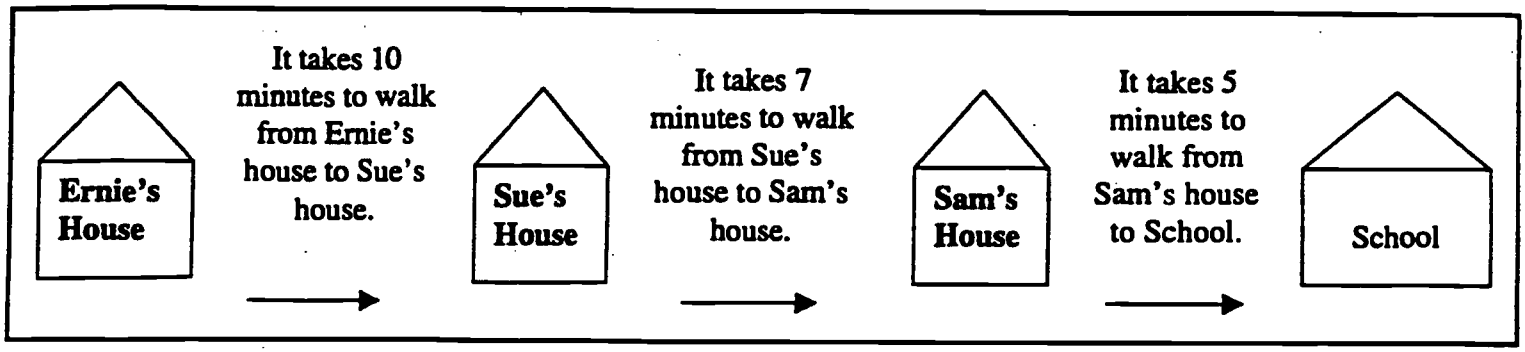
a. Fill in the chart below. You should include the day, the number of candy bars sold that day, and the number of candy bars that Sam would have left to sell at the end of each day. Part of the chart is filled in for you.

Day	1	2					
Number of Candy Bars Sold	20	25					
Number of Candy Bars Remaining	175						

b. What is the total number of candy bars sold on the first, second, third, and fourth days combined? Show how you found your answer.

c. How many days did it take Sam to sell all 195 candy bars? Explain how you found your answer.

❸ Ernie, Sue, and Sam walk to school.



a. **Ernie** leaves his house, walks past Sue's house, walks past Sam's house, and then walks to the school. How long does it take Ernie to walk to school? Show how you found your answer. 22

Inadequate mathematical language & communication skills

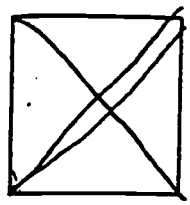
b. If **Ernie** leaves his house at 7:50 a.m., what time will he reach school? Show or explain how you found your answer. 1; 20pm

Minimal understanding of presented situation

c. School starts at 8:30 a.m. When will Sue need to leave home to have 5 minutes to play before school starts? Show or explain how you found your answer. 1 ;20am

❹

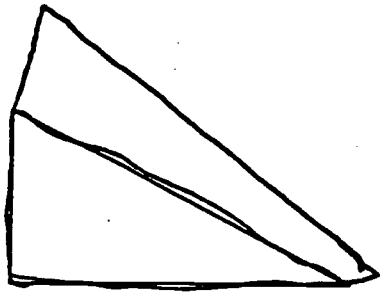
a. Draw one straight line to make **two rectangles** out of this square.



b. Is there more than one way to correctly draw the line in part a?
If your answer is yes, draw at least one example below.

Yes

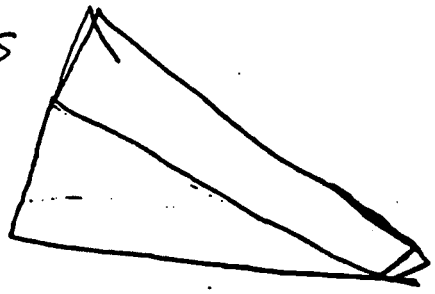
Minimal understanding of presented situation



c. Draw one straight line to make **two triangles** out of this triangle.

d. Is there more than one way to correctly draw the line in part c?
If your answer is yes, draw at least one example below.

Yes



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❺ A kitten climbed the stairs to the second floor of a house. First it went up 8 steps and got scared so it came down 5 steps. Feeling very brave, the kitten went up 6 steps, back down 2, and then up 3 steps to the very top of the stairs.

a. In the space below draw a picture, graph, or diagram that shows the path the kitten took to the second floor. 50

Minimal problem solving strategies

b. How many steps are there in this set of stairs? Explain how you found your answer. 56

Section IV

Preparing for the DMA

- ✓ Strategies for Teachers
- ✓ Advice for Students
- ✓ Scoring Standard for Students
- ✓ Practice Prompts and Assessments

Idaho Direct Mathematics Assessment
Fourth Grade Assessment Toolkit
State Department of Education

