DOCUMENT RESUME

ED 394 830 SE 058 301

AUTHOR Bentley, Michael L.; And Others
TITLE Community Resource Curriculum Development: Grades 3-4.
INSTITUTION Chicago Academy of Sciences, IL.; Chicago Public Schools, Ill.; Illinois Univ., Chicago.; National-Louis Univ., Evanston, IL.
SPONS AGENCY Eisenhower Program for Mathematics and Science Education (ED), Washington, DC.
PUB DATE 94
NOTE 182p.; For other curriculum development documents for grades K-2 and 5-6, see SE 058 300 and 302.
PUB TYPE Guides - Classroom Use - Teaching Guides (For Teacher) (052)

EDRS PRICE MF01/PC08 Plus Postage.
DESCRIPTORS *Animals; *Biology; Conservation (Environment); *Ecology; Elementary Education; Entomology; Hands on Science; *Interdisciplinary Approach; Inventions; *Multicultural Education; *Plants (Botany); Science Activities; Scientific Concepts; Zoos

ABSTRACT

This manual was developed by the Community Resource Curriculum Development Project (CRCDP), a cooperative project to develop multi-disciplinary, multi-ethnic, multi-cultural science/social sciences teaching units based upon the Illinois State Goals for Learning. This manual contains seven teaching units that include several experience-based activities using a constructivist teaching model and incorporating local resources. In these units, students approach each activity using skills gained from their own life experiences. Scientific principles and concepts are introduced following active exploration with hands-on models and investigations. Lessons are linked to information available in the local area and teachers are encouraged to utilize resources in their neighborhood communities whenever possible. The units include: (1) "Corn, Canoes, and Ecology: Gifts from the Native Americans"; (2) "Necessity is the Mother of Invention"; (3) "Arthropods and Spiders"; (4) "Plants for Life"; (5) "Zippity Zoo Dah"; (6) "The Green Streets of Chicago"; and (7) "I'm Just Like the City of Chicago." (JRH)

Community Resource Curriculum Development

Grades 3-4

A Cooperative Effort Project

between

William H. Brown Elementary School
Galileo Scholastic Academy
Andrew Jackson Language Academy
Mark T. Skinner Elementary
National-Louis University
University of Illinois/Chicago
and
The Chicago Academy of Sciences

Spring, 1993

Table of Contents

E. *Zippity Zoo Dah*

F. *The Green Streets of Chicago*

G. *I'm Just Like the City of Chicago*

Corn, Canoes, and Ecology:
Gifts of the Native Americans

Community Resource Curriculum Development Project

by: Lauren Murphy
Linda Hill
Shayle J. Gerstein

Corn, Canoes, and Ecology:
Gifts of the Native Americans

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the third-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Recognize that soil type affects plant growth.
Recognize science-related careers and avocations.
Research the scientific contributions of Native Americans.
Construct a verbal model and a physical model of a simple experiment.
Record and compare results of experiments.

SOCIAL SCIENCES
Recognize the need to conserve natural resources in our city and state.
Identify the contributions of Native Americans to our cultural heritage.
Use a map to locate the areas inhabited by specific Native-American groups.

MATHEMATICS
Use mathematics in other curriculum areas.

Content Background
Native Americans have made numerous contributions to the cultural heritage of our country. This unit includes activities highlighting three significant contributions: the canoe as a mode of efficient transportation, corn as a grain essential to the survival of the settlers of this country, and the understanding of ecology (the interconnectedness and respect for plants, animals, and their environments). These specific contributions were chosen because studying them will allow students to become involved in the scientific process and gain skills that are important to the development of their understanding of the field of science. This approach integrates different subject areas, allowing students to create connections and gain a richer understanding of the material presented.

<u>Background Information on Corn</u>
The word "corn" means grain. When Christopher Columbus returned to Europe after "discovering" America, he described the grain that the Indians grew. He called it "maize," which sounded like the name the Indians had used. Even today, the correct word for corn is maize. Corn is used in many recipes. It can be eaten off the cob, as kernels, or in a cream sauce. Corn is often eaten both hot and cold.

Background Information on Canoes

Different tribes had different methods of building canoes, but the most common canoe was the bark canoe. This was due to the availability of the paper, or white birch, tree. To make bark canoes, the Indians would cut down a large birch tree, slit the bark, and peel it off in one large piece. Saplings were bent and lashed into shape for the framework, which was then placed over the flattened birch bark. Slits were cut in the edge of the bark as necessary to fit it up and around the frame. These bark edges were overlapped and sewn into place. Then the seams were daubed with pitch to make the canoe waterproof.

Background Information on Environmentalism and Ecology

The foundation of environmentalism is linked to the respect and care which some Native Americans had for Mother Earth. Human society is complex, so no generalizations can be made about all Native-American tribes with regard to their valuing the land. Some Native Americans were destructive and did not preserve or appreciate the environment. Clearly, though, many Native tribes had been taught land ethics which the descendants from European cultures did not pass down from generation to generation. Ecology is often confused with environmentalism, but ecology is a science. It deals with the natural environment. An environment consists of different physical organisms and different biological interactions, even though several organisms may live in the same habitat. Ecologists are interested in patterns of nature beyond those embodied in organisms. They strive to know about the interaction between organism and environment. Ecology is not the same as environmentalism.

Timeline for Unit

The entire unit will last approximately six weeks. Four lessons with several 30 to 40-minute activities are included. While it seems logical to plan this unit just prior to Thanksgiving, it should be noted that this is the time that most Native-American resources are being used heavily. Early fall is recommended due to the availability of a variety of corn.

Evaluation/Assessment

Students will keep their own portfolios of work which will be used to assess achievement. The students will, with the guidance of the teacher, select representative work from each lesson in the unit. The teacher will interview each child on an individual basis at the time the portfolio is presented. The teacher will ask the student to relate steps in the activities as well as to communicate an understanding of the concepts learned. At the end of the unit, parents will be invited to school for a portfolio presentation/social hour.

Community Resources

American Indian Center
1630 West Wilson Avenue
Chicago, IL 60640
312/275-5871
This is a center where programs for and by Native Americans are held. Information regarding Native Americans visiting the classroom, the annual Pow-wow, and a wealth of other information can be received from the Center.

Chicago Botanic Garden
Lake Cook Road and I-94
Glencoe, IL 60022-0400
708/835-8279
To enhance student understanding of fertilization, planting, and gardening techniques, the Botanic Garden has several different programs arranged for school visits, including a new program currently being developed for the fall of 1993 on Native American plants. In addition, the Collaborative Outreach Education (CORE) teacher network is a wonderful program involving a partnership between the Botanic Garden and Chicago Public Schools: in addition to school visits made by Botanic Garden staff, school trips are arranged in which students do hands-on gardening at the Botanic Garden. Contact: Jim Veer of CORE or Katherine Johnson of the CBG Education Department.

The Chicagoland Canoebase
4019 N. Narragansett Avenue
Chicago, IL
312/777-1489
The canoebase builds and rents canoes of all shapes and sizes. It is run by a colorful man, Mr. Ralph Frese, who conducts presentations in classrooms, is willing to make arrangements for a group to visit the canoebase, and is a wealth of information regarding Native Americans, ecology and Chicagoland in general.

Lincoln Park Zoo
2200 N. Cannon Drive
Chicago, IL 60614
312/294-4641
The zoo has enough manure that an entire program ought to be able to be designed around it.

The Mitchell Indian Museum
2408 Orrington Avenue
Evanston, IL 60201
708/866-1395
This museum has exhibits introducing Native-American peoples. The museum's goal is to inform visitors of the cultural, historical, and artistic importance of Native Americans, using artwork, ethnographic material, books, and programs to encourage an understanding and appreciation of the lifeways of traditional and modern Indian peoples. School visits are available and are adapted by the staff for teacher's specific learning objectives.

Career Connections
Representatives from the following career fields can be invited to speak to the class: "green" architecture (solar buildings, recycled materials used in building); shipbuilding as pertains to canoe/transportation; science research; botany; farming as relates to fertilization techniques.

Glossary
BUOYANCY: the tendency for something to float or rise in liquid or air due to an upward pressure on the object

CANOE: a slender, open boat propelled by paddles or sails constructed with a light framework

FERTILIZER: a substance which, when added to soil, enriches it and makes it more productive for plant growth
a. organic fertilizers - fertilizers, such as manure, derived from living organisms
b. chemical fertilizers - fertilizers produced by human industrial processes

FISH EMULSION: a liquid preparation of fatty oils from fish suspended in an aqueous solution

HYPOTHESIS: an educated guess

MAIZE: a widely cultivated cereal plant occurring in many varieties, bearing grain in large ears or spikes; corn

SINEW: tendon or band of dense, tough, inelastic tissue serving to connect a muscle with a bone

VOLUME: the measure of amount of anything in three dimensions

Introduction to Lesson Development Model

The constructivist model of the teaching-learning process will be used. This model proposes that the learning process for the child is active and engaging: the students' prior knowledge of the subject matter must be tapped and shared. Learning activities are interactive. Scientific principles are introduced, and abstract models are created by students. Students will construct their own knowledge as they look for everyday examples of these models and then test these models for themselves. In this way, the teacher facilitates the learning processes by engaging students in thinking, writing, reading, and discussion activities.

LESSON 1: Corn as a Contribution of Native Americans

Lesson Introduction

Corn, as cultivated by the Native Americans, had great nutritional value that aided the European settlers tremendously in their new lives. In this lesson, the students will learn about the history of maize from the book *Corn is Maize: The Gift of the Indians* by Aliki. Students will engage in hands-on experiences to find out about the many benefits of corn.

Specific Lesson Objectives

The students will:

1. identify the contributions of Native Americans to our cultural heritage.
2. use a map to locate the areas inhabited by specific Native American groups.

Time Allotment

can be spread out over one week with three or four 30-minute sessions.

Materials

books: *Corn is Maize: The Gift of the Indians* by Aliki, Harper's Children's Books, 1976; *Keepers of the Earth: Native Stories and Environmental Activities for Children* by Michael J. Caduto and Joseph Bruchac, Fulcrum, 1988; *The Popcorn Book* by Tomie dePaolo, Holiday, 1978; ears of corn; rubber bands; paint; crayons; copies of student data sheets; pencils or pens

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Introduce the lesson by making a KWL (What do you know about corn, what do you want to know about corn and what did you learn about corn?) chart on the chalkboard.

Share with Neighbor

2. Read *Corn is Maize* to the students. The story highlights the Native American's use of corn. Invite the students to share within their groups what they know about Indian culture. What do they want to learn? Fill in the chart on the chalkboard with some of their responses.

Hands-on Activity

3. Distribute ears of corn, rubber bands, and paint to each group. Follow these directions to make cornhusk dolls;

    a) Hold the ends of 2 cornhusks together.

    b) Wrap another cornhusk around the ends to hold them together. Make a big lump when you do it.

    c) Fold the husks down over the lump.

d) Tie the folds with a rubber band. This makes the doll's head.
e) Split a cornhusk into 3 parts. Tie the strips together at one end.
f) Braid the 3 strips together. Tie the other end to make the hands and arms.
g) Position the arms between the first two husks and under the head.
h) Split one more husk into 2 parts.
i) Fold one part over each shoulder.
j) Tie with yarn at the waist. This makes a belt for your doll's shirt.

4. Ears of corn can be dried as the Native Americans did or the kernels can be cut off. Bring in cornmeal to make cornbread.

Introduce Principle/Concept
5. Give the students an appreciation of the interdependence of people and the environment. To achieve this, read the Native-American legend, "The Coming of Corn," in *Keepers of the Earth*, p 137-138.

Relate Activity and Concept
6. Complete the KWL activity by helping the students fill in the "What Did You Learn?" part of the chart.

7. Distribute crayons and maps of Native-American tribes in the United States. Let students color and label map to show areas where different Native-American tribes were located. Use a map of the U.S. to play a geography baseball game where students must point to location of tribes to advance on base.

Home Activity/Parent Involvement
Send cornbread recipes home for the students to make with their families. Other types of foods made with corn, such as pudding, popcorn balls, casseroles, nachos, and tortillas, could be made at home and brought in on portfolio day. A "Taste of the Corn" could be the theme.

Student Data Sheet Masters
Cornbread Recipe
Map of Native-American Tribes
"The Popcorn Song"

Lesson Assessment
Evaluate the students' portfolios at the end of the week on an individual basis. Measure concept mastery through both oral and written communications at this time.

Extension Activities

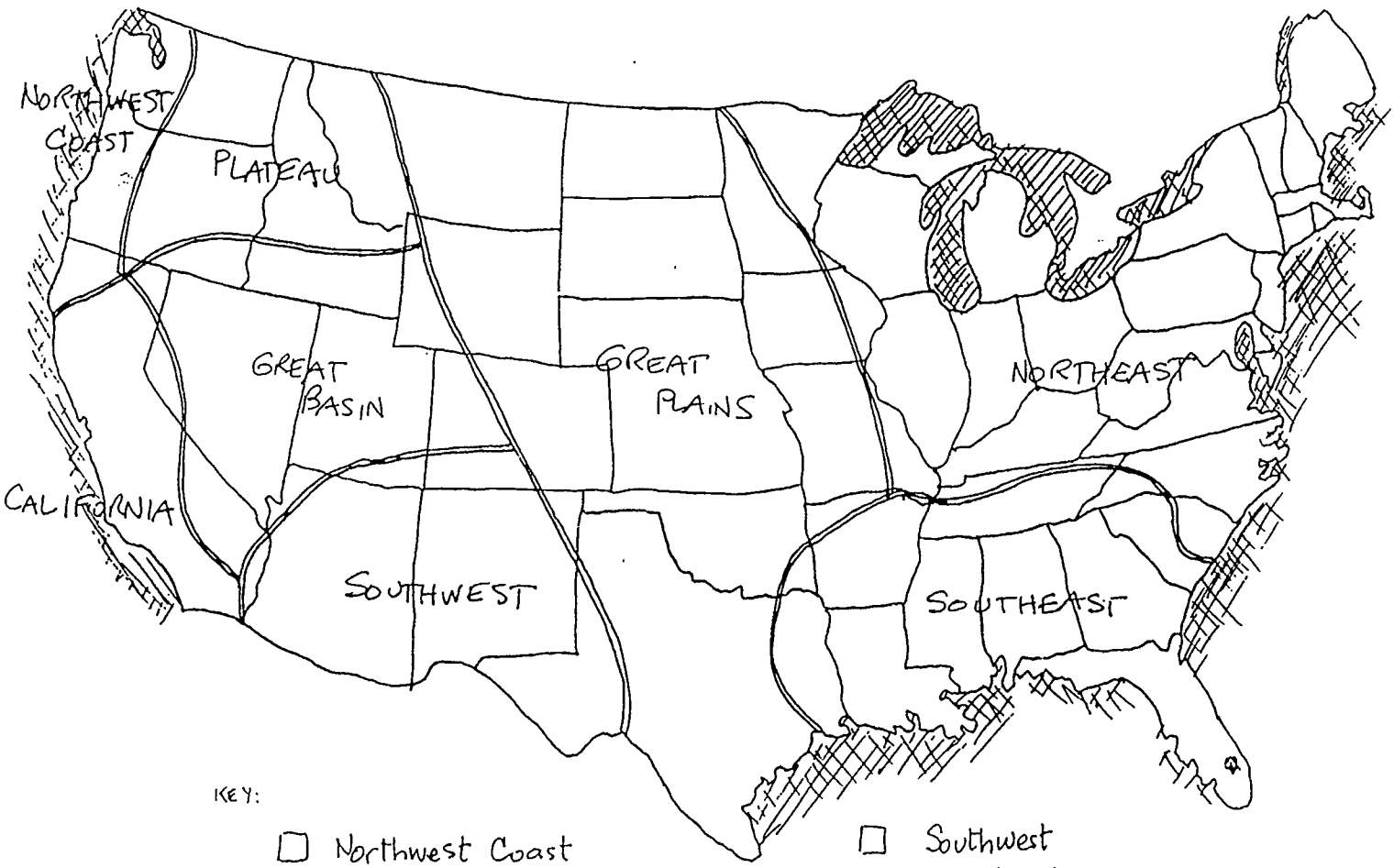
Additional Activities

1. A "Popcorn" unit makes a wonderful and enriching activity for students. Read *The Popcorn Book* by Tomie dePaolo to focus attention on the subject.

2. To integrate fine arts in the lesson, students can sing "The Popcorn Song." If possible, use a piano or another instrument like a woodblock or tambourine for accompaniment. Ask the students "How would you use your body to show a popcorn kernel?" Sing the first part of song. Tell the students "When we get to the point in the song when the popcorn kernel POPS!, show me how you would do that. Jump straight up and down and be careful not to pop onto any other popcorn! Listen for the rhythm of the piano and me singing. When the music slows down, you should too. Then curl back up into a kernel and we'll do it again."

Map of the Native-American Tribes
Answer Key

for step 7



LESSON 2: Native-American Fertilizing Techniques/Plant Growth

Lesson Introduction

As part of the natural cycle, dead plants and animals, called detritus, return to the soil as fertilizers. These remains are eaten by worms, insects, mites, and other organisms which break the remains down mechanically and leave them partially decomposed as excrement. Decomposers, chiefly bacteria and fungi, break this excrement down further. In this lesson, students will become familiar with fertilizers and the scientific method of problem solving. They will design experiments to determine how fertilizers affect plant growth.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. recognize that soil type affects plant growth.
3. construct a verbal model and a physical model of a simple experiment.
4. record and compare results of the experiments.
5. use mathematics in other curriculum areas.

Time Allotment

These learning activities will span five 40-minute periods over the course of a month. It may be a good idea to choose one particular day per week to record observations of plant growth. For example, every Monday students could record data.

Materials

plants which have been exposed to a variety of growing conditions; bean seeds; soil; fish emulsion; centimeter rulers; string; cups or milk cartons; liquid measures; copies of students data sheets; pencils or pens

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Introduce the lesson by making a KWL chart on the board about what makes a plant grow faster or bigger. Factors such as sunlight, soil type, water, and fertilizers should be discussed.

Share with Neighbor

2. Introduce the students to a problem. Will seeds planted in soil with fertilizer added grow the same as seeds planted in unfertilized soil? Each group will select a recorder, plant growth measurer, plant waterer, illustrator, and spokesperson. A class discussion will ensue.

Hands-on Activity

3. Have the groups examine some plants which have been exposed to different conditions. Compare and contrast their size and color, etc.

Introduce Principle/Concept

4. Introduce the word "hypothesis" as an educated guess.

5. Student groups will write up the problem and their hypotheses. Discuss how to test out this problem; brainstorm in groups for ideas.

Relate Activity and Concept

6. Instruct the students to plant bean seeds in cups labeled "regular soil" and then some in cups labeled "fish emulsion soil." Equal amounts of water will be poured into each of the cups. Discuss the importance of keeping both types of soil cups in similar lighting. Introduce the concept of a control group in an experiment.

7. Measure plant growth every two days with a string, and then measure the string against a centimeter ruler. The results will be placed on a group chart. The group illustrator will draw weekly pictures of the plants, noting changes in appearance and/or color. Label the pictures.

8. Use the group chart information to make a bar graph of class results: regular vs. fish emulsion soil plant growth.

9. To summarize, have the students write up a materials list and a procedure (What Happened?) in their groups.

10. Initiate a class discussion to offer reasons for these results. The students will determine that soil is not an infinite source of new life which can give endlessly: it is part of a cycle that must receive to keep giving. Students will recognize that dead plants and animals found in the soil are nutrients. They will distinguish between "chemical" and "organic" methods of fertilization.

11. Assist the students in writing up the Why? section of the experiments.

12. Discuss with the class and help them reach a conclusion.

13. Have the student groups write up their conclusions.

14. Complete the KWL activity with the "What did you learn?" section of the chart.

Home Activity/Parent Involvement

1. Students should be encouraged to begin growing plants at home with their parents to continue inquiries begun in school. Different types of seeds should be used. Record keeping of plant growth should be done.

2. For homework, students will write stories describing their journeys as particular seeds (blown off of a tree, floating in a river, adventures, etc.). "I am an apple seed which was thrown into the trash at the school cafeteria..." is an example.

Student Data Sheet Masters

Science Journals for Logging

Lesson Assessment

Use oral exchanges to monitor concept development. In addition, the students will write up experiments and logging of results in their portfolios. At the end of the lesson, assess individual mastery based upon oral questioning as well as the written projects in this portfolio.

Extension Activities

Additional Activities

Continue "Popcorn" activities. The scientific explanation for the popping of popcorn provides an additional opportunity for use of the scientific method. Begin lesson by querying students as to why a popcorn kernel pops in a popper. A group hypothesis should be written on the board.

Materials: clean tablecloth; popcorn; popcorn popper (hot air); measuring cups; construction paper; glue

1. Spread out the clean tablecloth on the floor.
2. Place flat popper in middle of tablecloth, with children around cloth.
3. Instruct the students to measure the correct amount of popcorn in the measuring cup for solid measures.
4. Pop the popcorn into a bowl, allowing overflow to collect on tablecloth. Elicit response as to why kernels pop when heated. The idea that heat causes expansion should be emphasized through teacher guiding of discussion.. Ask why some kernels did not pop. (The ones on top that did not receive direct heat are less likely to pop.)
5. As a group, the class can write up the experiment using scientific method: Problem, Hypothesis, What Happened, Why, Conclusion.
6. To integrate art into the lesson, students can use a dark crayon to write their names on construction paper. Then they trace the letters with glue, and carefully stick popcorn on the glue, making sure that each piece sticks. Students can also write stories entitled,"When We Popped Popcorn..." to be attached to their names. Encourage use of new vocabulary words (bursts, explode).

7. To integrate math, have students compare the volumes of popped and unpopped corn. Encourage them to construct graphs of the relative amounts.

Additional Community Resource Excursions

Make a visit to Chicago Botanic Garden or the Farm in the Zoo at Lincoln Park Zoo to see the benefits of fertilized soil.

LESSON 3: Keeping a Boat Afloat: The Art of Building an Indian Canoe

Lesson Introduction

When early explorers came to the new world, they found the Indians using a lightweight, yet strong and stable boat. They soon recognized these boats to be a very important discovery, as the boats were able to hold a large amount of weight but were not easily capsized, even under the worst water conditions. The boats were remarkably buoyant, could skim through very shallow water and were easily maneuvered through swift and narrow waterways. The explorers were impressed, and soon set about learning how to make these boats. These impressive boats were known as canoes, and resulted from generations of design and redesign by the Native Americans.

In this activity, students will experiment with floating and sinking in order to understand the properties of buoyancy that the Native Americans utilized as they developed the art of canoemaking.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. recognize science-related careers and avocations.
3. research the scientific contributions of Native Americans.
4. construct a verbal model and a physical model of a simple experiment.
5. record and compare results of experiments.
6. identify the contributions of Native Americans to our cultural heritage.

Time Allotment

This lesson contains three activities and two ongoing projects. These should all be able to be completed within 2 or 3 weeks at the most. The floating and sinking activity should be allotted at least an hour, followed by a 40-minute math session calculating area. The research project and independent exploration activities could be ongoing in the classroom during a 2-week period. The art activity is the last 40-minute class session, and can fit in at any time during the second week.

Materials

aluminum foil - several squares approximately 5" x 5 "; containers to hold water for experiment; water; plenty of uniform weights (pennies, tiles, metal nuts); sponges; art materials of teachers choice; plasticine modeling clay can be used for assessment; copies of student data sheets; pencils or pens

Advanced Preparation

Arrange the students into cooperative learning groups of 3 to 4 children. Gather containers for water for each group of children. Pre-cut or measure pieces of aluminum foil prior to the activity. Experiment by making a few trial boat designs.

Procedure

Tap Prior Knowledge

1. Introduce the lesson by asking the class "How do you think the Native Americans were able to get the fish that they planted with the corn?" They needed to catch plenty of fish, for not only did they plant fish with the corn seeds but fish were also an important part of their diet.

Share with Neighbor

2. Discuss their responses, focusing particularly on boats. Consider how the Native Americans knew to design and construct boats.

3. Gain the attention of the entire group. Have the students observe as you crumple a piece of foil into a ball. Ask the students to predict, silently, what will happen when you toss it into a container of water. Demonstrate, asking the students to make careful observations. After they have observed the ball of foil sink, ask them to write on a piece of paper why some objects sink and others float. When finished, ask them to try and convince the person sitting next to them that their explanation is "correct." The students should then switch, so all explanations are heard. Students should add these papers to their portfolios.

Hands-on Activity

4. Divide the students into cooperative learning groups of 3-4 children. Have students assigned to different responsibilities, such as recorder, materials supervisor, official measurer, water remover (clean up). Distribute materials to each group. (1 tub of water, one piece of aluminum foil per student, 50 pennies, a data sheet, and a sponge.)

5. Have each student make a shape with the foil that they predict will float on the surface of the water. The students trace the outlines of their boats onto their data sheets.

6. Before the boats are placed into the water, the group should compare each of the designs, and as a group, decide which they predict will float. Instruct the students to place a "Y" or an "N" in the appropriate spot on their data sheets.

7. Have each student test the boat design. Students should mark on their data sheets the results of whether or not it floated. If the designs did not float, have the student redesign the foil, using information they have learned from observing theirs and other's boats. If a student's boat did float, challenge them to design a different shape that also floats. Follow this procedure three times. Have the group select the design that floats the best.

8. In a discussion, allow each group to present its best design to the rest of the class by describing it in words and holding it up for others to see. After each group presents, asks students to compare and contrast the designs.

Introduce Principle/Concept

9. Introduce the concept of "buoyancy" to the group. The "Archimedes Principle" holds that any object wholly or partially immersed in liquid is buoyed up by a force equal to the weight of the liquid displaced. Ask students to explain how this principle, in their own words, describes what happened to their aluminum foil boats. Why did some boats sink and others float?

Relate Activity and Concept

10. Assign a letter to each boat presented to the class. Explains that each boat should not only be able to float, but should be able to hold cargo; for example, two to four Native-American fishermen, their fishing gear, and the fish they catch! Ask groups how they will apply the Archimedes Principle to their predictions of how much weight their boats will float.

11. Each group takes the boat they designed, predicts how much weight (in pennies) it will hold, and marks this on their individual data sheets. Each group adds pennies to their boat, counting how many their boat held before sinking. The teacher adds this information to the group data sheet, and students record it on their individual sheets. Let the class analyze the data and discuss which design held the most. Why do they think this happened?

12. Have students clean up their work areas and place data sheets in their portfolios.

13. Using the canoe tracings from the student data sheets, have the children determine the area of their three boat designs.

Connect to Everyday Examples

14. Have the students read books and study pictures/drawings of various canoe types, and apply what they have learned about buoyancy. Have them generate a list of other kinds of boats aside from canoes and discuss their similarities, differences, and efficiency. Have cooperative groups each report on different styles of Native-American canoes. *How To Build an Indian Canoe* adapted by George S. Fichter, (Watts, 1992) is a recommended resource. Research results are added to portfolios.

15. In addition, have cooperative groups design their own experiments to test buoyancy of different materials, shapes, and types of water (saltwater, moving water- use a fan). The experiment designs and results should be recorded and placed in portfolios.

Clean-up

Expect a watery mess, and have plenty of sponges and paper towels on hand.

Variation on Results
Variations are to be expected according to the designs created by the students. Prepare by testing many different foil designs before working with the students.

Home Activity/Parent Involvement
Send home notes with the students encouraging them to experiment with floating objects with their families. Families could try to fit this in during dishwashing or bath time.

Student Data Sheet Masters
Student Data Recording Sheet
Class Data Recording Sheet

Lesson Assessment
1. Working with the cooperative learning groups, ask the students to manipulate a ball of plasticine modeling clay into a shape that will float. Continue by molding the clay into various shapes and listen to the student's responses regarding whether or not they will float and why.

2. Ask the students if they were suddenly caught in a situation where the City of Chicago flooded and they needed to get around in the water, what would they do? What would they try to build for themselves and what materials would they use? Have the children write a story responding to this situation. The level of their understanding of buoyancy should be reflected in their ideas presented in their writing.

Extension Activities

Additional Activities
Have students create canoe models. Material ideas: Use paper egg carton lids that have been soaked in water and molded into a canoe shape. Reeds and twine can be used to form the sides and bottom support and the stitching on the ends and the edges. Paint to look like birch bark. Or use construction paper, fallen bark, clay, or other materials.

Additional Community Resource Excursions
As a wrap-up to the lesson on boats and buoyancy, Ralph Frese, of the Chicagoland Canoebase, would make a wonderful classroom visitor. As he constructs canoes for a living, he can visit and answer student's questions, tell stories regarding the boats he has built and how they've been used. He has built canoes that can hold over 15 people! Arranging to visit his place on Narragansett would also be a valuable experience.

LESSON 4: Contributions of Native Americans to Ecology

Lesson Introduction

This unit will emphasize the great respect which some of the Native Americans showed for Mother Earth. Certain Native-American tribes cherished the land, and worked very hard to preserve the natural beauty of the Earth. These values resulted in behaviors that protected the environment. For example, some Native Americans never took more than they needed from the land. Animals were considered to be brothers, and wastefulness and unnecessary killing of animals were forbidden. In this lesson, students will compare their own values and behaviors concerning the Earth to those of these Native Americans.

Specific Lesson Objectives

The students will:

1. recognize the need to conserve natural resources in our city and state.
2. identify the contributions of Native Americans to our cultural heritage.

Time Allotment

This lesson will be comprised of four 40-minute learning activities spanning a one-to two-week period.

Materials

Keepers of the Earth (see Lesson 1) and *The Gift of the Sacred Dog* by Paul Goble, Macmillan, 1982; copies of student data sheets; pencils or pens

Procedure

Tap Prior Knowledge

1.. Read Native-American legends selected from *Keepers of the Earth* which emphasize the great respect the Indians had for the land they loved and the regard they held for those who ruined it.

Share with Neighbor

Hands-on Activity

2. Engage the class in a role-playing activity. Divide the class into two groups: Native Americans who are seeking to preserve the Earth and white settlers who are building, polluting, logging, and fighting for land. Beliefs, issues, and values of each can be discussed.

Introduce Principle/Concept

3. After reading *The Gift of the Sacred Dog*, discuss the various uses of the buffalo. To Native Americans, the buffalo was the staff of life. Nothing was wasted. From its flesh to its bones, the buffalo was completely consumed in one way or another. The buffalo, posing a danger to the new railroads built by the white men, were killed off by hired hunters and sportsmen. Buffalo hides were

sold, but often carcasses were left to rot in the hot sun. The end of the buffalo spelled the end of the Indians on the Great Plains as well.

Relate Activity and Concept
4. Make a chart on the board with the headings "Body part" and "Use." With help of students, list all the buffalo body parts and their uses (flesh-food, hide-teepees and clothes, moccasin soles and lacings, sinews-bowstrings and sewing equipment, tongue-food, bones-cooking utensils, toys, horns-headdresses)

Connect to Other Everyday Examples
5. Brainstorm with the students of things that they are careless about wasting (water, paper, napkins, food, electricity). Point out consequences of such wastefulness (pollution, landfills full, other people in need). Then make a list of things children will do in order to prevent wasting the Earth's resources by not taking more than what is needed. Parents can check and monitor this list at home.

Home Activity/Parent Involvement
Students will create a list of things they can do to help save the Earth. Send home this checklist of actions to help save the Earth in chart form. At the end of each day, parents and students should refer to this checklist and review how their actions may have impacted the Earth.

Student Data Sheet Masters
Native-American Picture Writing

Lesson Assessment
Use your role as a moderator of the role-playing activity to pose questions to students concerning their knowledge of the lesson. Students' oral responses in the debate will be used in assessing student learning.

Extension Activities

Additional Activities
1. Show video: Life of a child growing up on a Modern Native American Indian reservation. If possible, arrange a visit to a nearby reservation.

2. Picture writing activity. After reading *The Gift of the Sacred Dog* by Paul Goble, engage the students in a picture-writing activity. Use Picture Dictionary (see master) to write a story about the Native Americans' love for the Earth.

Additional Community Resource Excursions
Visit the Chicago Academy of Sciences to see the buffalo (bison).

Unit Summary

Plan a field trip to the Mitchell Indian Museum. Contact the staff before the visit to explain what the students have been learning so they can cater the visit and displays to the needs of your group.

Have Native Americans living in Chicago visit the classroom. They can share their beliefs through storytelling, as well as share what life is currently like for them as Native Americans.

Invite the parents of the students to come into the classroom for an open house. Share the portfolios and other examples of students' work on display in the classroom.

Student Data Sheet Masters

Corn, Canoes, and Ecology
Student Data Sheet Master 1.1

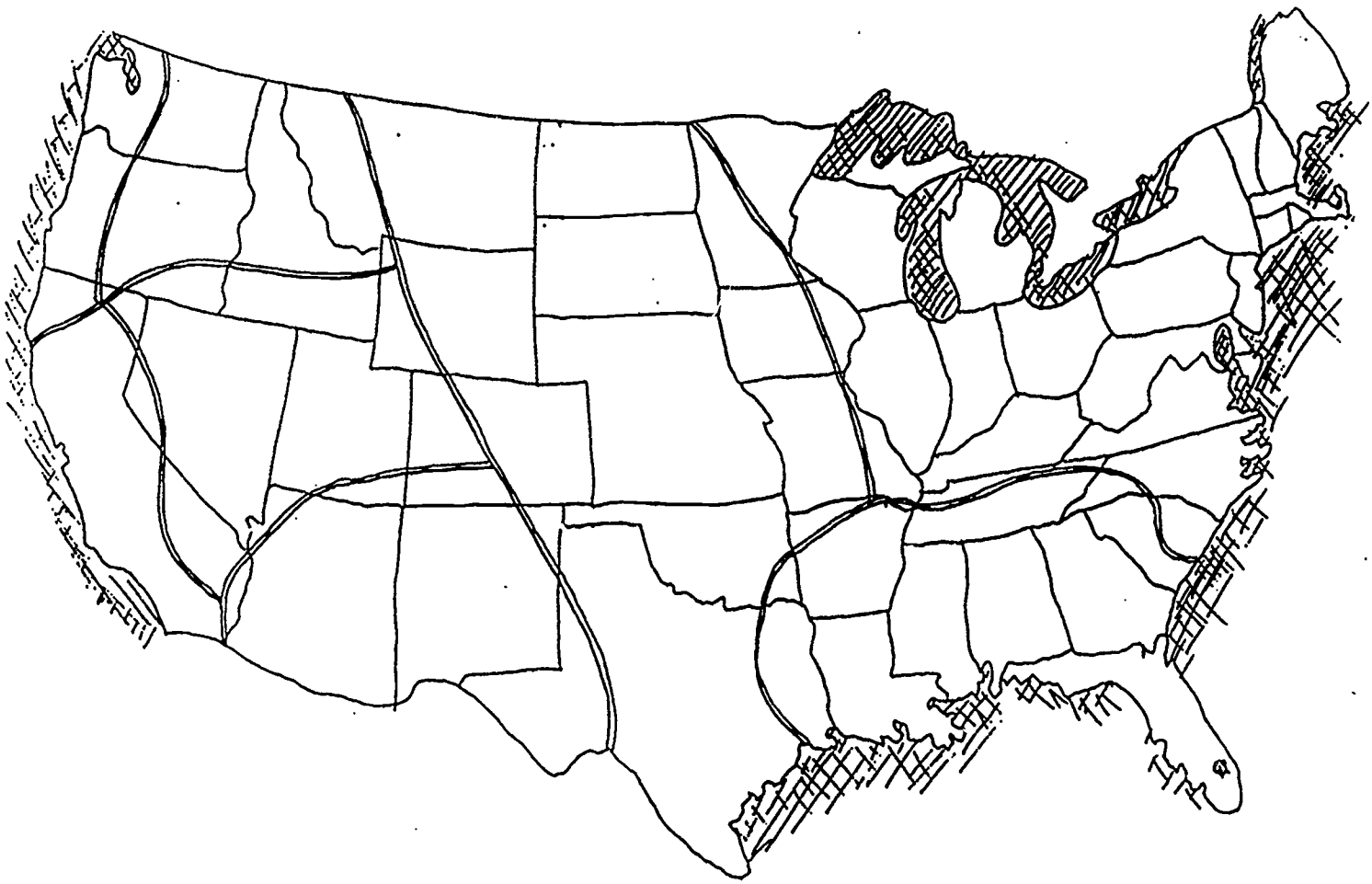
Cornbread Recipe

1/4 cup vegetable shortening
2 cups white cornmeal
2 tablespoons all-purpose flour
2 teaspoons baking powder
1 teaspoon salt
2 cups buttermilk
1 egg

1. Melt shortening in a 9" square baking pan in the oven.
2. Sift together dry ingredients.
3. Combine egg and buttermilk and stir into the dry ingredients along with the melted shortening.
4. Pour batter into the hot, greased pan.
5. Bake in a 450 degree oven 20 to 25 minutes.
6. Cut in squares and serve hot with butter, jelly, or honey.