Strategies for Teachers

1. Learn more:
   - Participate in state-sponsored in-service workshops and training.
   - Attend the presentations at the Idaho Council of Teachers of Mathematics (ICTM) Fall Conference.
   - Request in-service through the State Department of Education Math Coordinator, by phone (332-6932).
2. Invite a scorer from a previous year to share insights and how these assessments have affected his/her math instruction.
3. Provide copies of scoring standards to students, other teachers, and parents.
4. Present a workshop for parents in which scoring standards and anchor papers are discussed, and questions are answered.
5. Provide students with opportunities to practice problem solving and responding to practice prompts and practice assessments including assessments from previous years. Allow students to score their own papers using the scoring standard.
6. Do not provide scratch paper. This requires students to show their work on the test.
7. Encourage all mathematics teachers to use scoring standards, or parts of it (when appropriate) to assess math assignments.
8. Ask students to explain to parents using their papers, the scoring standard, and anchor papers.
9. Score papers and share your insights and conclusions with other faculty.
10. Hold a school-wide math assessment. Develop prompts, administer the assessment, and using the DMA scoring standard, find anchor papers, and score the papers. Invite parents, students, and community members to help score the papers.
11. Discuss higher level thinking skills with students. Encourage them to consider problem solving strategies and processes, and to explain these orally and in writing.
12. Ask students to make up their own prompts. Discuss these as a class and collect good samples for future practice.
13. Using copies of anchor papers, invite students to compare their work to anchor papers and explain similarities and differences. Ask them to use the anchor papers to set concrete goals for their own mathematics improvement.
14. Following the assessment, make copies of student responses for comparison with scores when the results arrive. These comparisons will improve teacher's instruction and understanding of the assessment.
15. Refer to the appropriate *Mathematics Terms and Vocabulary*, *Problem Solving Strategies*, and *Achievement Standards* documents to align instruction and curriculum with the assessment.

Advice for Students
Preparing for the Direct Mathematics Assessment

Appearance

DO write and organize your work so it is easy to read and follow.

DON'T be overly concerned with handwriting or spelling. They do not enter into scoring unless they hinder communication.

Communication

DO show your work and justify your answers. Use appropriate mathematical symbols and terms.

Example:
DO write 12 + 10 + 5 = 27

DON'T think that longer answers are always better.

DON'T use scratch paper.

Example:
DON'T write "At first I took the twelve, then I added the ten, then I added the five and got twenty-seven."

Assessment Strategies

DO practice taking sample assessments. Complete as much of the first problem as you can. Then skim the remaining problems and choose the ones that best demonstrate your abilities.

DON'T think you need to do every problem in the order it is written on the assessment.

DO attempt to answer all parts of the questions you select.

DON'T spend too much time on any one problem. If you are having trouble, move on to another question.

Note to teacher: Holistic scoring takes into consideration all work shown on the assessment unless it is crossed out or erased. If students work on **all** prompts *after* the first page of the assessment and decide that one prompt does not demonstrate their best work, students may cross out all work done on that prompt.

Scoring Standard for Students

***5* Advanced**

A score of *5* shows that you have an advanced understanding of math skills needed to solve the problem. You showed advanced ability to explain and show what you know. You included clear and understandable steps in getting your answer. Problem solving strategies were used well in reaching your solution. There were few or no mistakes.

***4* Proficient**

A score of *4* shows that you have a clear understanding of math skills needed to solve the problem. Problem solving strategies are correct. Your answers were explained well, although you may have made a few mistakes.

***3* Satisfactory**

A score of *3* shows you have a basic understanding of math skills needed to solve the problem. Problem solving strategies were used. When you showed your work, some steps were unclear or missing. There were occasional mistakes.

***2* Developing**

A score of *2* shows that you are beginning to use basic math skills. You may have tried to use problem-solving strategies, but they do not fit the situation. The steps are difficult to follow and there are many mistakes.

***1* Minimal**

A score of *1* shows that you have difficulty understanding the problem and using math skills to solve it. You did not choose a correct way to solve the problem. Your answers were incorrect or did not fit the problem.

***0* Insufficient**

A score of *0* shows you left the assessment blank, or your work could not be read or understood.

Idaho DMA Practice Assessment

Welcome to the Idaho Direct Mathematics Assessment. Your teacher will read the entire test to you before you begin. You may NOT use a calculator on this assessment.

❶ Hilltop Elementary School is having a bake sale to raise money for computers. Cookies and cupcakes will be sold.

a. Amy will make three batches of cookies to sell at the bake sale. Each batch of cookies needs to have two cups of flour. How many cups of flour will Amy need altogether for her cookies? Show how you found your answer.

b. John buys seven cupcakes at the bake sale. Cupcakes cost $.25 each. How much money will John spend on cupcakes? Show how you found your answer.

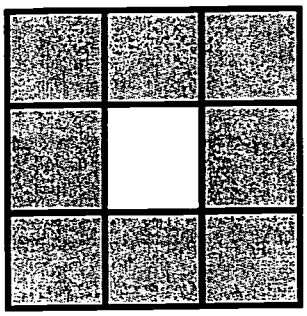
c. There were 224 cupcakes and twice as many cookies for bake sale. How many cookies did the students have? Show how you found your answer.

d. The students at Hillside Elementary raised $4,200 for computers. Each computer costs $1,500. How many computers would the school be able to buy with the money that they raised? Show how you found your answer.

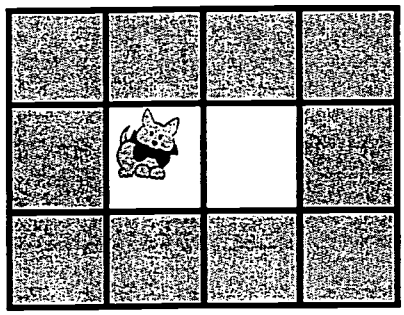
Achievement Standards References: 540.02.a,b,e 540.03.a,b 541.02.a,b,c 541.02.a 541.04.a,b

Read the remaining four numbered problems (2, 3, 4, and 5) and select three you wish to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the one problem you do not choose to answer.

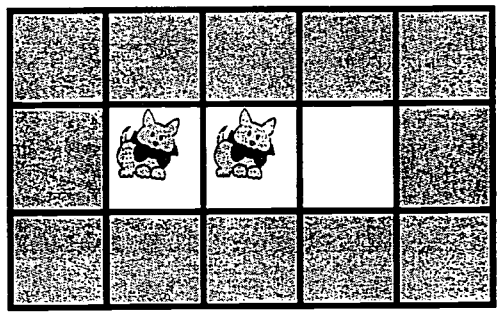
❷ Look at the following pattern of pictures. Count the number of cats and gray squares in each part of the pattern.



Number of cats	
Number of gray squares	



Number of cats	
Number of gray squares	



Number of cats	
Number of gray squares	

a. How many squares are needed to go around 4 cats? Explain or show how you found your answer.

b. How many squares are needed to go around 6 cats. Explain or show how you found your answer.

c. How many squares are needed to go around 10 cats? Explain or show how you found your answer.

Achievement Standards References: 540.02.a,e 540.03.a 541.01.a,b,c 541.02.a 546.01.a,b

❸

a. Jennifer gets an allowance of $12.00 a week. February has 4 weeks. How much money does Jennifer get in February? Show how you found your answer.

b. March has 5 weeks. Jennifer got her allowance for the first 2 weeks, but only half of her allowance the last 3 weeks because she didn't get her work done. How much money did she get in March? Show how you found your answer.

c. Did Jennifer get more money in March or February? Explain how you found your answer?

Achievement Standards References: 540.02.a,b,e 540.03.a,b 541.02.a,b,c 541.02.a 541.04.a,b

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❹ Three fourth grade classes are planning a field trip to the Idaho History Museum. Mr. Blue's class has 26 students, Mrs. Gold's class has 22 students, and Mr. White's class has 24 students.

a. How many fourth grade students are there in all? Show how you found your answer.

b. If you combine Mr. Blue's and Mr. White's classes, how many more students would be in this combined class than in Mrs. Gold's class? Show or explain how you found your answer.

Achievement Standards References: 540.02.a,b,e 540.03.a,b 541.01.a,b,c 541.02.a 541.04.a,b

❺ Mr. Brown's students have earned a pizza party. He asks his students to name their favorite kind of pizza. Each student can name only one kind.

Favorite Kinds of Pizza

Canadian Bacon	𝍸 𝍸 𝍸
Cheese	𝍸
Pepperoni	𝍸

a. Mr. Brown decides to graph the results of his survey. Complete the graph for Mr. Brown.

Favorite Kinds of Pizza

b. What is the total number of students in Mr. Brown's class? Explain or show how you found your answer?

c. How many more students like Canadian bacon pizza than like cheese pizza? Explain or show how you found your answer?

d. What kind of pizza was 2 times more popular as cheese pizza? Explain or show how you found your answer?

Idaho DMA Practice Assessment

1998

Welcome to the 1998 Direct Mathematics Assessment. Your teacher will read the entire test to you before you begin. You may NOT use a calculator on this assessment.

❶ Your fourth-grade class is planning a picnic for the end of the year. You are in charge of buying cookies. There are 27 students in the class. Your teacher and two parents will also be going to the picnic.

a. How many people will be going on the picnic? Show how you found the answer.

b. How many cookies will you need so every person at the picnic can have two? Show how you found the answer.

c. There are 10 cookies in each package. How many packages of cookies will you need to buy so that each person at the picnic can have two? Show how you found the answer.

d. At the store, the price on a package of 10 cookies is $3.00. How much will all of the packages of cookies cost? Show how you found the answer.

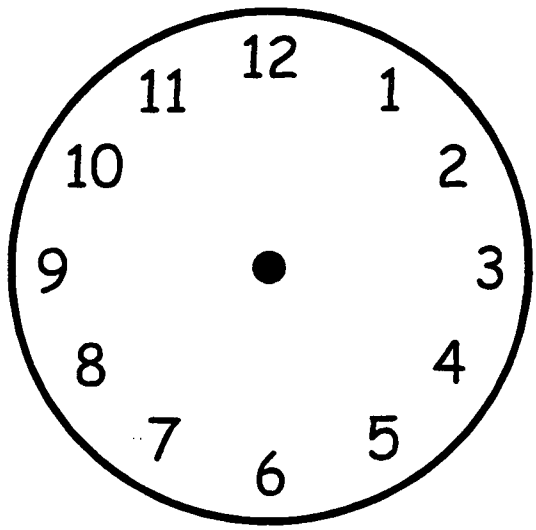
e. The teacher gave you two $10.00 bills to buy the cookies. How much change will you get back? Show how you found the answer.

Achievement Standards References: 541.02.a 546.02.a,b

Read the remaining four numbered problems (2, 3, 4, and 5) and select three you wish to answer. Answer ALL of the parts of the three problems you choose to answer. Cross out the one problem you do not choose to answer.

❷ Below is the schedule for the fourth-grade students at Washington Elementary School. Use the schedule to answer the questions.