Corn, Canoes, and Ecology
Student Data Sheet Master 1.2

Map of the Native-American Tribes



KEY

☐ ☐

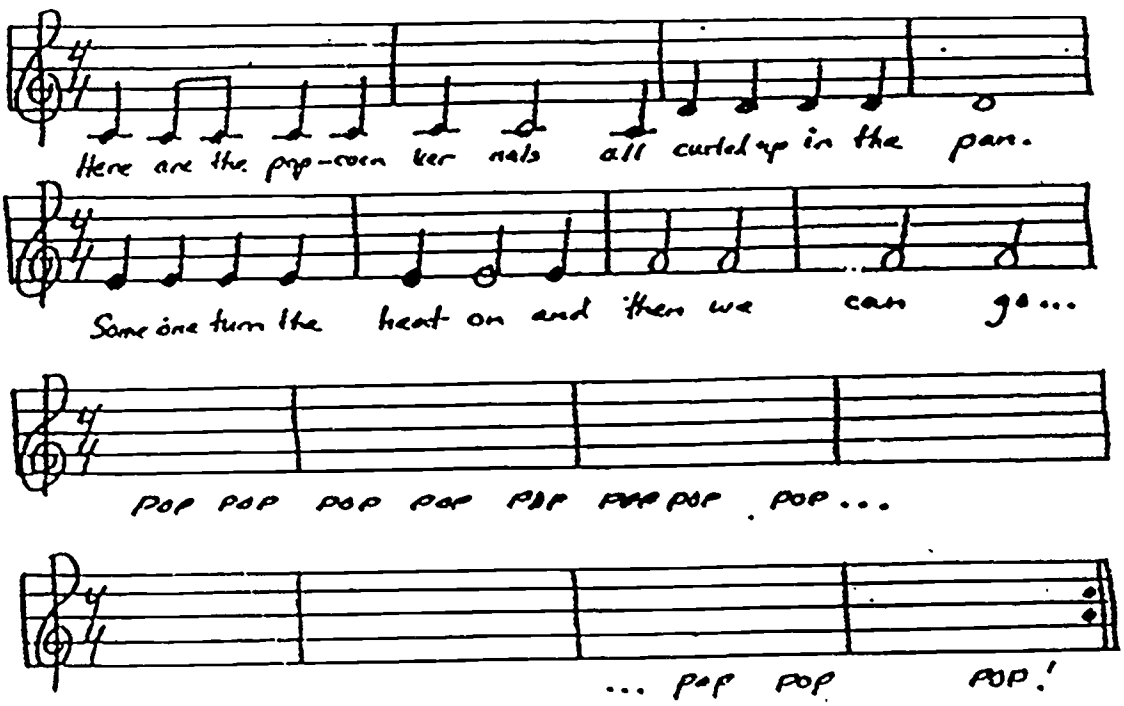
☐ ☐

☐ ☐

☐ ☐

Corn, Canoes, and Ecology
Student Data Sheet Master 1.3

"The Popcorn Song"



Corn, Canoes, and Ecology
Student Data Sheet Master 2.1

Science Journals for Logging

Corn, Canoes, and Ecology
Student Data Sheet Master 3.1

Student Data Recording Sheet

KEEPING A BOAT AFLOAT

NAME _____

STUDENT DATA:

My first boat design

Does the group predict it will float?

Did it float?

My second boat design

Does the group predict it will float?

Did it float?

My third boat design

Does the group predict it will float?

Did it float?

Corn, Canoes, and Ecology
Student Data Sheet Master 3.2

Class Data Recording Sheet

KEEPING A BOAT AFLOAT

CLASS DATA:

Boat Letter	Prediction of how much weight it will hold:	How much did it hold?
Boat A		
Boat B		
Boat C		
Boat D		
Boat E		
Boat F		
Boat G		
Boat H		

Draw the design of the boat that floated the longest.

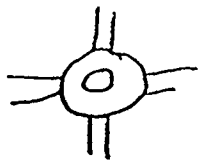
Can you redesign it to hold more?

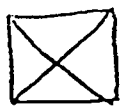
Corn, Canoes, and Ecology
Student Data Sheet Master 4.1

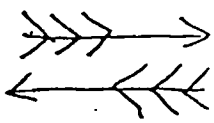
Native-American Picture Writing

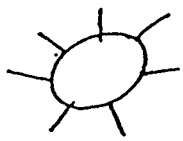

man


woman


happy


help


war


sun


moon


campfire


lake


mountains


river


drum


tipi

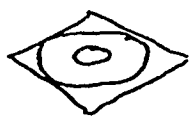

boy


girl


good


bad

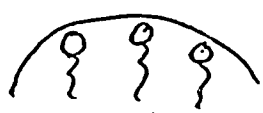

wise

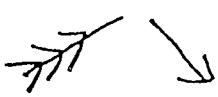

Great Spirit


horse

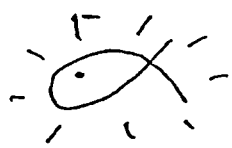

clear weather


rain


snow


peace


fish


many fish

Necessity is the Mother of Invention

Community Resource Curriculum Development Project

by: Miriam Fitzhugh
Laureen Cleary
Friedricka White

Necessity is the Mother of Invention

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the third-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Recognize science-related careers and avocations.
Research international contributions of scientists, representing males and females, diverse multicultural groups, and handicapped persons.

SOCIAL SCIENCES
Recognize how needs and wants dictate supply and demand.
Recognize the technological development in communication and transportation which have led to changes within society.
Use a map to identify the site of the first airplane flight.

MATHEMATICS
Use mathematics in other curriculum areas.

Content Background
There is a difference between a discovery and an invention. Something which has existed already but has not yet been identified is "discovered." When we put ideas and/or materials together to make something that wasn't there before, it is called an "invention." It is important to note that inventions do not always have to be concrete machinery; they can be ideas and principles developed by people as well.

The book *Was it Discovered or Invented?* is published by Education Insights, Dominguez Hill CA 90220 ($5.95) and can be used as an excellent source for finding out about invented toys, games, and other trivia. It will be especially helpful when children are trying to make up their own inventions. The book also features the use of the decoder ($2.00) which will record and unlock secret answer codes found in every brain booster activity in the book. Other topics featured are: "Fix it Shoppe" (relating parts to whole); "Crime Busting" (using deductive thinking); "Wheeling Along" (visualizing the interior workings of machines); "Magic of Invention" (matching natural and human-made inventions); "Back to Nature" (matching natural and human-made inventions); "Spin Offs From Space" (classifying inventions by their original purposes); "Leonardo, Artist of Invention" (deducing inventions from sketches); "Crazy Contraptions" (analyzing how machines work); "Was it Discovered or Invented?" (categorizing)

The following table may help to summarize some of the important inventions and discoveries in history:

Who did it	What was done	When	Significance
Benjamin Banneker; astronomer; African-American male	wrote an almanac	1780 Maryland	Understanding changes in the weather
Alexander Graham Bell; speech teacher for deaf people; deaf male	made a telephone	1875 Boston	People can talk to each other through a machine
Louis Braille; teenage inventor; blind male	designed an alphabet of dotted symbols for the blind to read words, numerals, and punctuation	1824 Paris France	Education of blind people
George Washington Carver; botanist; African-American male	developed hundreds of products from the peanut and the sweet potato, taught how to recycle, and conserve natural resources	U.S.A.	Conserving and recycling of natural resources
Mae Jemison; astronaut; African-American female	rode and helped to fly a spaceship	U.S.A.	Space exploration
Margaret Mitchell; astronomer; White Quaker female	discovered a comet	1818-1889	Knowledge of the universe
Garrett Morgan; African-American male	invented the gas mask	1916 U.S.A.	Firefighters can breathe in gas-filled buildings

Who did it	What was done	When	Significance
Bette Nesmith; secretary; White American female	made a liquid white out eraser	U.S.A. Dallas, Texas	People can make neater corrections on paper without erasing or crossing out
Orville and Wilbur Wright; bicycle repairmen; White males	made and flew the first airplane at Kitty Hawk, NC	1903 U.S.A. Ohio	Made travel faster
Charles Goodyear; hardware salesperson; White male	invented a process called Vulcanization which made it possible to make thousands of useful things out of rubber	1800-1860 U.S.A.	Many products were made stronger and new products were developed

Timeline for Unit

This unit consists of four main lessons, each focusing on a specific invention or discovery and the "scientist(s)" associated with it. Each of the lessons can be divided into five 40-minute sessions, and can be taught over the course of a week. This unit was not developed for a specific time of the year, but it could be planned to coincide with National Inventors Week in the spring, or with the birthdates of the scientists being studied.

Evaluation/Assessment

Using higher-order thinking skills, children will express opinions and report on the importance or necessity of inventions or scientific discoveries of both the past and present. Given the opportunity as individuals or as members of a cooperative group, children will show a creative invention or drawing of their own making. Portfolios will be kept to showcase student work.

Community Resources

A.R.C. Gallery Education Foundation
1040 W. Huron Street, Chicago, IL 60622
312/733-2787
Hours: 11:00-5:00 Tuesday-Saturday
Offers hands on workshops for students and a special events gallery where works by people with disabilities are exhibited.

Adler Planetarium
1300 S. Lake Shore Drive, Chicago, IL 60605
312/322-0304
Hours: 9:30-9:00 on Friday, 9:30-4:30 other days
Offers extensive education for students in astronomy.

Chicago Botanic Garden
I-94 and Lake Cook Road, Glencoe, IL 60022
708/835-5440
Hours: 8:00 a.m.-dusk
Has a variety of programs devoted to education and research in plant study.

DuSable Museum of African-American History
740 E. 56th Pl., Chicago, IL 60637
312/947-0600
Hours: 9:00-5:00 daily
Various collections and books on African and African-American art, history, and culture.

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive, Chicago, IL 60605
312/922-9410
Hours: 9:00-5:30 daily
Has on permanent display various exhibits depicting American Indian life, early Egyptian culture, animals, birds, insects, gemstones, dinosaurs, etc.

Meigs Field
Lake Shore Drive at Roosevelt Road, Chicago, IL 60605
A small airport where students can observe small aircraft and an observation tower.

Museum of Science and Industry
57th Street and Lake Shore Drive, Chicago, IL 60637
312/684-1414
Hours: 9:30-4:30
Shows the student the important contributions that science and industry have made to our ways of life.

Career Connections
The careers available in the study of inventions and discoveries include historian, inventor, researcher, and teacher.

Glossary

AGRICULTURE: having to do with the science of growing and farming

ASTRONAUT: a traveler in a spaceship

BOTANY: study of plants and plant life

BRAILLE: system of writing for the blind that uses characters made up of raised dots

COMPOST: fertilizing materials consisting largely of decayed organic matter

COMET: a small bright celestial body often develops a cloudy tail when in orbit around the sun

DISCOVER: obtain sight or knowledge of something for the first time

HORTICULTURE: the science of growing fruits, vegetables, and ornamental plants

LIFT: the upward force that is developed by a moving airplane and that opposes the pull of gravity.

MEDICINAL: tending or used to relieve or cure disease or pain

SYNTHETIC: produced artificially or by chemical means

TDD: telecommunications device for the deaf

THRUST: force exerted endwise through a propeller shaft (as of an airplane)

LESSON 1: Wilbur and Orville Wright

Lesson Introduction
In this lesson, the students will study Orville and Wilbur Wright's invention of the first flying airplane. They will also study some of the basic scientific concepts that make it possible for a plane to fly.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. research international contributions of scientists, representing males and females, diverse multicultural groups, and handicapped persons.
3. recognize the technological development in communication and transportation which have led to changes within society.
4. use a map to identify the site of the first airplane flight.
5. recognize science-related careers and avocations.
6. use mathematics in other curriculum areas.

Time Allotment
this lesson can be divided, as desired, into as many as five 40-minute sessions

Materials
construction paper; newspaper; map of the United States; tape; glue; 10-15 funnels; 10-15 ping pong balls; copies of student data sheets; pencils or pens

Advanced Preparation
Make arrangements with an airline or an aviation institute to have a pilot or one in training visit the classroom. Scheduling a field trip to an airport should be done before you begin teaching the lesson.

Procedure

Tap Prior knowledge
1. Ask the students "What do you know about airplanes? When you see an airplane fly overhead, what do you think about? Isn't it amazing that something so big is able to stay in the air?"

Share with Neighbor
2. Allow the students to list all that they know about airplanes and flight, including who made the first airplane. Let them discuss their answers in groups.

Hands-on Activity
3. Tuck a thin strip of construction paper into a book and blow over the top of the paper. What happens? The paper will lift up into the air.

4. Blow between two sheets of newspaper and note what happens. The two sheets come together.

5. Have the students measure and cut a piece of writing paper 4x8 inches and bend it down 1-inch at the short ends to form a "bridge" on a table. Blow hard under the bridge and note what happens. The top of the bridge comes down when you blow.

Introduce Principle/Concept

6. All of these things happen because the air is moving quickly over the top of the paper, between the newspaper, or under the paper. The rapidly moving air is at a lower pressure than the still air below the paper. The higher pressure of the air under the paper, outside of the newspaper, or above the bridge pushes it towards the lower pressure. This phenomenon is called Bernoulli's Principle.

Relate Activity and Concept

7. To demonstrate this principle further, place a new ping pong ball into a funnel. Blow hard through the funnel. Can you dislodge the ball? Blow harder. What happens? The rapid air stream produces low pressure between the side of the ball (a curve like an airplane wing) and inside of the funnel. With the ball in the funnel quickly turn the funnel upside down while blowing into the narrow end. Can you prevent the ball from dropping out of the funnel?

8. How does an airplane fly? Ask the students if they can explain according to Bernoulli's Principle. The faster air flows, the less pressure on the top side of the wing is less than the air pressure on the under side. The difference in air pressure is what lifts the plane. The airplane's engine is the force that keeps it moving fast through the air. We call this force "thrust." Ask a pilot or a pilot in training to come in one day to speak to the class about how planes fly.

9. Construct paper airplanes and try to make them fly. Use the Paper Airplane Plans. Encourage the students to make predictions and test different styles of aircraft. Point out lift and thrust.

10. Discuss the invention of Orville and Wilbur Wright. Make sure that the students understand the technological development in transportation which led to changes within society. Observe on a map where the first airplane was flown.

Connect to Other Everyday Examples

11. Challenge the students to work together to list some examples of Bernoulli's Principle. Examples include: flags waving in the breeze, objects flying out of an open car window when it is going down the highway, and rubber ducks in the bathtub moving toward the running water.

Home Activity/Parent Involvement

Students and their families can construct different models of paper airplanes and try to make them fly.

Student Data Sheet Master
Paper Airplane Plans

Lesson Assessment
Have the students write an essay about "The First Airplane That Flew!" They should include the contributions which Orville and Wilbur Wright made in the technological developments in transportation and the change within society. They should demonstrate and explain orally Bernoulli's scientific concept that was used in the invention of the first airplane that flew. Each student should be able to locate Kitty Hawk, N.C. on a map of the United States. In partners, students will come up with a list of at least fifteen careers related to aviation. These lists can be saved in their portfolios.

Extension Activities

Books to Read
Before the Wright Brothers by Don Berliner, Lerner, 1990
Flying by Rocco Feravolo, Garrard, 1960
The Wright Brothers: How They Invented the Airplane by R. Freedman, Holiday House, 1971
The Facts of Flight by Jerry Grey, Westminster Press, 1973
When the First Men Flew by James Mc Cague, Garrard, 1969

Additional Activities
1. Research the various careers in aviation.
2. Research the development of the airplane in the beginning years.

Additional Community Resource Excursions
O'Hare Airport, Mannheim Road & Kennedy Expressway, Chicago, IL
American Airlines Maintenance, 5333 S. Laramie, Chicago, IL
Contact person: Craig Neviel, (312) 582-9494

LESSON 2: Alexander Graham Bell

Lesson Introduction
In this lesson, the students will learn about Alexander Graham Bell, an American inventor and teacher of the deaf, who is famous for his invention of the telephone. They will discuss how a telephone plays an important role in communication in our everyday lives. They will also learn about communication and how it is related to our sense of hearing and the sense of sight.

Alexander Graham Bell was born on March 3, 1847 in Edinburgh, Scotland. His mother was hearing-impaired. His father taught speech to deaf people and wrote books on correct speech. As a young man, A.G. Bell moved to Boston, Massachusetts, where he taught deaf children and teachers of the deaf during the day. At night, he experimented with electricity and attempted to build a better telegraph machine. In 1875, Bell and his co-worker, Thomas Watson were able to send sounds over the wire from one room to another in their electric shop. It took a lot of time, patience and hard work to perfect the telephone. The word "telephone" comes from two Greek words: "tele" meaning "far off" and "phone" meaning "sound."

A.G. Bell married a hearing-impaired woman, Mabel Hubbard. Mabel's father was Gardiner Greene Hubbard. He was a wealthy man who gave A.G. Bell some financial support for his invention. In 1876, A.G. Bell received a patent for the telephone from Washington, D.C. In his later years A.G. Bell continued to make contributions to society. He helped to invent the phonograph and also the audiometer. Throughout his life Bell remained dedicated to the deaf community. He died on August 2, 1922.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. research international contributions of scientists, representing males and females, diverse multicultural groups, and handicapped persons.
3. use mathematics in other curriculum areas.
4. recognize the technological development in communication and transportation which have led to changes within society.

Time Allotment
this lesson can be divided, as desired, into as many as five 40-minute sessions

Materials
two paper cups or oatmeal boxes, two paper clips, string, scissors; diagram of the human ear; picture of A.G. Bell and the first telephone; a disconnected classroom telephone (disconnected); a tape recorder and a 90-minute cassette; tuning fork or

several metal forks of different sizes; video cassette and cam corder; maps and globes; copies of student data sheets; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Ask the students "What do you know about the invention of the phone? How do we all benefit from its use?"

Share with Neighbor
2. Invite the students to tell their telephone numbers. Using the disconnected classroom telephone, have the students practice writing and dialing their home numbers. Discuss what a hearing impairment is and how the hearing-impaired person communicates by telephone. Introduce the idea of TDD, or Telecommunications Device for the Deaf.

Hands-on Activity
3. Allow the students a chance to use a tuning fork to observe different pitches.

4. Give the students an opportunity to observe how sound waves travel to their ears by making their own "telephones."
Directions:

a. Poke a hole through two paper cups.
b. Measure and cut some string about 25 feet long.
c. Pull the string through the bottom of both cups and secure the string inside each cup with a paper clip and a knot.
d. Each person holds a cup and walks away so the string is taut.
e. One person talks into the cup while the other person listens in the cup at the opposite end.

Introduce Principle/Concept
5. The sound vibrations are collected by the outer ear and directed into the ear canal to the eardrum. The result is sound. What happens in the demonstration above? When one person speaks into the cup, the cup vibrates. These vibrations travel along the string and through the other cup. The other cup vibrates near the listener's ear.

Relate Activity and Concept
6. Have the students label specific parts of the ear on a diagram of the ear.

7. Show a picture of A.G. Bell and read a short story about his life and inventions. Make sure the students understand his interest in speech and communication.

8. Use a map or a globe and have the students point out Europe and North America, Scotland and the United States, Edinburgh and Boston. Be sure each student has a chance to find these locations.

9. Determine Bell's age at different times in his life.

1875 invented phone	1922 died
- 1847 born	- 1847 born
28 years when invented phone	75 years when he died

Connect to Other Everyday Examples

10. See if the students can explain what an emergency is. Have the students share language experience stories about public or pay telephones and talk about 911 emergencies in their groups. Why is it important for us to have conveniently-located telephones? The students can make taped recording or videos of how they would explain a 911 emergency situation to an operator on the telephone.

Home Activity/Parent Involvement

1. Have the students make and keep a personal telephone book of friends' addresses and numbers.

2. Distribute the Manual Alphabet Chart and suggest that the students learn it by sharing it and practicing with their parents.

Student Data Sheet Master

Manual Alphabet Chart

Lesson Assessment

The students' participation during the telephone demonstration and during class discussions should be observed and noted for assessment. When asked, each student should be able to explain the contribution that Alexander Graham Bell made to society. They should understand reasons for having public phones in places of convenience and types of technological development in communication such as TDD (Telecommunications Device for the Deaf) which have helped members of our society. During the lesson, each student will have an opportunity to locate Europe, the United States, Edinburgh, and Boston on a map or globe. Each student will calculate A.G. Bell's ages at specific points in his life. The diagram on which the students identified parts of the human ear can be collected and saved in their portfolios.

Extension Activities

Books to Read

The Ear and Hearing by Steve Parker, Franklin Watts, 1989
Alexander Graham Bell by Patricia Ryon Quiri, Franklin Watts, 1991
Alexander Graham Bell: Man of Sound by Elizabeth Ryder, Garrard, 1963

Additional Activities

1. Use this lesson's vocabulary words for extra credit on weekly spelling tests. The vocabulary word list should contain relevant words and should be located and defined in a classroom dictionary.
Vocabulary: communicate, deaf, emergency, patent, co-worker, wealthy, original, TDD, vibrate, eardrum

2. Fingerspelling word games for the entire class to participate in seeing how many of the weekly spelling words in their classroom textbooks can be spelled using manual communication.

LESSON 3: Louis Braille

Lesson Introduction
In this lesson, the students will learn about Louis Braille, who while still in his teens, devised a system of reading and writing used by the blind. They will discuss how this six-dot code has opened the sighted community's world of schools and libraries to those who read by touching with their fingers. They will also learn about our sense of sight and how it relates to some of our other senses.

Louis Braille was born in Coupvray, France, which is a small village east of Paris, on January 4, 1809. His father was the village harness maker. Every day his father, Simon Rene Braille, worked in his harness shop with sharp knives to slash and cut leather and with pointed awls to punch holes. Louis Braille watched his father work every day in the harness shop. He would play with the scraps of leather around the shop. One day he decided to make a small harness out of a piece of leather. He used a sharp pointed awl to try to poke through the tough leather. The awl slipped and pierced his eye. He was only three years old. The injured eye became swollen and inflamed and after a few days, the other eye began to blur.

When Louis was ten years old, he was enrolled at the Royal Institution for Blind Youth in Paris. Louis felt that blind students at the school could not have an education equal to sighted students because they did not have access to any of the written material that books and libraries offered. There were only a few books at the Royal Institute that were embossed in the large letters of the sighted. Louis wished that someone would discover a simpler alphabet that could be read by the fingertips as quickly as the eye can read the printed word. When he was 15 years old, he designed an alphabet code of six embossed dots, three high and two wide. This was done by using a dull awl. He remained at the Institute as a professor of grammar, history, geography, math, and music.

In his later years at the Institute, he spent hours in research and transcribing. He became the organist at his church. He used the music which he had transcribed into braille. The students at the Institute used Braille's six-dot alphabet daily in their classes. Throughout his life, he continued to dedicate himself to doing research and transcribing books for the blind. He died in Paris on January 6, 1852, a few days after his 43rd birthday.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. research international contributions of scientists, representing males and females, diverse multicultural groups, and handicapped persons.
3. use mathematics in other curriculum areas.
4. recognize how needs and wants dictate supply and demand.
5. recognize the technological development in communication and transportation which have led to changes within society.

Time Allotment

this lesson can be divided, as desired, into as many as five 40-minute sessions

Materials

blindfold(s); a box containing several small items: metal keys and rings , wax crayons and candles, round buttons and coins, paper money and index cards; spice flavors, e.g. vanilla, garlic, lemon, burned pieces of paper or fabric, ammonia or bleach, sour milk in jars with tight lids; a story about Louis Braille; sandpaper; poster board; picture of a braille-writer machine; pencils; map or globe of the world; a diagram of the human eye; copies of student data sheets; pencils or pens

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Invite the students to share information about the importance of the sense of sight. Give them time to list the things that our eyes allow us to do easily, e.g. read, draw, watch videos.

Share with Neighbor

2. Let them share language experience stories. What would it be like to spend a day with our eyes closed? What things can they we that are dangerous for our eyes? Have students discuss what "visually impaired" means within individual groups.

Hands-on Activity

3. Play blindfolded feeling and smelling games. Take turns presenting various items to the students. Ask them "Can you determine what this object is by touching it while you're blindfolded? Can you recognize the smell of something that you cannot see?"

Introduce Principle/Concept

4. Be sure the students understand that Louis Braille was a highly motivated young man who worked diligently on a project that would benefit a large

community of handicapped persons. Read a short story about his life to illustrate that scientists and inventors begin their careers just like the rest of us. Many overcome diabilities and hardships to follow their inspirations.

5. Use a map or a globe and have the students point out Europe, France and Paris. Be sure each student has a chance to find these locations.

6. Determine Louis Braille's age at specific times in his life. For example,

1852 death
- 1809 birth
43 years old at his death

Relate Activity and Concept

7. Show a picture of a Braille Writer and distribute copies of the Braille alphabet to the students. Let them try to write messages using the dot alphabet. They can use pencils to poke holes to write their notes.

8. Make large alphabet charts using sandpaper. When cutting out the sandpaper alphabet letters, paste them to large poster board cards. These can be used to simulate the tactile sense that is used to discriminate between different letters of the alphabet for people who are visually impaired.

Connect to Other Everyday Examples

9. Is it necessary to have all of our senses? Point out how the students usually can recognize the voices of their classmates without seeing them, just as they can recognize a singer's voice on the radio. Ask for other examples of how visually impaired individuals adapt. When one of our senses is not being used, sometimes the other senses even become more acute.

Home Activity/Parent Involvement

Have the students label specific parts of the human eye on a diagram.

Remind students to protect their own eyes from injury by wearing special visors or goggles when working with equipment or chemicals that may splash. They should be safety-conscious when in potentially dangerous work situations in the home or outside. Fumes and smoke can also be threatening to healthy eyes. Red, watery eyes are sometimes an indication telling you that you need to get away from a hazardous situation.

Student Data Sheet Master

Braille Alphabet Chart

Lesson Assessment

The students' participation during the blindfolded game and during class discussions should be observed and noted for assessment. When asked, each student should be able to explain the contribution that Louis Braille made to the

blind community, and to society in general. They should recognize how needs and wants dictate supply and demand and identify ways in which individuals use their talents for the benefit of the country. During the lesson, each student will have an opportunity to locate Europe, France, and Paris on a map or globe. Each student will calculate Louis Braille's ages at specific points in his life. The diagram on which the students identified parts of the human eye can be collected and saved in their portfolios.

Extension Activities

Books to Read

My Mom Can't See Me by Sally Hobart Alexander, Collier-Macmillan, 1990
Seeing Fingers by Etta De Gering, David McKay Co., 1962
The Eye and Seeing by Steve Parker, Franklin Watts, 1989

Additional Activities

1. Use some of the vocabulary words for extra credit on weekly spelling tests and/or vocabulary definition tests. Vocabulary: braille/braille writer, blind/visually impaired, cornea, cataract, optometrist, the six main senses (seeing or visual, hearing or aural, smelling, balance, taste, touch or tactile)

2. Plan to have a time for listening to classical musical programs on Chicago radio stations WNIB 97.1 and/or WFMT 98.7.

LESSON 4: George Washington Carver

Lesson Introduction

In this lesson, the students will learn about George Washington Carver's life. They will discuss how Carver was the first Black man of science to emerge as an American folk hero and how his unselfish efforts to improve the lives of others turned him into a legend in his own time. They will also learn some interesting things about plants in our environment.

George Washington Carver was born a slave on a farm near Diamond, Missouri around 1864. The date is not specific because it was extremely difficult to document when a child was born into slavery back at that time. As a youngster, George was a frail, sickly child so his duties on the farm were limited to taking care of the family garden and other less difficult tasks. Growing up near the woods provided an environment that gave George an appreciation of nature. He even started a small garden of his own in the woods where he transplanted and cultivated a variety of plants. He would observe the conditions that enabled them to develop into strong healthy plants.

George later moved to Kansas where he was able to attend school. He was extremely bright even as a young child. In 1890, George moved to Iowa, where he was able to enroll as a student into Simpson College. He paid his way by doing laundry in a small shack where he also lived. Later he transferred to the Iowa State College of Agriculture where he studied botany and horticulture. He received a Master of Agriculture degree from Iowa State College. He left Iowa to join the faculty of Tuskegee Institute in Alabama at the request of Booker T. Washington who was principal of Tuskegee.

It was at Tuskegee that Carver began raising peanuts in the school experiment station around 1903. He found hundreds of new uses for the peanut, including foods, beverages, dyes, and cosmetics. His experiments with peanuts brought him recognition from the United States Department of Agriculture. Because of his efforts, the peanut crop brought the southern farmers an income of 60 million dollars in a single year! Farmers discovered they made more money raising peanuts than raising cotton or tobacco crops.

George Washington Carver never married. He could have lived his later years as a rich man, but he found more satisfaction being useful to the world. He died in Alabama on January 5, 1943. George Washington Carver was an agricultural chemist, a botanist, a teacher, and an inventor. He was famous for creating a revolution in the agricultural technology of the Southern United States.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. research international contributions of scientists, representing males and females, diverse multicultural groups, and handicapped persons.
3. recognize how needs and wants dictate supply and demand.

Time Allotment
this lesson can be divided, as desired, into as many as five 40-minute sessions

Materials
picture of George Washington Carver; story about George Washington Carver; map of the United States; diagram of a peanut plant; roasted peanuts; vegetable oil; honey; crackers; a blender or food processor; small classroom plants and tools; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Ask the students "Can you explain how and where peanuts grow?" Give them a chance to share what they know.

Share with Neighbor
2. In their individual groups, have the students make a list of all the food-producing plants. Then, have them make a list of non-edible plants. After discussing their responses, save these lists in their portfolios.

Hands-on Activity
3. Make peanut butter. The students will learn that peanut butter is a healthy nutritious food by making peanut butter.
Directions:

a. take shells and skins off of roasted peanuts
b. pour peanuts into a blender
c. pour a small amount of vegetable oil into the blender
d. pour a small amount of honey into the blender
e. turn on blender slowly; mix peanuts until it becomes peanut butter
f. spread small amounts of the peanut butter on crackers and enjoy

Introduce Principle/Concept
4. Discuss how many types of foods contain peanuts or peanut products. How did needs and wants dictate supply and demand of peanuts in the United States?

5. Show a picture of George Washington Carver and read a short story about his life. Make sure students understand his interest in plants and the contributions which he made to our society.

6. Use a map to locate the Midwestern and Southern states of the United States. Be sure each student has a chance to find Missouri, Iowa, Alabama, etc.

7. Make a class timeline and point out 3 or 4 events in Carver's life:

1864	1890	1903	1943
Born in Missouri	Enrolled in Simpson College, Iowa	Experiments with peanut	Died in Alabama

Relate Activity and Concept

8. Give the students an opportunity to observe how plants grow and why plants die in the classroom. Have the students label parts of the peanut plant on a diagram and observe the parts of a peanut.

Connect to Other Everyday Examples

9. Let the students plant, observe, and care for small classroom plants.

Home Activity/Parent Involvement

Suggest to parents that the students can take care of plants at home. Perhaps they could help with outdoor gardening chores.

Lesson Assessment

The students' participation during the peanut butter making and during class discussions should be observed and noted for assessment. When asked, each student should be able to explain the contribution that George Washington Carver made. They should recognize how needs and wants dictate supply and demand and identify ways in which individuals use their talents for the benefit of the country. During the lesson, each student will have an opportunity to locate the Midwestern and Southern United States on a map. Each student will help prepare a timeline of specific points in Carver's life. The diagram on which the students identified parts of the peanut plant can be collected and saved in their portfolios, along with the edible/non-edible foods list.

Extension Activities

Books to Read

George Washington Carver by Gene Adair, Chelsea House, 1989
George Washington Carver by James Martin Gray, Silver Burditt Press, 1991
North American Indian Medicine People by Karen Liptak, Franklin Watts, 1990

Additional Activities

1. Make a bulletin board with the captions "George Washington Carver Healed Plants" and "Indians Discovered that Plants Healed People" or "Careers in Botany."

2. Use some of the vocabulary words for extra credit on weekly spelling tests and/or vocabulary definition tests. Vocabulary: horticulture, botany, boll weevil, legume.