First Bus Arrives	**7:50 a.m.**
Last Bus Arrives	**8:15 a.m.**
School Begins	**8:30 a.m.**
Morning Recess	**10:30 a.m. to 10:45 a.m.**
Lunch	**11:35 a.m. to 12:05 p.m.**
Noon Recess	**12:05 p.m. to 12:30 p.m.**
School Begins	**12:30 p.m.**
Afternoon Recess	**1:30 p.m. to 1:45 p.m.**
School Dismisses	**3:00 p.m.**
Buses Leave	**3:10 p.m.**



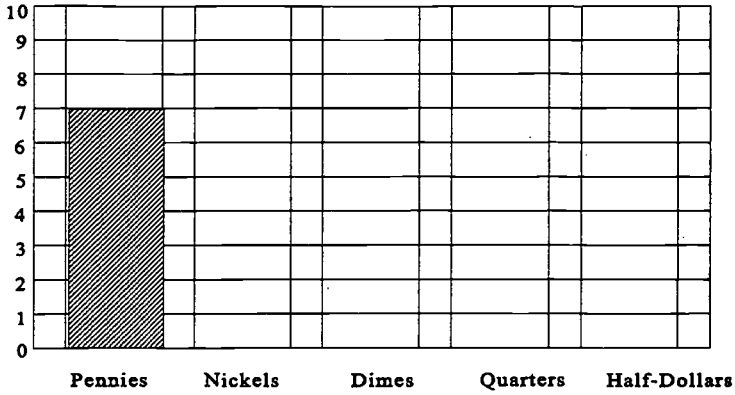
a. Bobby arrives on the first bus. Anne arrives on the last bus. How long is Bobby at the school before Anne arrives? Show how you found your answer.

b. How many total minutes are these fourth-graders allowed for morning recess, noon recess, and afternoon recess during each day? Show how you found your answer.

c. It takes Charles 30 minutes to walk home from school. Bill rides the bus for 22 minutes and walks 5 minutes more to get home. Which student gets home from school first? Show how you found this answer.

d. It takes Debbie 45 minutes to get ready for school and another 30 minutes to do her morning chores and eat breakfast. She also needs 15 minutes to walk to school. At what time will Debbie have to wake up to get to school on time. Show how you found your answer.

❸ Sally sorted the coins from her bank. She grouped the pennies, nickels, dimes, quarters, and half-dollars into piles. Sally counted the number of coins in each pile. She had the following coins: 7 pennies, 3 nickels, 8 dimes, 5 quarters, and 2 half-dollars. Sally began making a bar graph to show the number of each coin she has. She completed the penny bar.



a. Complete the bar graph to show the numbers of each coin that Sally has.

b. How many more pennies than quarters does Sally have? Show how you found this answer.

c. How much money did Sally have in her bank in all? Show how you found this answer.

❹

Square Patterns	□	□ □ □ □	□ □ □ □ □ □ □ □ □	
Size of square:	1 by 1	2 by 2	3 by 3	4 by 4
Number of tiles:	1	4	?	?

Mr. Clark's fourth-grade students are placing small black tiles to form square patterns as shown in the table above. (Tiles are not stacked on top of other tiles.)

a. Complete the table by drawing the *4 by 4* square pattern showing the tiles. What two numbers should go in the table where the question marks are? Show how you found these numbers.

b. Sam is going to make the *5 by 5* square pattern. How many tiles will Sam need for the *5 by 5* square pattern? Show how you found this answer.

c. Wilson wants to make the *1 by 1* square, then the *2 by 2* square, then the *3 by 3* square, and finally the *4 by 4* square pattern. How many tiles will Wilson need in all? Show how you found this answer.

❺

Row: 1	**1**						
Row 2:	**1**		**2**				
Row 3:	**1**		**2**		**3**		
Row 4:	**1**		**2**		**3**		**4**
Row 5:	**1**		**2**		**3**		**4**		**5**
Row 6:	**1**		**2**		**3**		**4**		**5**		**6**
Row 7:	**1**		**2**		**3**		**4**		**5**		**6**		**7**
Row 8:	____		____		____		____		____		____		____

a. Fill in *Row 8* of the table.

b. How many numbers will be in ***Row 9***? How do you know?

c. If the pattern were continued, what would be the last number in ***Row 20***? How do you know?

d. How many numbers are there in all of the **first seven rows**? Show how you found this number.

Idaho DMA Practice Assessment

1999

Welcome to the 1999 Idaho Direct Mathematics Assessment. Your teacher will read the entire test to you before you begin. Do not use a calculator on this assessment.

❶ The librarian counted the books in the library. She counted 1,076 biography books, 3,987 fiction books, 459 poetry books, and 96 reference books.

a. How many books does the librarian have altogether? Show how you found your answer.

b. How many more fiction books than biography books does the library have? Show how you found your answer.

c. If the librarian had two times as many reference books as she has now, how many reference books would she have? Show how you found your answer.

d. The librarian has 36 books about animals. If the librarian evenly divides the animal books up among 3 classrooms, how many animal books would each classroom have? Show how you found your answer.

Read problems 2, 3, 4, and 5 on this and the next two pages. Select three problems to answer. Answer ALL of the parts of the three problems you select to answer. Cross out the one problem that you do not choose to answer.

❷ Mary went shopping at the mall with her friends. She began the day with $40.

$7.90
(book)

$1.50
(drink)

$2.80
(hamburger)

$15.70
(CD)

a. Mary bought 2 books at the bookstore. What was the total amount of money she spent there? Show how you found your answer.

b. Mary went to the music store where she bought a CD. She gave the clerk a $20 bill. How much change did she get back? Show how you found your answer.

c. Mary decided she was hungry. She bought a hamburger and a drink. How much money did she spend at the food court? Show how you found your answer.

d. After purchasing the 2 books, the CD, a hamburger, and a drink, Mary has $3 left. Does she have the correct amount of money? Show how you found your answer.

❸ In the space below, draw a circle, a square, a rectangle, and a triangle. Write the name of each figure next to your drawings.

a. Which two of the figures you drew are the most alike? Explain why you think so.

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❹ Debbie put one book on the bottom shelf of a bookcase. She put 5 books on the second shelf and 9 books on the third shelf.

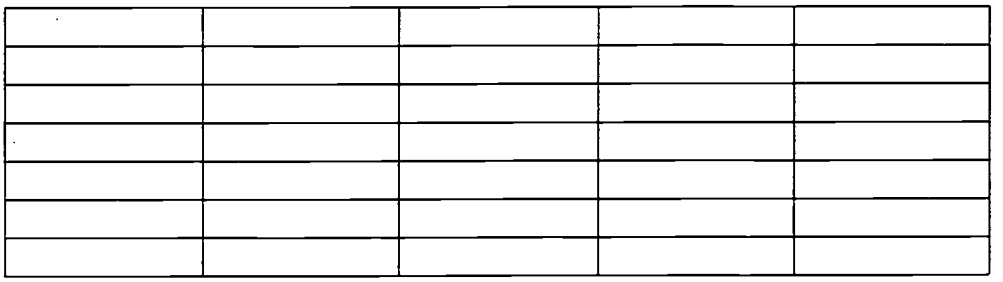
a. If this pattern continues, how many books will she put on the sixth shelf? Show how you found your answer by drawing a picture, making a chart, or writing an explanation.

b. What is the total number of books she put on the first six shelves? Show how you found your answer.

❺ Ann was working at a grocery store. The worker who sells the most turkeys gets a free turkey for his or her family for Thanksgiving. Ann kept track of the number of turkeys she sold in five days. On Monday, she sold 15 turkeys. On Tuesday, she sold 5 turkeys. On Wednesday, she sold 30 turkeys. On Thursday, she sold 20 turkeys, and on Friday, she sold 10 turkeys.

a. Fill in the bar graph to show the number of turkeys Ann sold each day.

Turkeys Sold by Ann



b. On which day did Ann sell the most turkeys? How did your graph help you answer this question?

c. How many turkeys did Ann sell during the entire week? Show or explain how you found your answer.

d. What is the difference between the number of turkeys Ann sold on her highest day and her lowest day? Show or explain how you found your answer.

Fourth Grade Idaho Direct Mathematics Assessment

#4-001 Fourth-Grade Practice Prompt *Number Concepts & Computation*

The fourth grade students at Lincoln Elementary School went to the zoo for their field trip. They went first to the monkey cages, where there were 60 monkeys swing through the trees. Next, they went to the bird cages, where they watched 405 birds. Visiting the next few cages, they saw 22 seals, 5 bears, and 56 deer.

a. What is the total number of animals and birds the students saw at the zoo? Show or explain how you found your answer.

b. How many more birds than monkeys did they see? Show or explain how you found your answer.

c. If each deer had two babies, how many baby deer would there be? Show or explain how you found your answer.

d. At the end of the day, the zookeeper announced that he was going to give the birds away to 5 students. How many birds would each of the 5 students get? Show or explain how you found your answer.

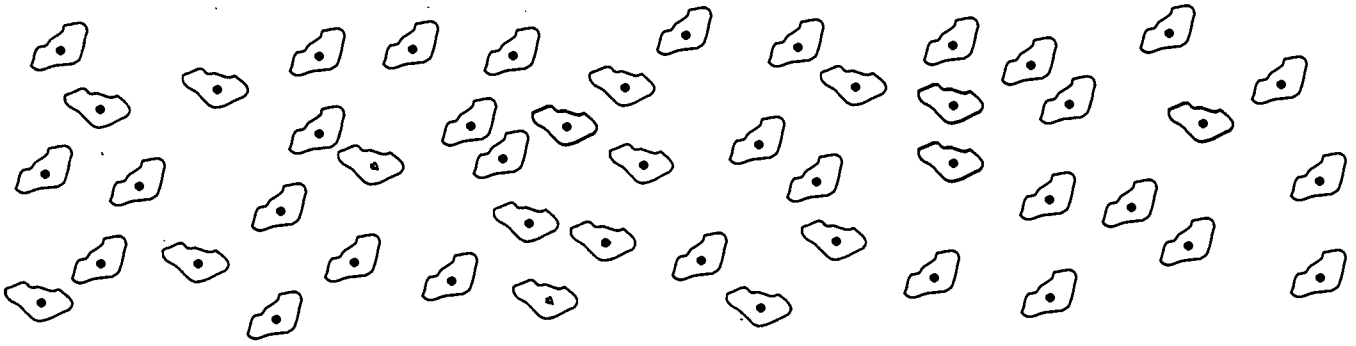
Achievement Standards References: 540.02.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-002 Fourth-Grade Practice Prompt *Number Concepts & Computation*

This is an **ogg**:

a. A package of **oggs** holds six of them. How many packages are needed to hold all of the oggs pictured below? Show or explain how you found your answer.



b. If you have 66 **oggs**, how many packages will you need to hold all your **oggs**? Show or explain how you found your answer.