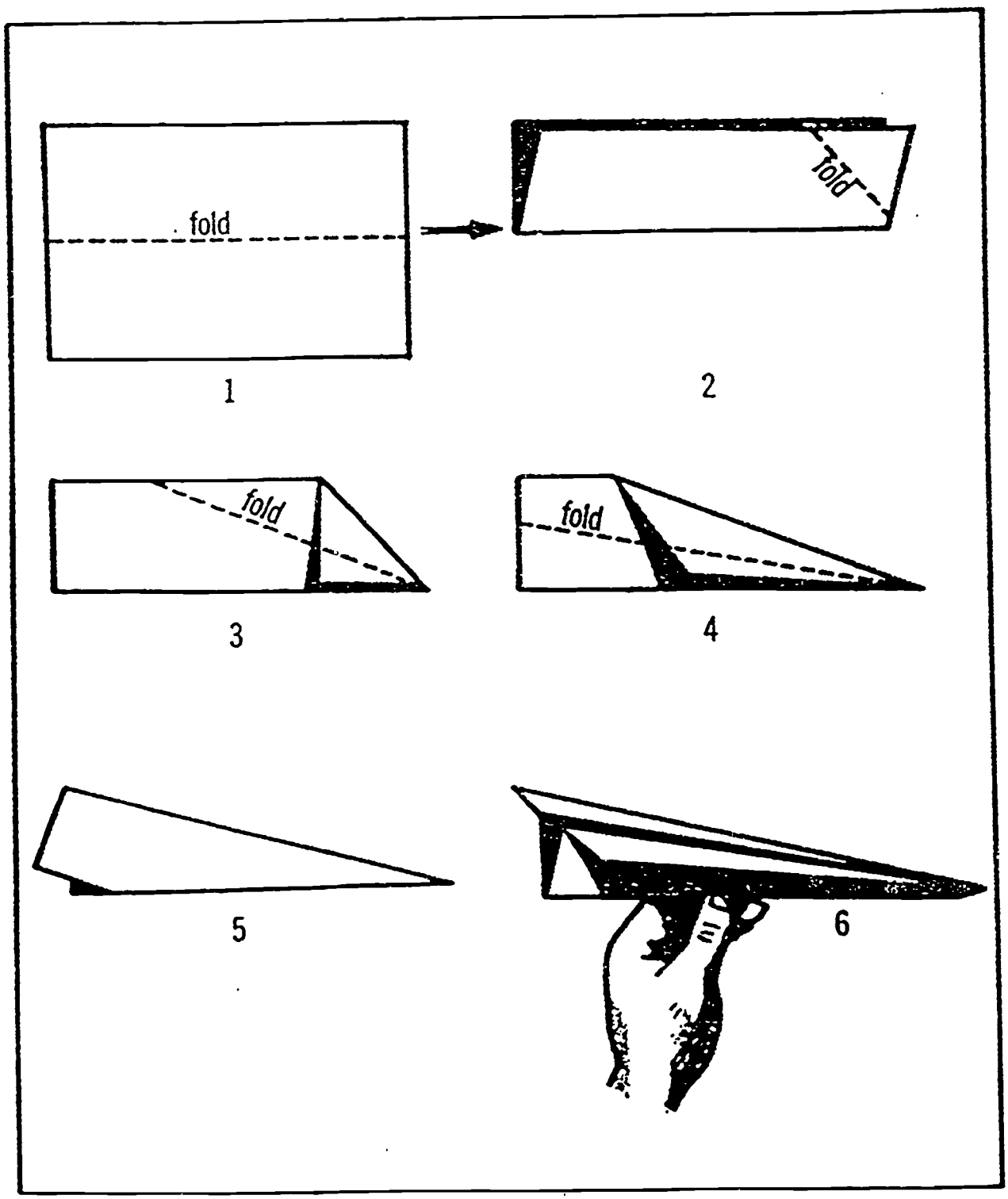
Additional Community Resource Excursions

Plan field trips to Garfield Park Conservatory on 100 N. Central Park Avenue and/or Lincoln Park Conservatory on Stockton Drive and Fullerton.

Student Data Sheet Masters

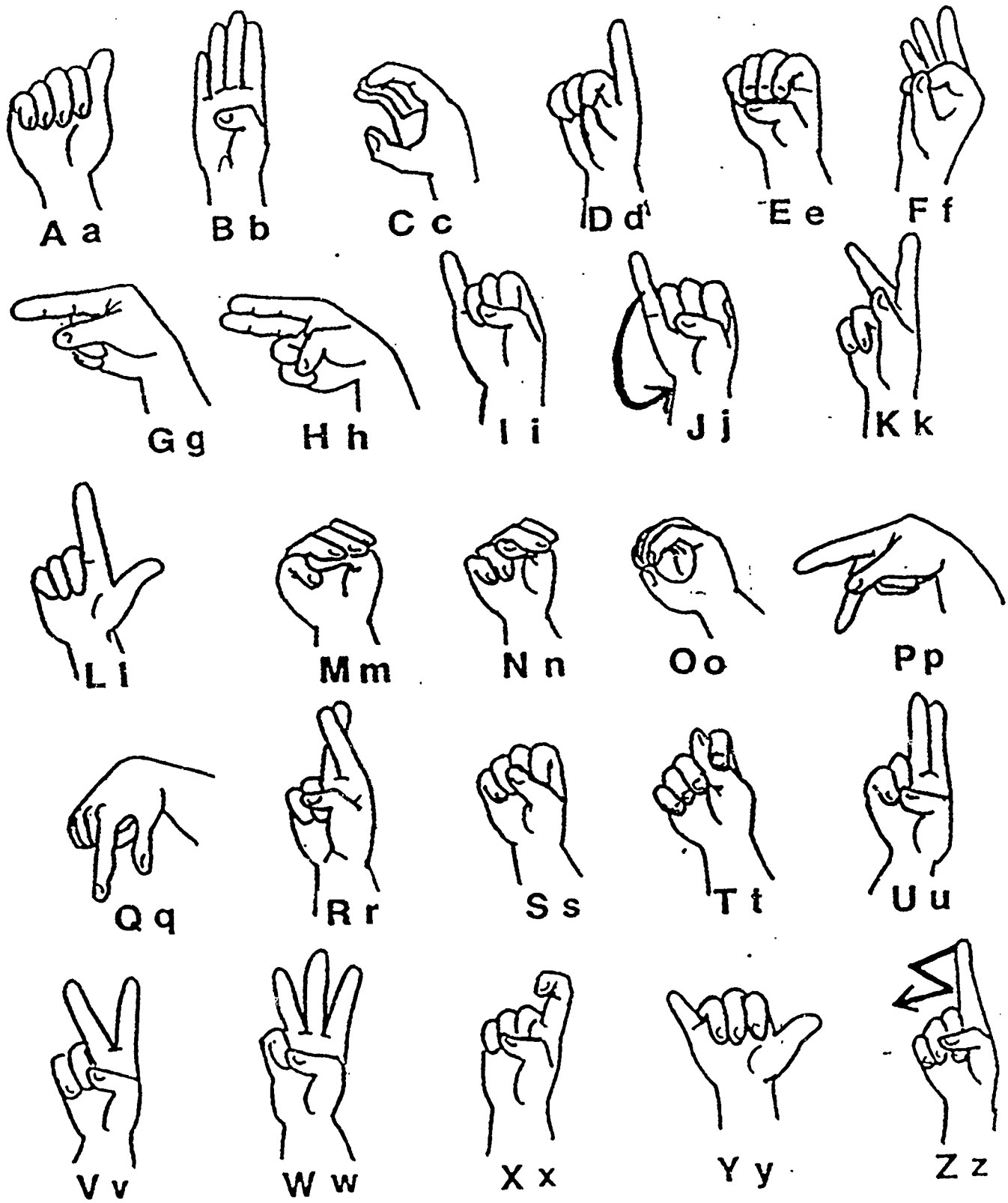
Necessity is the Mother of Invention
Student Data Sheet Master 1.1

Paper Airplane Plans



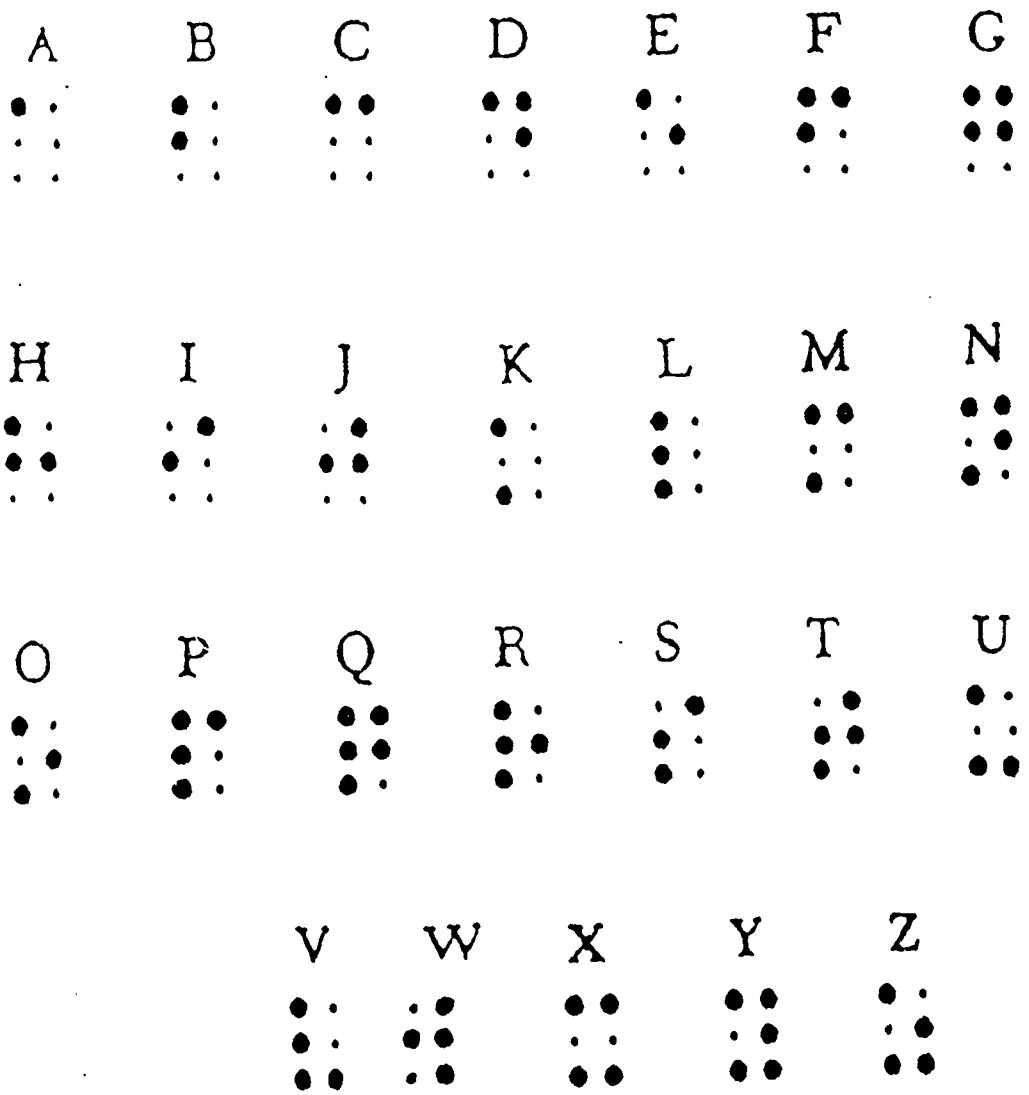
Necessity is the Mother of Invention
Student Data Sheet Master 2.1

Manual Alphabet Chart



Necessity is the Mother of Invention
Student Data Sheet Master 3.1

Braille Alphabet Chart



Arthropods: Insects and Spiders

Community Resource Curriculum Development Project

by: Frederic D. Miller, Ph.D.
Janice Schnobrich, Ed. D.
Alfonso Valtierra, M.A.

Arthropods: Insects and Spiders

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the fourth-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Recognize the importance of insects and spiders.
Compare the body parts of an insect with the body parts of other animals.
Compare the relationship of various organisms within food chains.
Compare and contrast specified environmental conditions.
Identify science-related careers and avocations.

SOCIAL SCIENCES
Identify ways in which the government of Illinois and the government of the United States protect and serve their citizens.

MATHEMATICS
Use mathematics in other curriculum areas.

Content Background
An insect is an invertebrate with a body composed of three parts: head, thorax, and abdomen. There are two antennae on the insect's head, used for feeling, smelling, and sometimes even hearing. Most insects have at least two eyes on their heads as well. These eyes may be of two types: simple, which consist of a single lens and are sensitive to light, or compound, which are multi-faceted and produce multiple images for the insect. Many insects have both types of eyes, in addition to their antennae. The thorax has six legs and depending upon the species, it may have wings as well. The insect's abdomen may have sensory structures called cerci, at the tip. All insects have breathing pores along the sides of the abdomen in addition to one or two pairs on the thorax.

Spiders are invertebrates which share some of the same characteristics as insects. They both belong to the phylum Arthropoda, along with horseshoe crabs, crustaceans, millipedes, and centipedes. However, a spider is not an insect; there are several important differences. A spider has only two body sections instead of three. It has a head/thorax (called a cephalothorax) and an abdomen. It also has eight legs instead of six. With ticks, mites, scorpions, etc., spiders are members of the class Arachnida. Most spiders have six finger-like structures which spin silk for webs. Some have fewer than six of these spinnerets.

Timeline for Unit

This unit is divided into four lesson sections and should take about two to three weeks to teach. Students will observe the characteristics of insects and spiders in the first two lessons, and they will note the changes which take place during metamorphosis by observing larva in the third lesson. The final activity focuses on the importance of insects and spiders in a naturally-balanced ecosystem. These lessons should be introduced in the early Fall of the year or in the late Spring. These are times when insects and spiders are still evident in our environment. The weather during these times also permits students to conduct observations and excursions more easily.

Evaluation/Assessment

Each lesson has an evaluation component as part of its design. Most assessments are done through the use of journal entries, with the students recording observations and data, and summarizing their experiences on an ongoing basis. In addition, each student will keep a portfolio during the unit. This portfolio may be evaluated during or upon completion of the activities. Attention should be given to completion of assignments and effective communication. Students should demonstrate an understanding of the contents of the lessons and how the concepts relate; they should successfully convey their understanding in their journal entries. Some feedback may be necessary to teach students to write productively and effectively.

Community Resources

Chicago Botanic Garden
Lake Cook Road and I-94
Glencoe, IL 60022-0400
708/835-5440

Cooperative Extension Service
University of Illinois at Urbana-Champaign
6438 Joliet Road
Countryside, IL 60525
708/352-0451

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605
312/922-9410

The Morton Arboretum
Illinois Highway 53
Lisle, IL 60532
708/719-2468

Career Connections
The careers available in the study of and control of insects and spiders include museum curator, insect control specialist, biologist, chemist, and environmental engineer.

Glossary
ABDOMEN: the rear section of an insect's or spider's body

ADULT: the final stage of the life cycle

ANTENNA: one of a pair of sensory appendages on each side of an insect's head. Two are called antennae

ARTHROPOD: any animal without a backbone, with a hard skeleton on the outside of the body and with bendable, jointed legs

ASEXUAL: reproducing without the union of sperm and egg

COCOON: the case in which a fully-grown larva is enclosed during the pupal stage, prior to emerging as an adult

COMPOUND EYE: a visual sensory organ which has many sides (facets) or lenses and gives many images

EGG: the first stage of the life cycle

EXOSKELETON: the hard, supporting outer structure of an insect's or spider's body

INSECT: an arthropod with two antennae, three separate body parts, four wings (in most cases), and six legs in its adult stage

LARVA: the second stage of the life cycle, in complete metamorphosis

METAMORPHOSIS: changing from an immature to a mature insect in either three stages (incomplete metamorphosis) or four (complete metamorphosis)

MOLT: to shed the exoskeleton or outer skin

NYMPH: the second stage of the life cycle, in incomplete metamorphosis

PUPA: the third stage of the life cycle, in complete metamorphosis, in which the insect is covered by a cocoon and transforms into an adult

SCAVENGER: one who eats decaying or left-over organic materials

SIMPLE EYE: a visual sensory organ with one lens

SOCIAL: living in organized communities with a division of labor. Ants and bees, for example, are social creatures

SPIDER: an arthropod, with two main body parts, eight legs, and eight eyes

SPINNERET: part of a spider's body used to produce a web

THORAX: part of the body between an insect's head and abdomen

LESSON 1: Investigating Insects

Lesson Introduction

There are more insects on Earth than all other animals combined. Over 850,000 species of insects have been identified to date and about a million different species probably exist. Insects have three body parts: head, thorax, and abdomen. They have six jointed legs. Some insects, such as ants and silverfish, do not have wings, but most insects have two pairs of wings in the adult stage; only flies have a single pair of wings. Insects also have two compound eyes for seeing and antennae which are used for feeling, smelling, hearing, and/or tasting. Insects have hard outside bodies called exoskeletons. Entomologists are scientists who study insects.

Many children are afraid of insects. Most of their fear is unnecessary because the majority of insects are indeed harmless. This lesson should help students understand insects better by giving them a chance to observe a variety of insects up close.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. compare the body parts of an insect with the body parts of other animals.
3. identify science-related careers and avocations.

Time Allotment

one 40-minute session

Materials

copies of pictures of various insects from magazines and books; labels to put on the pictures; containers; nets (optional); magnifiers; journals; pens or pencils

Advanced Preparation

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Ask the students "What kind of insects live in your backyards or neighborhoods? Can you describe them? Do all insects have legs? Wings?"

Share with Neighbor

2. Distribute pictures of insects to each group and allow the students to discuss the insects by comparing and contrasting what they see. Instruct them to come up with a list of defining characteristics for insects.

Hands-on Activity

3. Ask the students how the body parts of an insect are different from the body parts of a human. Have them write their hypotheses in their journals. Distribute the labels of the body parts to each group and challenge the class to label their photographs.

4. Announce to the class that everyone is going to be an entomologist. An entomologist is a scientist who studies insects. Bring the containers and the magnifiers and take the class on an "Insect Search" outside. Weedy patches near the school, gardens, and places with rocks or logs would be good places to begin your search. Look for ants, moth/butterfly caterpillars, beetles, grasshoppers, and crickets. Help the students each find one insect and observe it closely to describe its characteristics. Remind the students to handle the insects gently. Place them in the containers, and begin the observation. This observation can be done either outdoors or in the classroom.

Introduce Principle/Concept

5. Compare insects with humans. In their journals, have the students draw a picture of their insects and then draw one of themselves. Under the illustrations, have them make a chart listing all of the senses and some actions. Fill in the chart by investigating how both organisms see, hear, smell, taste, feel, move, or grab objects, etc. Other observations, such as body hair and type of skeleton, can be added. This comparison will help the students become more familiar with the vocabulary in the lesson.

6. Lead the students through the discovery process by allowing them first to make guesses and then figure out how to test them. In groups, let them compare how their insects sense things and move about. How do the students get information from the environment and/or get around themselves?

	Insects	Humans
Seeing	*simple/compound eyes*	*simple eyes*
Hearing	*antennae*	*ears*
Smelling	*antennae*	*nose*
Tasting	*mouth/antennae/feet*	*tongue*
Feeling	*antennae/hair*	*skin*
Moving	*wings and six legs*	*two legs and feet*
Grabbing	*pincers*	*thumb and fingers*
Body	*outside (exo) skeleton*	*inside skeleton*

Relate Activity and Concept

7. Allow the students to share their data with each other. Initiate a discussion with the students to point out some of the special adaptations which various insects/humans have developed to survive or do their work more efficiently. Some examples include:

- special color adaptations

- legs and feet for swimming, grasping, jumping, digging, collecting pollen...
- mouths designed for chewing, piercing/sucking, lapping, sponging...

8. Give the students some time to summarize what they know about insects in their journals. What new words did they learn in this lesson? Encourage them to use this vocabulary in their writings.

9. Release all of the insects which have been collected where they were found.

Safety
Of course, bees and wasps should not be handled by students when they are out on their observation excursions. Some students may be allergic to stings.

Lesson Assessment
Collect the students' journals and check them for completion. All of the data should be filled in. The writings should reflect the vocabulary which has been introduced in this lesson.

Extension Activities

Books to Read
Insects by Illa Podendorf, Children's Press, 1981
Insects Do the Strangest Things by L. and A. Hornblow, Random House, 1968
Let's Look at Insects by H.E. Huntington, Doubleday, 1969

Additional Community Resource Excursions
Arrange a trip to a natural history museum to see collections of insects.

LESSON 2: Wings and Webs

Lesson Introduction

Spiders are the largest group of arachnids. There are more than 35,000 species in the world. Spiders are found everywhere on Earth except Antarctica. Spiders have the same type of outer body as insects. It is called an exoskeleton. However, spiders have only two body parts: a cephalothorax and an abdomen. They usually have eight simple eyes and no compound eyes. Spiders have no wings and no antennae.

The most important job of the spider is to eat insects. This is helpful to us because some insects can carry diseases or destroy crops. This lesson will help the students discover the differences between spiders and other arthropods. It will highlight the spider's ability to spin webs from silk produced by glands in their bodies. These webs provide most spiders with convenient, safe homes and a clever way of catching their food.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. compare the body parts of an insect with the body parts of other animals.

Time Allotment

one 40-minute session

Materials

model of a spider; one or two boxes of cotton in a roll; scraps of colored paper to make insects and spiders; gluesticks; scissors; markers; journals; copies of student data sheets; pens or pencils

Advanced Preparation

Arrange the students into cooperative groups. Each group will produce a model. Assign roles to each member of each group: two students will make the web; one will make the insects; one will make the spider with the babies on her back.

Procedure

Tap Prior Knowledge

1. Review what has been learned so far about insects. Show the students the spider model and ask "Are spiders considered to be insects? Do they have all of the defining characteristics which were listed in the last lesson?" Let volunteers point out the body parts they know on the spider model.

Share with Neighbor

2. In their groups, let the students decide what the major difference(s) between insects and spiders is (are). Discuss their responses with the class. There are many possibilities for discussion. Both are invertebrates which belong to the

phylum Arthropoda. Spiders have only two body parts while insects have three. Spiders have eight jointed legs while insects have six. Spiders do not have wings or antennae. Students can take notes in their journals during the class discussion. Complete data sheet.

Hands-on Activity

3. Remind each student of the roles which were assigned previously as you distribute materials to each group. The web-makers should take about one foot of the cotton and very gently spread it apart on a desk so the cotton still stays together but individual strands can be seen. The cotton should be well spread and somewhat geometrical. Students should try to get straight edges, although there will be some variance in the webs.

4. The insect-makers should use the scraps of paper to make various insects of different sizes. They should draw upon their insect observation experience from the previous lesson to make them as realistic as possible.

5. The spider-makers should make sure their spiders are sized in relationship to the insects. Make them as realistic as possible; remind them that there are two body parts and eight legs, etc. If the spiders are small, spider-makers may draw some spider babies on their mother's back instead of gluing more paper on. All body parts should be present on their drawings.

Introduce Principle/Concept

6. Using the models the students have created, describe what happens to the insects when they become caught in a spider's web. Explain that the web is sticky and that the more an insect struggles, the more entrapped it becomes. The spiders wrap the insects inside a cocoon-like web so they cannot escape. If they are ready to eat, they crush the insects or suck the blood out. If they are not ready to eat, they sometimes paralyze their prey and save it for later.

Relate Activity and Concept

7. Discuss with the students why the web is such a safe and helpful home for the spiders. How does it help them to survive?

8. Have the students do a creative writing activity pretending that they are one of the creatures in the web. Have them describe from that creature's perspective how it feels to be trapped and what happens while they are in the web.

Connect to Other Everyday Examples

9. Discuss why the web is a good hiding place. Does its transparency help the spider to catch insects? What other animals have devised ways to catch food like a spider's web?

Student Data Sheet Master

Wings and Webs

Lesson Assessment
Collect the students' writings and review them. Look for vocabulary and concept understanding.

Extension Activities

Books to Read
Spiders and their Kin by Herbert W. Levi and Lorna R. Levi, Golden Press, 1987

Additional Activities
Invite the students to investigate different types of spiders. How many types are poisonous, for example? How does the arrangement of eyes help scientists tell from which family a spider comes?

LESSON 3: The Life Cycle: Complete and Incomplete Metamorphosis

Lesson Introduction

Many insects go through four stages of growth in their life cycles. These four stages are egg, larva, pupa, and adult. The changes that take place are called metamorphosis. Metamorphosis is a Greek word meaning "to transform or change." Mealworms are the larval stage of grain beetles, before they shed their skin, or molt, and enter the pupal stage. Dragonflies, mayflies, cockroaches, grasshoppers, silverfish, and stoneflies are examples of insects which go through complete metamorphosis.

Some other insects undergo incomplete metamorphosis, with three stages: egg, nymph (molting), and adult. Butterflies, moths, flies, fleas, ants, bees, wasps, and beetles go through incomplete metamorphosis.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. compare and contrast specified environmental conditions.
3. use mathematics in other curriculum areas.

Time Allotment

one 40-minute session

Materials

mealworms; large container; cereal; small pieces of vegetable; small petri dishes or similar; paper liners for petri dishes; straw; magnifiers; ; bran cereal; water; ice; eyedroppers; journals; copies of student sdtata sheet; pens or pencils

Advanced Preparation

Mealworms can be obtained from local pet suppliers. Purchase several hundred worms since you will get them in a variety of life-cycle stages. Put them in a container filled half-way with bran or similar cereal. Store in a dark, cool place. Add small pieces of vegetables for moisture. Replace cereal when most of it is gone.

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Have the students observe the collection of mealworms and point out the worms in different stages, if they know them. Introduce the terms used for the four stages in the life cycle in complete metamorphosis: egg, larva, pupa, and adult. This is how many insects develop. Some are born looking like miniature adults and just grow by shedding their skin, or molting, throughout their lives. Others, like these grain beetles, go through discrete steps. Ask the students

"What steps of the life cycle do you see represented in the container of mealworms?" Complete the student data sheet.

Share with Neighbor

2. Have the students draw pictures of the different stages of growth in their journals or data sheets. Allow them some time to share their work with others.

Hands-on Activity

3. Distribute materials to each group. Instruct the students to line a dish with a small piece of paper. Put a meal worm in the dish. Observe the mealworm with a magnifier. Have the students record the number of legs, the body segments, the feelers and the characteristics of the mouth area. If they would like, they can draw a picture of their worms in their journals.

4. Pose some questions to the students: "How fast does the worm walk? How does it move? Can it walk when the dish is tilted?" Take the paper liner out of the dish for a moment and observe the worm from beneath. Note how the legs work together as it walks. "What does the mealworm do in the dish? Can you get it to walk backwards?" Time the worms for one minute and see how far they move.

Introduce Principle/Concept

5. Record the observation data. Show students how to make a table in their journals or on the back of the data sheet to record a variety of stimuli and the mealworm's response to each. Draw a vertical line down the middle of one side of the paper. Label the left and right columns.

Stimulus	Response

6. Introduce a variety of stimuli to the mealworm's environment and note its response. With a straw, blow some air on the mealworm and record its response. Tap next to it. How does the worm react? Place some cereal in the dish. What happens? With an eyedropper, place a little water on half of the dish. Put an ice cube near the worm. Continue investigating, allowing the students to pose hypotheses of their own and test them. Be sure they continue to record their data.

Relate Activity and Concept

7. Review once again the stages involved in complete metamorphosis. The mealworms which are being studied are in the larval stage of grain beetles, before they shed their skin, or molt, and enter the pupal stage. Mealworms like to be in places that are dark and damp. They eat grain, cereal, flour, bran, bread, and

crackers as well as other scraps they can find. They are fond of apples, bananas, and other fruits and vegetables, too.

8. Compare insects to spiders. Spiders do not go through metamorphosis like insects. They molt during growth. Most live about a year. Some tarantulas may grow to be 20 years old.

Safety
The mealworm is a living thing so do not put anything harmful on it. Students should wash their hands after this activity.

Student Data Sheet Master
Mealworm Observation

Lesson Assessment
Note the students' participation in the investigation activity; collect their journals and check the data for completion and accuracy. Journal entries should contain a statement about the stages of the insect life cycle.

Extension Activities

Books to Read
The Strange Lives of Familiar Insects by Edwin Way Teale, Dodd, Mead & Co., 1962
The Life of Insects by V.B. Wigglesworth, World, 1964

Additional Activities
1. Have the students measure their mealworms. Find some things in the room which are the same size as the worms.

2. Write a story about a mealworm.

LESSON 4: Importance of Insects and Spiders

Lesson Introduction

Most of our fruits and many of our vegetables and field crops are fertilized by insects. This is called pollination. Insects feed upon various plant parts and bring pollen from one to another. Many insects are also useful as scavengers. By eating decaying matter, they help clear the ground of waste. This waste is useful as fertilizer. Some insects are the source of many types of medical and chemical substances. Spider silk has been used by primitive people for fishing nets, lures, bags, and headdresses. The silk has also been used in telescopes, levels, and surveying equipment. They are a source of food for other animals and for humans. Moths and grasshoppers are a delicacy in parts of Africa and Asia; beetle grubs are eaten in South America.

This lesson will show the students why it is important to have both insects and spiders in our environment.

Specific Lesson Objectives

The students will:

1. recognize the importance of insects and spiders.
2. compare and contrast specified environmental conditions.
3. identify ways in which the government of Illinois and the government of the United States protect and serve their citizens.
4. identify science-related careers and avocations.
5. compare the relationship of various organisms within food chains.

Time Allotment

one 40-minute session

Materials

index cards with pictures of spiders, insects, and plants on them; journals; pens or pencils

Advanced Preparation

Prepare to play the role-playing game by creating the cards. In a class of 30 students, there should be five spiders, 10 insects, and 15 plants. Adjust the numbers for the size of the class.

Procedure

Tap Prior Knowledge

1. Ask the students "Do you think there are more spiders than insects in a balanced ecosystem, or more insects than spiders?"

Share with Neighbor

2. In their groups, give the students a chance to debate their answers. They can discuss some of the implications of the relative populations. Tell them that we are going to find out more.

Hands-on Activity

3. Randomly hand out one role-playing card to each student. The actual number of students will vary from class to class, but there should be approximately five spiders, 10 insects, and 15 plants. You can choose the number of organisms to take part in each game. To play, the students circulate about the room. The spiders are allowed to tag the insects and take their cards. The insects then have a seat on the sidelines. In a natural ecosystem, spiders prey upon insects. The insects in turn are allowed to tag plants and take their cards. Insects often feed upon plants. By varying the number of each organism taking part, you can illustrate for the class how all the elements work together in the natural environment.

4. Give the class a simple scenario. A specific pesticide had been used in an area which has resulted in killing most of the spider population. Eighty percent, or four out of five spiders, are gone. Remove four of the five spider cardholders before beginning the game. Allow the remaining insect cardholders to tag the plants. There is nothing to stop the insects from eating the plants and taking their cards. Soon we have no more plants, oxygen, or food. Discuss this situation with the students.

5. Try a scenario in which there are too many spiders and not enough insects. Again, allow the students to discuss what happens.

Introduce Principle/Concept

6. Spiders and insects play an important role in the food chain. Without spiders, the insect population would grow unchecked and the natural balance would be upset. Without insects, plants would not be pollinated and would not continue to thrive.

Relate Activity and Concept

7. The government has a special office which is given the responsibility of monitoring the population of insects and spiders, among other organisms. Environmental specialists work with chemists and biologists to maintain a good balance. Ask the students "Is it important for people to pay attention to such things? Would the right balance occur naturally without human interference? Should governments spend money and resources on trying to control spider and insect populations?" Share some of the benefits of insects and spiders which are included in the lesson introduction. Ask the students if they think governments have an obligation to provide benefits like these to the citizens. Discuss their answers.

Connect to Other Everyday Examples

8. In a naturally-occurring ecosystem, there are going to be fewer spiders than insects, and fewer insects than plants, crops, and flowers. This is known as a food pyramid. This relationship often exists within a food chain. Invite the students to offer other examples of food pyramids with other organisms.

Lesson Assessment

Have the students summarize the discussion of the role-playing game in their journals. They can also draw the food web exemplified by the game. Check their journals to be sure they have included the important concepts from the lesson.

Extension Activities

Books to Read

Destructive and Useful Insects by C.L. Metcalf and W.P. Flint, McGraw Hill , 1962

Additional Activities

Pose the following ideas to the students and ask them to write about it: Where an animal lives is called its habitat. Each insect and spider has chosen a habitat which provides them with food, water, shelter and space. Where would you live if you needed blood; warm, moist surroundings; protection; cool water; a certain type of food. Compare your habitat to that of the arthropods. Some people live in cities, some in the country. Why do we choose to live where we live?

Student Data Sheet Masters

Arthropods: Insect and Spiders
Student Data Sheet Master 2.1

Wings and Webs
Compare insects with spiders you have seen.

What is the common name of your insect? _____

What is the common name of your spider? _____

	INSECT	SPIDER
number of legs		
number of body parts		
number of wings		
number of eyes		
other notes		

observations: _____

_____

_____

_____

Draw a picture of your insect and your spider:

Arthropods: Insect and Spiders
Student Data Sheet Master 3.1

Mealworm Observation

Classify all of the mealworms in the container.

	LARVAE	PUPAE	ADULTS
week 1			
week 3			
week 5			
week 7			

Draw a natural environment in which your mealworm might live:

Plants for Life

Community Resource Curriculum Development Project

by: Earnest Billups
Sharon Gill
Savannah Smith

Plants for Life

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the third-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Describe human dependence upon green plants.
Record and compare results of experiments.
Use simple devices to measure length.
Demonstrate that an inference can be made from direct observation.

SOCIAL SCIENCES
Use a map to locate rainforest areas around the world.
Recognize how needs and wants dictate supply and demand.

MATHEMATICS
Collect and record observations over a period of time and summarize them on a simple graph.
Use mathematics in other curriculum areas.

Content Background
All animals are dependent upon green plants. Green plants are used as food by animals and humans. They are the only living things that can produce their own food. Through photosynthesis plants convert incidental light to chemical energy, and combine organic compounds from inorganic compounds, especially carbohydrates from carbon dioxide and water, with the simultaneous release of energy.

Some green plants are identified by their roots, stems, and leaves. These parts are made up of cells grouped into tissues and organs that perform specific functions within the plant. Green plants produce seeds; the plant's seeds determine the kind of plant produced.

Green plants are used to supply humans with important raw materials. Plants and other fibers are used to make clothing and shelter for humans. Fossil fuels, which include coal, oil, and natural gas (formed millions of years ago from deposits of ancient plant and animal remains) are used for heating and cooking. Fossil fuels are the main raw materials used to manufacture plastics and chemicals.

The tropical rain forest, covering approximately seven percent of the Earth's surface, is home to more than forty percent of all the plant and animal species on

Earth. Scientists might go into this area and find insects not yet discovered. This area might contain plants with anti-cancer properties and countless other medicinal and useful plants.

Many modern medicines and drugs come from wild plants, or plants found in the tropical rainforests. These medicines and drugs include:
ipecac, a drug used to treat dysentery is made from the roots of a Brazilian plant; quinine, a drug used to treat malaria is made from cinchona bark; tubocurarine, a drug which makes open heart surgery possible and comes from a tropical plant; aspirin, a drug which comes from the willow tree; and reserpine, a drug which makes eye operations possible and comes from a tropical plant.

Timeline for Unit
This unit consists of six 40-minute sessions, an observation of growing plants over a two-week period, and a one-day trip to a local grocery store. The planting should be completed in the beginning of the two- to three-week period to give the seeds a chance to grow and the students a chance to observe and record changes in the seed growth. It is necessary to arrange a trip to a nearby grocery store well in advance of beginning the unit.