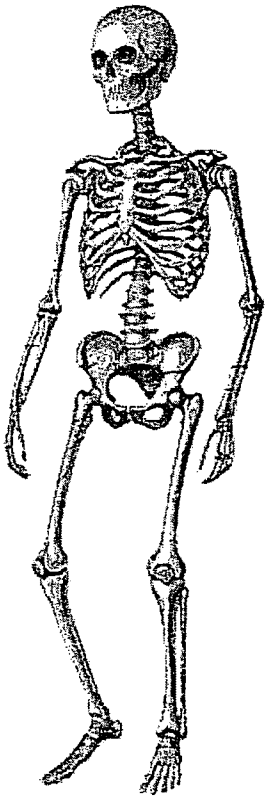
c. If you have 53 **oggs**, how many packages will you need to hold all of your **oggs**? Show or explain how you found your answer.

Achievement Standards References: 540.02.a
545.02.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-003 Fourth-Grade Practice Prompt *Number Concepts & Computation*

Solve each problem about the human skeleton below.



a. There are 8 bones in the part of the skull that protects the brain, fourteen bones protect the face, and six bones are in <u>each</u> ear. How many bones are in the human head altogether? Show or explain how you found your answer.

b. There are 26 bones in the spine. Twelve bones have ribs attached to them. How many bones in the spine do not have ribs attached? Show or explain how you found your answer.

c. There are 52 bone in both feet altogether. How many bones are in just one foot? Show or explain how you found your answer.

d. One child has 33 vertebrae. How many total vertebrae would there be in 8 children? Show or explain how you found your answer.

e. There are a total of 54 bones in both hands and wrists. Each arm has 3 bones. How many more bones are in both hands and wrists than in both arms? Show or explain how you found your answer.

Achievement Standards References: 540.01.d 540.02.a,b,e 541.03.a,b 541.01.a,b 541.04.a,b

Mike and Mary were playing a new computer game. They each played three games. Their scores were:

	Mike	Mary
Game 1	305	327
Game 2	385	415
Game 3	378	310

a. If Mike and Mary totaled their scores in all three games, who had the highest score? Show your work.

b. While Mike was doing his homework, Mary decided to play two more games. What does she have to score in her 3rd game to tie Mike's three game total?

Game 1 309
Game 2 388

c. If Mary wanted to double Mike's three game total, what would her score be?

Achievement Standards References: 540.01.d 540.02.a,b 540.03.a,b 541.01.a,b 541.02.a 541.04.a,b 545.01.a 545.02.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-005 Fourth-Grade Practice Prompt *Number Concepts & Computation*

The Ice Cream Shoppe owner counted how many ice cream treats her workers made last week. They had 1,345 hot fudge sundaes, 916 strawberry sundaes, 156 banana splits, and 751 milkshakes. SHOW ALL YOUR WORK FOR "a THROUGH d."

a. How many ice cream treats did the workers make last week?

b. How many more hot fudge sundaes did the workers make than strawberry sundaes?

c. The workers used 99 bananas to make all the ice cream treats. Next week the manager is having a big sale on sundaes and needs to order three times as many bananas. How many bananas does the manager need to order?

d. The 99 bananas came in three boxes. How many bananas were in each box?

Achievement Standards References: 540.01.d 540.02.a,b,e 540.03.a,b 541.01.a,b 541.04.a,b

Fourth Grade Idaho Direct Mathematics Assessment

#4-006 Fourth-Grade Practice Prompt *Number Concepts & Computation*

James is separating his sport cards into three (3) groups. He has:

1,036 Football cards
982 Basketball cards
704 Baseball cards

a. How many cards in all does James have? Please show how you got your total.

b. How many more Football cards than Baseball cards does James have? Show how you figured the difference.

c. James best friend Paul has 3 times as many Baseball cards as James. How many Baseball cards does Paul have? Be sure to show your work.

Achievement Standards References: 540.02.a 541.01.b 541.04.b

Fourth Grade Idaho Direct Mathematics Assessment

#4-007 Fourth-Grade Practice Prompt *Number Concepts & Computation*

Two workers from the Forest Service told our class that for every fully-grown tree that was cut down, 5 small seedling trees are planted to replace that tree. These Forest Service workers told our class that it takes 25 trees to build one house.

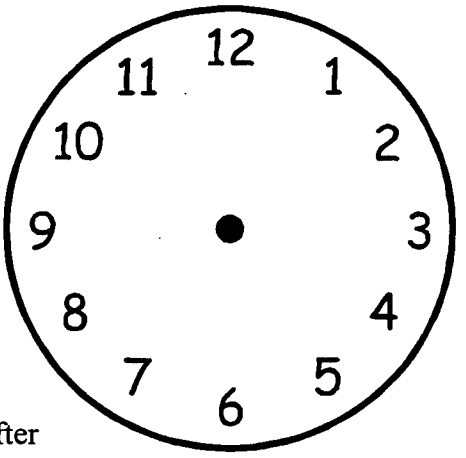
a. How many fully-grown trees were cut down in the forest if the workers planted 50 small seedling trees? Explain or show how you found your answer.

b. How many houses can be built when those 50 seedling trees become fully grown trees? Explain or show how you found your answer.

c. How many fully-grown trees would it take to build four houses? Explain or show how you found your answer.

Achievement Standards References: 541.01.a 541.04.b

Tina gets home from school at 3:00 p.m. She spends 45 minutes on Math homework, 1 hour reading her library book for a book report, and 20 minutes studying for a spelling test.



a. How many hours and minutes does Tina spend on schoolwork after school? Show how you got your answer.

b. If Tina wanted to watch a special on TV at 5:00 p.m. would she have time to finish her homework before the TV special? Show how you know if she does or does not have time?

c. Tina wants to wait to study her spelling in the morning. It takes her 30 minutes to get ready for school, including eating breakfast, and 10 minutes to walk to school. What time does she need to get up to have time to practice her spelling and still get to school on time? Show how you found your answer.

Achievement Standards References: 540.02.a 542.01.e

Fourth Grade Idaho Direct Mathematics Assessment

#4-009 Fourth-Grade Practice Prompt *Time and Money*

Pat has gone to the store to shop. He has taken the $20.00 bill he received for his birthday. He found the following items at the store.

Item	Price (including tax)
Baseball cards (large package)	$ 9.00
Giga Pet	15.00
Bag of jelly beans	1.50
Music C D	12.50
A book	4.00

a. If Pat bought the giga pet and one book, how much would it cost? How much change would he receive? Please show your work

b. Does Pat have enough to buy the baseball cards, jellybeans, and one book? Show how you figured your answer.

c. If Pat buys 3 bags of jellybeans how much would it cost? How much change would he receive? Be sure to show your work.

Achievement Standards References: 540.01.b 540.01.c

Fourth Grade Idaho Direct Mathematics Assessment

#4-010 Fourth-Grade Practice Prompt *Time and Money*

Danny needs to be at school for Honor Choir at 8:15 a.m. It takes him 10 minutes to walk to school. Before he leaves, it takes Danny 10 minutes to shower, 15 minutes to eat breakfast, and 20 minutes to do his chores each morning. Show your work for each part.

a. What time does Danny need to leave the house?

b. How long does it take Danny to get ready for school before he leaves each morning?

c. What times does he need to set his alarm to be on time for Honor Choir?

d. Honor Choir started 15 minutes earlier one day. What time did Danny have to get up that morning?

Achievement Standards References: 541.01.a 541.01.e

John and Susan went to lunch. John had $5.00 to spend on lunch and Susan had $3.50 to spend on lunch. They chose food from this menu.

MENU

Hamburger.....	$1.23	Milkshake.....	$1.35
French-fries.....	.76	Orange Juice.....	.93
Onion Rings.....	.85	Chicken Strips.....	1.51

a. What are two different combinations of food John could have ordered with his $5.00?

one combination	another combination

b. If Susan bought a hamburger, onions rings, and orange juice, what would her total cost be?

c. How much change would Susan receive after paying for the meal?

Achievement Standards References: 540.01.b 540.01.c

Fourth Grade Idaho Direct Mathematics Assessment

#4-012 Fourth-Grade Practice Prompt Patterns and Relationships

Mary was planting flowers. She wanted to have a lot of fresh flowers to cut. In the first row she planted 6 flowers. In the second row she planted 12 flowers. In the third row she planted 18 flowers.

a. If this pattern continues, how many flowers would she plant in the 10^{th} row?

b. If this pattern continues, how many flowers would she plant in the 100^{th} row?

c. What is a rule that would help you figure out the number of flowers in any row?

Achievement Standards References: 541.01.a,b,c 546.01.a,b

Fourth Grade Idaho Direct Mathematics Assessment

#4-013 Fourth-Grade Practice Prompt *Patterns and Relationships*

Wendy works at the Big Eats Cafe. Mr. Clark gave her $5.00 to pay his lunch bill of $4.72. Wendy kept him waiting while she told him 12 different ways she could give him change. Can you find 12 ways?

Show your work by making a chart.

Achievement Standards References: 541.01.a,b,c 546.01.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-014 Fourth-Grade Practice Prompt *Patterns and Relationships*

Kyle bought new school clothes. He bought three tops and three bottoms. The tops he bought were a white T-shirt, a blue T-shirt, and a red sweatshirt. The bottoms he bought were white shorts, blue jeans, and blue sweatpants. Show how many different combinations of tops and bottoms Kyle can wear to school.

Achievement Standards References: 541.01.a,b,c 541.02.a 546.01.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-015 Fourth-Grade Practice Prompt *Graphs, Data Collection, and Analysis*

The White Elementary School had a boat race to see which boat could stay afloat the longest. Mary's boat floated for 11 minutes, Larry's boat for 13 minutes, Jerry's boat had trouble and only floated for 4 minutes and Beth's boat stayed afloat for a total of 9 minutes. SHOW ALL YOUR WORK FOR "a THROUGH d."

a. Draw a chart or graph to show how many minutes each boat floated in the water.

b. Which boat stayed afloat the longest?

c. Jerry's boat sank how many minutes before Beth's boat?

d. If Larry's boat had floated twice as long, how many minutes would it have floated?

Achievement Standards References: 540.01.a 540.02.a 541.01.a,c 546.02.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-016 Fourth-Grade Practice Prompt *Graphs, Data Collection, and Analysis*

Jeff is playing a board game. He has to roll two dice and find their sum to know how many spaces to move on the board. Each dice can land on either 1, 2, 3, 4, 5, or 6.