Evaluation/Assessment
Through prediction, observation, data collection, and investigation, students will see how humans are dependent on green plants for their existence. Students will develop and use charts, tables and graphs to evaluate plant growth. Attention should be given to basic science vocabulary, biological, physical and environmental science, and application to life and work in contemporary technological society.

Students will keep journals, present short and long term projects, explore discovery questions and maintain portfolios.

Community Resources
University of Illinois Cooperative Extension, Chicago

Area Supermarkets/Grocery Stores; Randolph Street Market; Fulton Street Market

Chicago Botanic Garden, Lake Cook Road at Edens Expressway, Glencoe, IL 60022, 708/835-5440

The Chicago Academy of Sciences, 2001 North Clark Street, Chicago, IL 60614, 312/549-0606

Mayor's Office of Inquiry and Information, 312/744-5000

Adopt a Street Program, City of Chicago, Department of Environment, Henry Henderson, Commissioner, 320 North Clark Street, Room 405, Chicago, IL 60610, 312/744-7606, Fax: 312/744-6451.

Greenstreets, Mayor's Office, Karen Nowacki, Coordinator, 121 N. LaSalle Street, Chicago, IL 60602, 312/744-5324, Fax: 312/744-2727

Third Ward Sanitation Office, Charles Collins, 5021 Wabash, Chicago, IL 60615, 312/747-6181

City of Chicago Water Department, Samuel Hurley, Commissioner, 1000 East Ohio Street, Chicago, IL 60611, 312/744-7001, Fax: 312/744-7075

City of Chicago, Police Department, 2nd District, Eddie King, Commander, 5101 South Wentworth, Chicago, IL 60609, 312/747-8366, Neighborhood Relations, 2nd District, 312/744-4000

City of Chicago, Bureau of Forestry, Steve Bylina, Deputy Commissioner, 320 North Clark Street, Room 302, Chicago, IL 60610, 312/744-4392, Fax: 312/744-5746

Chicago Housing Authority, Robert Taylor, Managers: B1 Brenda Parker, 312/567-7827; B2 Henry Eaton, 312/791-4696, LAC President, Ethel Washington, 312/373-2715

Boys and Girls Club, Robert Taylor Unit, 5120 South Federal, Chicago, IL 60609, 312/924-6160

DuSable High School, Emiel Hamberlin, Horticulture Teacher, 4934 South Wabash, Chicago, IL 60609, 312/535-1100

University of Illinois Cooperative Extension Service, Ron Wolford, Urban Gardening, 5106 South Western, Chicago, IL 60609, 312/737-1178, Fax: 312/776-2148

Chicago Park District, Dominic Tassone, Garfield Park Conservatory, 300 North Central Park, IL, 312/533-1281

Open Lands Project, Karen Hobbs, Kathy Dickhut, Urban Greening, 312/427-4256

Garden Club of Illinois, Youth Activities, Virginia Beatty, 708/328-5473

Career Connections

The careers available in the science of botany include pharmacist, farmer, florist, produce manager, and medical doctor.

Glossary

CARBOHYDRATE: a chemical compound from carbon, hydrogen, and oxygen formed by green plants or produced by humans

CELL: a microscopic mass which forms the basic structure of plants and animals

CONSERVATION: the use of resources which attempts to save them, or does not waste them, so there are enough resources for the future

CONVERT: to change into another form

FIBER: a long, narrow cell of wood

LEAVES: the external parts of a plant, usually shooting from the sides of the stem and branches, and ordinarily green in color.

OBSERVATION: taking note of, or paying, attention

RESOURCES: people or materials which give information and assistance

SEED: one of the grains or fruits of a plant

SPECIES: a group of plants or animals which bear close resemblance to each other

STEM: the supporting part of a tree or plant

SUPPLY AND DEMAND: an economic principle that the price of an item or service is determined by how much of it is available and how much it is desired

TROPICAL RAIN FOREST: a tropical forest with an annual rainfall of more than 100 inches

LESSON 1: Plant Parts

Lesson Introduction
In this lesson, the students will identify the important parts of a plant, including the stems, leaves, flowers, and seeds. They will also describe the function of these parts.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. record and compare results of experiments.
4. collect and record observations over a period of time and summarize them on a simple graph.
5. use mathematics in other curriculum areas.
6. use simple devices to measure length.
7. demonstrate that an inference can be made from direct observation.

Time Allotment
two 40-minute sessions

Materials
one mature plant; large picture of a plant; small plants; magnifying glasses; celery stalks; red food coloring; black paper; plastic wrap or bags; water; clear cups; construction paper; crayons; pens or pencils

Advanced Preparation
A large picture of a plant is needed for this lesson; a large drawing on the board is sufficient. Separate celery stalks and prepare food color and water mixture. Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Ask students "Why are plants important to humans and other animals?" Display picture or drawing of a plant. Elicit all responses and discuss.

Share with Neighbor
2. Allow students to identify the plant parts they know and share prior knowledge with the class. Let them discuss the function of each plant part in their groups. This activity should take about 20 minutes and each group should produce a written list of plant parts and their functions.

Hands-on Activity
3. Create two groups: a "stem group" and a "leaf group." Each group will investigate the function of the plant part it is assigned.

4. Have the students in the "stem group" place a celery stalk in a mixture of red food coloring and water overnight. Have those in the "leaves group" cover some leaves with black paper and plastic. On the following day, they will observe the celery or plant several times and record what takes place.

Introduce Principle/Concept

5. Illustrate how inferences can be made from direct observations. Students in the "stem group" will infer as a result of their findings that stems transport water and other nutrients from the soil to the leaves. Discuss the job of the roots and stem in bringing the nutrients to the plants. The students will describe the function of the stem to the members of the other group, either in small groups or the class.

6. Students in the "leaves group" will see that the leaves covered in black paper did not get sunlight. The leaves covered in plastic did not get air. Students will infer that without sunlight or air, the leaves will die. They will describe the importance of air and sunlight to leaves for the class.

7. Have the students work in groups to make a chart or a simple line graph of the results of their observations. Save the results in the students' portfolios.

Relate Activity and Concept

8. Give each cooperative group a magnifying glass and a small plant that has each plant part discussed previously. Instruct the students to examine the plants with the magnifying glass and identify plant parts. On construction paper, let students create a detailed drawing to outline their findings. They should label each plant part and its function.

Safety

Students should be discouraged from putting leaves of plants into their mouths. Some plant leaves are poisonous. Everyone should wash hands after these activities.

Home Activity/Parent Involvement

Encourage students to observe flowers and plants in their homes or neighborhoods. Can they locate the different plant parts that they know?

Lesson Assessment

Collect drawings and group data sheets to check on student comprehension of the material. Keep written work in the students' portfolios. Note student participation during class discussion and oral reporting. Students may keep an observation journal to be collected and reviewed periodically as well.

Extension Activities

Books to Read

The Tiny Seed by Eric Carle, Picture Book Studio, 1991

LESSON 2: Light and Plants Together: Photosynthesis

Lesson Introduction
In this lesson, the students will describe how plants use air, water, and sunlight. They will understand that plants produce their own food, are an important part of the food chain, and that all living things are dependent upon green plants.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. demonstrate that an inference can be made from direct observation.

Time Allotment
one 40-minute session

Materials
mature, medium to large-sized plants; large pictures or drawings of plants; paper; journals; pens or pencils

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Ask students "How do plants use air, water, and sunlight? How do plants get their food?"

Share with Neighbor
2. With partners, let the students identify the plant parts that they feel directly use air, water, and sunlight. Example: "roots take water form the ground."

Hands-on Activity
3. Students should examine mature plants as they form hypotheses.
Display a picture of a plant in addition to the actual mature plant. Discuss how plants use water, air (carbon dioxide) and sunlight (energy) to produce their own food (glucose).

Introduce Principle/Concept
4. Explain that during this process called photosynthesis, plants give off oxygen which humans and other animals need to live.

Relate Activity and Concept

5. Hold up a few solid green plants and ask "What do the leaves on all of these plants have in common?" (They are all green.) Explain that the food for plants is made in the plants leaves, and that the green in the leaves is caused by a pigment, or coloring matter called chlorophyll. Explain that chlorophyll plays a key role in trapping the light energy that green plants use to make their own food.

Connect to Other Everyday Examples

6. Using their journals, have the students make notes about environmental elements used by plants and the specific plant part that uses each element. Water is used by roots, carbon dioxide is used by leaves, light energy is used by leaves, glucose/sugar is produced by leaves, oxygen is produced by leaves. What can they infer from leaves that are green or yellow in color?

Safety:

Discourage students from putting leaves in their mouths.

Summary

Students should answer these questions written or orally: "Can you identify the plant part that produces food for the plant? What do plants need to produce food for themselves?"

Lesson Assessment

Collect the students' data sheets and check for completion and accuracy. Ask each student to answer the summary questions either in writing or orally. Note participation in class activities. Store students' work in their portfolios.

Extension Activities

Books to Read

Looking at Plants by David Suzuki, Wiley, 1992

Additional Community Resource Excursions

Arrange a trip to the Garfield Park Conservatory.

LESSON 3: Let's Grow Plants

Lesson Introduction
In this lesson, the students will better understand how to use methods of data collection and analysis; including tables, charts, graphs, and comparison as they monitor plant growth.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. record and compare results of experiments.
3. use simple devices to measure length.
4. demonstrate that an inference can be made from direct observation.
5. collect and record observations over a period of time and summarize them on a simple graph.
6. use mathematics in other curriculum areas.

Time Allotment
two weeks, as students monitor plant growth daily. Planting activity should begin during the first week of *Plants for Life* unit.

Materials
containers; soil; seeds (marigold, beans, or radish); water; sunshine or grow lamps; paper; journals; old newspaper; pens or pencils

Advanced Preparation
Collect empty milk cartons or paper cups from school's lunch room. Collect old newspaper. Purchase seeds and soil from local nursery. Duplicate journals, graphs, charts and tables. Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Tell students that they will be doing a planting activity. Ask them, "What do you think you will need to do planting today? How long do you think it will take your plants to grow? Do you think the larger seed will make a larger and taller plant?"

Share with Neighbor
2. Have the students write a short entry in their journals and share with the others in the group.

Hands-on Activity
3. Each pair of students should receive seeds, a container, and soil. Plant the seeds and cover lightly with soil.

Introduce Principle/Concept

4. Watch the growth of the seeds you have planted. Each pair of students will maintain its own project. Each will be assigned conditions/an area to place the project. Different areas and conditions make observations more interesting. Some conditions/areas are: moist and warm, dry and cool, sunny and dry, moist and dark, sunlight vs. grow lamp.

5. Instruct the students to record growth and height in centimeters. They will maintain an observation journal on a daily basis. A plant journal should be completed at least twice a week. In the plant journal, have the students draw the plants appearance, then using basic vocabulary, write a brief description of their plants during growth stages. Before beginning observations, encourage the students to make predictions about what will happen in each of the conditions.

Clean-up

Sweep soil spills from floors, recycle newspaper, wipe up water spills.

Summary

At the close of this lesson, students will use the data in their observation journals to create visual representations of the results. Help them to create tables, charts and simple graphs. Afterwards, working as a class on a large graph, record the data collected by students. Students will discover under which conditions seeds grew best.

Lesson Assessment

Collect the students' journal entries and their data in the form of tables, charts, graphs showing how they monitored plant growth. Store these in their portfolios. Note student participation during class activities to assess their understanding of plant growth as well.

Extension Activities

Additional Community Resource Excursions

Arrange a trip to Chicago Botanic Gardens.

Lesson 4: Tropical Forests

Lesson Introduction

Many of the plants we use everyday have their origins in tropical forests. Plants have been used for centuries to treat human diseases. Native Americans chewed willow bark to treat headaches and fever. A drug related to aspirin was in the bark. People with malaria are sometimes treated with a drug called quinine, which is found in the bark of a South American tree called Chincona. For hundreds of years, people in Peru drank a tea made from this bark. Almost 2,000 years ago, a tea made from foxglove leaves was used to treat the disease called dropsy. This disease occurs when the heart doesn't beat strongly enough. Today, a drug called digitalis is taken from foxglove leaves and used to treat this heart disease. In this lesson, the students will discover the relationship of the rainforest to the medicinal usage of plants.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. use a map to locate rainforest areas around the world.
4. recognize how needs and wants dictate supply and demand.

Time Allotment

two 40-minutes sessions

Materials

seven world maps for small group use; magazines, brochures, and books on the rainforest; paper; scissors; paste; food sections of newspapers; atlases; encyclopedias; twigs, paper clips and leaves for the Scientist/Developer game; pens or pencils

Advanced Preparation

Collect pictures of rainforest products for a display of household items. Obtain map with rainforests highlighted. Obtain books and magazines for the children to research in small groups or on their own to build information. Gather data for the average monthly rainfall and temperature location from the National Climatic Data Center in Asheville, NC at 704-259-0682.

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Elicit from children what they already know about rainforests. Ask them "What are rainforests? Do you know where they are on the Earth?"

Share with Neighbor
2. Allow the students some time to share their knowledge in their groups and later present what they came up with to the whole class.

Hands-on Activity
3. Distribute pictures of rainforest items and instruct the students to cut and paste the items onto individual maps to show where the products are from.

4. Play the Scientist Developer Game with groups of ten or more. After a short discussion about the medicinal uses of plants and the vast number of undiscovered plant species in the rainforest that might help us cure diseases, pick one students to be a scientist trying to cure a disease, e.g. cancer, AIDS, etc. Pick another student to be a land developer interested in building on a certain section of land. All of the other students are plants standing in a large circle with their hands behind their backs. The scientist and developer close their eyes and hide behind the wall while the teacher gives five or six of the plants something to hold (e.g. twigs, paper clips, leaves...) The plants holding something are the ones that will help the scientist to develop a cure for the disease.

5. First, the scientist comes into the circle and picks a plant. That plant then shows if it had something in its hand. If something were there, it would help the scientist. The plants that are picked sit away from the circle. Next, the developer takes a turn. Ask what s/he wants to build... mall store, houses. A large item will require that several plants be cut down. Once again the plants picked show if they are holding anything. If they were, they could have helped the scientist, however, they are destroyed. Continue the game until no plants are left in the circle. Allow several students the opportunity to be the scientist and developer. Discuss the implications of developing large amounts of land. (Adapted from The Chicago Academy of Sciences)

Introduce Principle/Concept
6. List some of the different kinds of forests that grow around the world (boreal, temperate, tropical). Describe some ways these forests are different by looking at leaves, comparing rainfall, and temperature. For math, graphing skills could be utilized to compare information. This can be an individual or group activity.

Relate Activity and Concept
7. Compare the conditions in a nearby forest or woodlot with those in a tropical rain forest.

Connect to Other Everyday Examples
8. The leaves, rainfall, and temperature of the students' home areas could be compared to the rainforests.

Home Activity/Parent Involvement

The students can make lists at home with their parents helping them to see how many products they use or have in their homes which come from rainforests.

Lesson Assessment

Collect the maps with the pasted products and the students' list of rainforest products and check for accuracy. Note students' participation during the Scientist/Developer game. Store all work in students' portfolios.

Tips for Reteaching

Use a teacher-constructed matching board for individual or group review of the plants, plant names, and rainforest location. The students could return to the lists they took home to discuss with each other the importance of the rainforest in their daily lives.

Extension Activities

Books to Read

Where the Forest Meets the Sea by Jeannie Baker, Greenwillow, 1988
Wonders of the Rainforest by Janet Craig, Troll, 1989

Additional Activities

Write letters to senators and representatives. Buy an acre of rainforest or raise money to support programs that are helping to protect the world's rainforests.

Additional Community Resource Excursions

Arrange a visit to a neighborhood Park, Garfield Park Conservatory; or contact the Chicago Housing Authority. Henry Horner Housing Maintenance Division, Mr. Gary 1834 W. Washington Blvd.

LESSON 5: Trip to the Supermarket

Lesson Introduction
A walking trip to a common institution in the community will illustrate peoples' dependence on plants. At some time, everyone goes to the grocery store or the produce market. A visit to a grocery store will help the students to see the importance of green plants in their everyday lives.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. recognize how needs and wants dictate supply and demand.

Time Allotment
This activity should take most of one day. Before the trip, establish the purpose of the visit to the supermarket and assign specific responsibilities to individuals or small groups. Following the actual trip and the gathering of information, the students will share their information with classmates.

Materials
copies of student data sheet; paper; pens or pencils

Advanced Preparation
Contact the produce manager or store manager for permission to visit the supermarket. Attempt to arrange for a knowledgeable person at the store to make a presentation.

Procedure for Trip

1. Remind the students that the class is visiting the supermarket to find some plants that we use in our everyday lives. Review the desired behavior while out in the community. Be sure each group knows who is responsible for recording observations during the trip.

2. During the visit, have the students use the data sheet to make a list of every plant that is a part of their diets. List grains, vegetables, and fruits. Remind them that the juices they drink come from fruits too. Also remember that chocolate comes from the cocoa bean! Each group should have at least 20 different plants listed.

3. Upon returning to the classroom, have the students work in their groups to put the plants in their lists in order, starting with the plants they eat most often.

4. Look at the lists. How many different plants are on it? Compare the lists from the different groups. The students should be able to identify what part of the plant is used (leaf, stem, seed, root).

5. Think about the panda's diet. What happens to the pandas when there is no bamboo? Discuss this with the class. Perhaps add a few more examples.

6. What would happen if you could no longer get one of the plants on your list? Discuss why the prices of various plants vary with distance to market, production costs, climactic factors, supply, demand, etc.

Student Data Sheet Master
Your Diet

Safety
Arrange for a safe route to and from the store. Also, provide adequate supervision during the trip.

Home Activity/Parent Involvement
Students can use the same procedure to list and classify the green plants that are used in the home. How many different plants are in the family's diet?