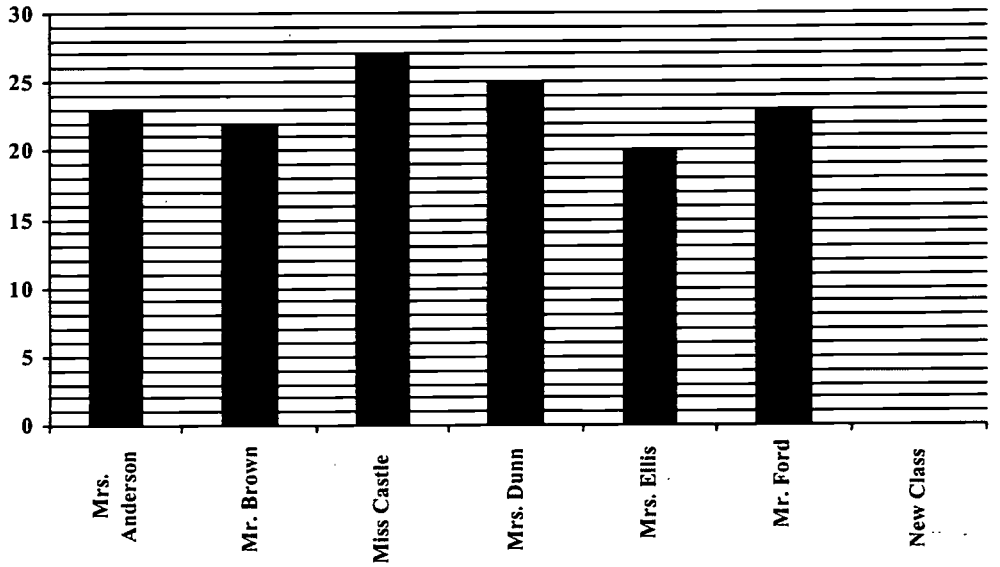
a. What is the fewest number of spaces that Jeff could move? Show or explain how you know.

b. What is the greatest number of spaces that Jeff could move? Show or explain how you know.

c. List all the possible ways that Jeff could roll the dice and what each sum would be.

Achievement Standards References: 540.02.a 541.01.a,c 541.02.a 545.04.a

Fourth Grade Class Sizes at Idaho Elementary School



Use the information in the graph to answer the following questions.

1. How many more students are in Miss Castle's class than in Mrs. Ellis'? Show your work.

2. How many fourth grade students are there at Idaho Elementary School? Show your work.

3. The school will be adding one more fourth grade class. Some students from each class will move into the new class. All of the fourth grade teachers want to have the same number of students.

   a. How many students will need to be moved from each room so that all 7 classes have the same number of students?

   b. How many students will be in each room?

   c. Color the graph to show how many students will be in the new class.

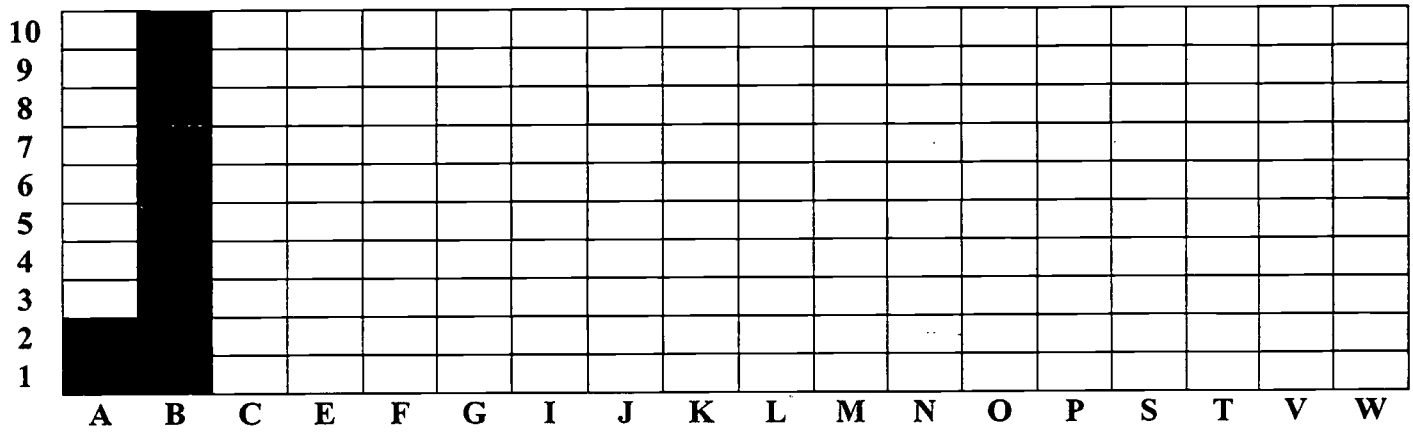
Achievement Standards References: 540.02.a 541.01.a,b,c 545.01.a

Fourth Grade Idaho Direct Mathematics Assessment

#4-018 Fourth-Grade Practice Prompt *Graphs, Data Collection, and Analysis*

There are 44 counties in the State of Idaho. Ten counties begin with the letter "B"; 7 with the letter "C"; 4 with the letter "L"; 2 with the letter "A", "F", "G", "J", "M", "O", "P", and "T"; and one each with "E", "I", "K", "N", "S", "V", and "W".

a. Complete the bar graph to show the amount of counties for each letter:



b. How many more "L" counties are there than "M" counties"? Explain or show how you found your answer.

c. There are 10 "B" counties. Which other letters would add up to the same number as the "B" counties? Explain or show how you found your answer.

Achievement Standards References: 541.02.a 541.01.c 545.02.a,b

QUESTIONS, COMMENTS OR CONCERNS

The State Department of Education would like to hear from you regarding the Direct Mathematics Assessment. If you have any questions, comments or concerns please list them in the space below. To mail: simply tear out this sheet, fold, seal, and place in your mailbox. No postage necessary.

Have a prompt for us to try? Submit your original prompt of no more than four parts, including references to the Achievement Standards. Or if you have a prompt that you have field-tested in your classroom, submit it along with a results summary and we will consider it. *Please include your contact information.*

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