Extension Activities

Books to Read
Bean and Plant by Christine Back & Barrie Watts, Silver Burdett, 1986

Additional Activities
Purchase various types of green plants for a tasting session upon return to school. An emphasis can be directed toward different and unique green plants to expand the students' experiences.

Student Data Sheet Masters

Plants for Life
Student Data Sheet Master 5.1

Your Diet

How many different plants are in your diet?

• Make a list of all of the plants that you eat. List vegetables, grains, and fruits. Remember that the juices you drink come from fruits as well.

• Now, put a number next to each of the plants on your list. Start with the number 1 next to the plant you eat most often and continue until all are numbered.

• What would happen to you if you could no longer get one of the plants on your list?

_____

_____

_____

Zippity-Zoo-Dah

Community Resource Curriculum Development Project

by: Patricia Abramowicz Wingate
Frana Wheeler Allen
Susan M. Knibbs
Mary L. Zeltmann

Zippity-Zoo-Dah

"Zoos once took animals from the wild
and displayed them for people to see.
Today, zoos seek to conserve and protect wild animals
and the places in which they live."

David Hales
Director, Lincoln Park Zoological Society
1992-1993

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the fourth-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Compare behavioral patterns of animals from various regions of the world.
Compare and contrast specified environmental conditions.
Identify science-related careers and avocations.
Chart the changes in the physical environment that result from human activity.

SOCIAL SCIENCES
Analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

MATHEMATICS
Organize data in rank order and in a bar graph.
Use mathematics in other curriculum areas.
Recognize when an estimate makes sense.

Content Background
BOOKLETS AND PAMPHLETS:
(Available at Lincoln Park Zoo through the Education Department):
Lincoln Park Zoo Review Spring 1993
Annual Report of the Lincoln Park Zoological Society 1992
Lincoln Park ZOOBOOK 1990
Future in the Wild (World Wildlife Fund- U.S.).
Zoo-cology ACTION GUIDES (for field trips)
WILD TIMES July 1993

The New Ark 1990
ADOPT at Lincoln Park Zoo
Endangered Species (U.S. Department of Interior)

NEWSPAPER ARTICLES FROM THE *CHICAGO TRIBUNE*:
An Evolving Field by Stevenson Swanson, May 1993. Saving wildlife now means preserving ecosystems and even economies.
Leader of the Packs by Rick Kogan, June 29, 1993. In birdman Kevin Bell, Lincoln Park Zoo has a popular new director.
Are Zoo Animals Happy? Some Experts Doubt It by Louise Kiernan, May 2, 1993.

MAGAZINE:
New Zoos- Taking Down the Bars by Cliff Taroy in *National Geographic Vol. 184, No. 1, July 1993*, pages 2-47.

COMPUTER SOFTWARE:
Oh, Deer by MECC
Dataquest North American Mammals by MECC
Animal Life Databases by Sunburst
Food Chains and Webs by Silver Burdett
The Balance In Nature by Focus Media
The Environment by Ellen Nelson Learning Library
Decisions, Decisions: The Environment by T. Snyder

Timeline for Unit
This unit is divided into seven lessons. One of the lessons is a half-day field trip to the Lincoln Park Zoo. Each of the other lessons can be taught in one or two 40-60-minute sessions, and can be taught over the course of a few weeks. This unit was not developed for a specific time of the year, but it should be planned when the weather is suitable for a trip to the Lincoln Park Zoo. You must call Lincoln Park Zoo for field trip information in order to schedule your trip. Reservations must be made in advance!

Evaluation/Assessment
Using higher-order thinking skills, children will express opinions and report on the importance or necessity of protecting endangered species. Given the opportunity as individuals or as members of a cooperative group, children can display their understanding of the unit's concepts in a variety of activities following each lesson. Data sheets will be completed by the students and collected for review. Oral reports and constructed models will also be used for assessment. Portfolios will be kept to showcase student work and will be evaluated by both student and teacher.

Community Resources

Brookfield Zoo
3300 South Golf
Brookfield, IL 60513
708/485-0263, ext. 360

The Chicago Academy of Sciences
2001 North Clark Street
Chicago, IL 60614
312/549-0606

Lincoln Park Zoo
2200 North Cannon Drive
Chicago, IL 60614
312/294-4649

U.S. Fish and Wildlife Service
Rosemont, IL 60018
708/298-3250

Career Connections

Contact these organizations for information about the following careers:

ANIMAL NUTRITIONIST
American Academy of Veterinary Nutrition
c/o IAMS, 2395 Clower Street, Snellville, GA 30278

MARINE MAMMAL TRAINER
American Association of Zoological Parks and Aquariums
Oglebay Park, Wheeling, WV 26003

DAIRY FARMER
Wisconsin Dairy Council
6300 North River Road, Rosemont, IL 60018

FISH FARMER
American Fisheries Society
5410 Grosvenor Lane Suite 110, Bethesda, MD 20814

HORSE SHOW MANAGER
American Horse Council
1700 K Street N.W. Suite 300, Washington, D.C. 20006

ZOO KEEPER
American Ornithologist Union
Natural Museum of Natural History, Washington, D.C. 20560

ZOO BIOLOGIST
American Society of Zoologists
104 Sirius Circle, Thousand Oaks, CA 91360

VETERINARIAN
American Veterinary Medical Association
1931 North Meachum Road, Schaumburg, IL 60173

ANIMAL SHELTER FOREPERSON
ASPCA Animal Rescue
2336 Linden Boulevard, Brooklyn, NY 11208

GAME WARDEN
International Association of Fish and Wildlife Agencies
444 North Capital Street, N.W. #534, Washington, D.C. 20001

PET GROOMER
International Professional Groomers
79 Flint Locke Drive, Duxbury, MA 02332

ILLUSTRATOR
Society of Illustrators
128 East 63rd Street, New York, NY 10021

Glossary

ADAPT: to fit in or adjust, just as the woods hawk has done in the forest. Its wings are shorter than the wings of the hawk in the open fields, which does not need to maneuver branches, and its tail is longer, providing a more efficient rudder.

AMERICAN ASSOCIATION OF ZOOLOGICAL PARKS AND AQUARIUMS (AAZPA): an organization which issues zoos and aquariums a test that gives them accreditation. Only 10% of zoos and aquariums in this country pass the test and are making the financial investments and policy shifts needed to properly care for the physical and mental health of their animals. Lincoln Park Zoo is AAZPA accredited.

BIOME: a plant and animal community that covers a large geographical area. The boundaries of different biomes on land are determined mainly by climate. Important land biomes include: tundra, coniferous forests, deciduous forests, grasslands, savannas, deserts, chaparral, and tropical rainforests.

CAPTIVE BREEDING: the breeding of endangered animals in captivity; the goal is to eventually return the species to the wild. For several species, like the

California condor, Florida panther, or black footed ferret, captive breeding may offer the greatest hope for survival. The red wolf is a well known species that recently has been introduced into the wild as a result of an intensive captive breeding program.

CONSERVATION: the protection and wise use of anything we want to keep.

ECOSYSTEM: a system formed by the interaction of a community of organisms with their environment.

ENDANGERED SPECIES: a species that has few members living. The St. Lucia parrot is the rarest parrot in the world. It only lives in the mountain forests of the island of St. Lucia in the West Indies. This bird, once abundant, has now been reduced to a population of 100.

ENDANGERED SPECIES ACT OF 1973: the most far-reaching law ever enacted by any nation for the preservation of endangered species. It outlaws the import, sale, and hunting of any plant or animal on the U.S. Endangered Species List.

EXTINCT: a condition that occurs when there are no longer any living members of a species. An example of extinction would be the dinosaur.

HABITAT: the place in which an animal makes its home. The habitat of a sea lion, for example, is the sea coast or off shore islands; that of a bear is a forest.

MAMMAL: warm-blooded animal that has hair and produces milk to feed its young.

RECOVERY: (of endangered species)- requires stopping and reversing its decline, and then ensuring its long-term survival in nature. Recovery plan recommendations can call for habitat protection, new research, captive breeding, and reintroduction, or special wildlife and habitat management techniques. The American Bald Eagle is making a remarkable recovery. At one point, they reached an estimated low of 400 nesting pairs in the 1960's. Since that time, federal protection and tremendous public and private support have led to a significant increase in the range and population of this species.

SPECIES: a group of individuals of the same kind that rarely crossbreed with other kinds.

LESSON 1: Welcome to the Zoo!

Lesson Introduction
In this lesson, the students will be introduced to the Lincoln Park Zoo. They will learn about the role and purpose of the zoo in our community. The students will also see how the institution has changed over the past 125 years.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. identify science-related careers and avocations.
3. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment
one 40-minute session

Materials
copies of student data sheets; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Introduce the unit by asking the students "How many of you have ever visited a zoo? Why did you visit? What did you like best? What do you think is the purpose of a zoo?"

2. Inform the class that during the next couple of weeks they will learn about one of the nation's oldest and most famous zoos, the Lincoln Park Zoo, its early beginnings and purposes, the zoo's growth and its purpose today.

Share with Neighbor
3. Draw a two column chart on the board or overhead: "What We Think" and "What We Know." Let the students work in their groups to come with responses for the first column of the chart.

Hands-on Activity
4. Invite the students to come up to the chalkboard and write their responses concerning the purpose of the zoo in the left-hand column of the chart.

5. Distribute copies of "Happy Birthday, Lincoln Park Zoo!" and read it aloud with the class. Provide time for the students to answer the questions. Use these responses to complete column two of the chart.

Introduce Principle/Concept

6. Review important vocabulary from the glossary and discuss the role of the zoo in our community. Why is it important for people to set aside large amounts of land to study or preserve the habitats of wild animals? What types of jobs are involved in creating a zoo or wildlife preserve? Have the students complete the focus questions on the data sheet.

7. Give the students some time to write a journal entry. Each group should develop a paragraph describing the changing role of the zoo.

Home Activity/Parent Involvement

Have the students ask their parents what zoos were like when they were growing up. Students should list some of their parents' zoo memories and then bring them in to share with the class.

Special Notes

1. Begin a zoo portfolio for each student to showcase all work.
2. Be sure you have confirmed your zoo field trip!

Student Data Sheet Master

Happy Birthday, Lincoln Park Zoo!

Lesson Assessment

Collect each group's paragraph describing the changing role of the Lincoln Park Zoo and each student's completed data sheet and home activity list for review. Note participation in class discussion. Save students' work in their portfolios.

Extension Activities

Additional Activities

1. Encourage students to interview senior citizens they know to compare and contrast zoos from the past and present.
2. Have students pretend that they are newspaper reporters from the mid-1800's. Have them make up headlines, stories, and illustrations, describing the new inhabitants and their shenanigans, in Lincoln Park.

LESSON 2: The New Zoos

Lesson Introduction
In this lesson, the students will identify changes in the philosophy of zoos.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. identify science-related careers and avocations.
3. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment
one 40-minute session

Materials
copies of student data sheet; journals; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Review the original purpose of the Lincoln Park Zoo. Have individuals read their homework lists of parents' memories.

Share with Neighbor
2. Distribute and orally read "A Modern Zoo." Elicit comparisons and contrasts between early zoo exhibits and modern ones.

Hands-on Activity
3. Have students work in small groups to complete the focus questions on the back of the data sheet.

Introduce Principle/Concept
4. Discuss with the class the concept of biodiversity, and that zoos help promote biodiversity on Earth by maintaining particular species of animals. Contrast changes in philosophy and approaches used in caring for wild animals over the years. Bring out that changes in philosophy occur gradually and that these "gray" areas are to be expected.

5. Ask students to use their imaginations to predict how zoos will care for animals in the future. What types of jobs will be necessary to maintain zoos in the coming years. Will they be different from the careers which currently exist?

Home Activity/Parent Involvement

Instruct students to write an entry in their journals, with parental assistance, about the importance of promoting biodiversity. Challenge them to write about a world without falcons or bears or monkeys, etc.

Special Notes

1. Reminder: place all handouts and all student work in individual zoo portfolios.
2. Have students begin to think about a design for a zoo exhibit of the future.

Student Data Sheet Master

A Modern Zoo

Lesson Assessment

Collect completed data sheets for assessment. Note student participation in class discussion. Save students' work in their portfolios.

Extension Activities

Additional Activities

1. Bring in newspaper or magazine articles about zoos or endangered species to share with the class. Display the articles on a bulletin board.
2. Have students design, in a group mural, a zoo of the future.
3. Pretend to interview the oldest animal at the zoo after reading "A Modern Zoo." Have students discuss, write about, or role play, the interview.

LESSON 3: Habitats

Lesson Introduction
In this lesson, the students will learn more about habitats. They will define and give specific examples of habitats that recognize that food, water, and shelter are basic necessities of all habitats.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. compare and contrast specified environmental conditions.
3. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment
one 40-minute session

Materials
copies of student data sheet; paper; crayons or markers; journals; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Write the term "habitat" on the board and have it pronounced. Have students brainstorm definitions and list them on the board. Have a student read the actual definition from the dictionary. Let students determine which of their previous definitions still apply.

Share with Neighbor
2. In their groups, let students describe several habitats: their own, and those from other countries. How do we use our natural resources and land? Do we put them to the best possible use? What do we need to survive in our habitats? What is the difference between "need" and "want?"

Hands-on Activity
3. Distribute "Where Do I Live?" and let each group complete it using an animal of their choosing.

4. Share responses. Drawings could be displayed on a bulletin board before being placed in the students' zoo portfolios.

Introduce Principle/Concept

5. Teach the students to appreciate the planning which goes into designing a zoo habitat. On a blank piece of paper or in their journals, have the students design their own habitats. What do they want and need from a place to live?

Home Activity/Parent Involvement

Sketch two ways that people affect an animal's habitat in either its food, water, or shelter. Describe each drawing in a sentence or two below it.

Student Data Sheet Master

Where Do I Live?

Lesson Assessment

Collect each group's completed data sheet. Note student participation in class discussion. Save students' work in their portfolios.

Extension Activities

Additional Activities

Have the students write animal riddles where they describe the animals habitat, appearance, etc. without saying what the animal is. Whoever guesses the answer gets to read his/her riddle next.

LESSON 4: Our Favorite Pets

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. compare and contrast specified environmental conditions.
3. organize data in rank order and in a bar graph.
4. use mathematics in other curriculum areas.

Time Allotment
one 60-minute session

Materials
transparency of "Our Favorite Pets" bar graph, copies of "Animal Habitats"; glue; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Ask the students "Do you know how to make or read a bar graph?" Show them a simple graph and see if they can read information from it.

Share with Neighbor
2. Draw a table on the board entitled, "Our Favorite Pets." Label the columns, "Type of Pet" and "# of Votes." Have students call out their favorite pets. List five in the table.

Hands-on Activity
3. Now take a vote: one student = one vote. Write the totals next to each pet. For purposes of this lesson, do not allow more than 10 votes per pet.

Introduce Principle/Concept
4. Explain that there are many ways to show the same information. Show the transparency and note the placements of the title and the headings. By referring back to the table, write in the types of pets.

5. Demonstrate how to create the bars to stand for the number of votes. Once the bar graph is completed, erase the table from the board and ask questions: What is the title of this graph? How many different types of animals are listed? Which pet got the most votes? Which pet got the least? Did any two pets get the same number?

6. Now have a student redo the table, this time in rank order, using the information from the graph.

7. Distribute "Animal Habitats Bar Graph." Define and discuss these five biomes: tundra, desert, savanna, rain forest and grassland. Go through the mammal list and have the students decide/find out where each one lives. Let them write an initial for the biome in a corner of each animal's box to help them remember later. Instruct the students to cut out the animal boxes at the bottom of the sheet and glue them in the bar graph to show where each one lives.

Answer Key
Tundra: Reindeer, Arctic Fox, Polar Bear
Desert: Arabian Oryx, Bactrian Camel
Savanna: Asian Lion, Grevy's Zebra, African Elephant, Baringo Giraffe
Rain Forest: S.Am. Tapir, Jaguar, 2-toed Sloth, Lowland Gorilla, Bornean Orangutan
Grassland: American Bison, Timber Wolf, Sable Antelope, Black Rhino

8. Distribute "Animal Habitats Rank Order" and instruct the students to use the information from the bar graph to complete the table. Reinforce the use of the new vocabulary as the students work.

Home Activity/Parent Involvement
Using the "Babies in the Ark" bar graph and table, have the students make a new bar graph dividing the animals into mammals, reptiles, birds, amphibians, etc.

Student Data Sheet Masters
Our Favorite Pets (transparency only)
Animal Habitats Bar Graph
Animal Habitats Rank Order
Babies in the Ark

Lesson Assessment
Note student participation and understanding of concepts during the class discussion. Collect completed data sheets for review. All students should be able to make a simple bar graph following this lesson. Collect the home activity to assess this skill. Save students' work in their portfolios.

Extension Activities

Additional Activities
Make realistic drawings of animals in murals according to continents or habitats in groups.

LESSON 5: Animals in Trouble

Introduction
In this lesson, the students will distinguish between the terms "extinct" and "endangered." They will also predict and identify reasons why animals become endangered. Finally, they will investigate a species from the Endangered Species List and produce a guidebook to be shared with the school.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. compare and contrast specified environmental conditions.
3. chart the changes in the physical environment that result from human activity.
4. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment
two 40-minute sessions

Materials
various reference materials, such as encyclopedias, dictionaries, animal books, pamphlets; copies of student data sheet; construction paper; unlined paper; scissors; crayons; markers; journals; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure
Tap Prior Knowledge
1. Draw a two-column chart on the board. Label the columns "Extinct" and "Endangered." Ask students to define these terms.

Share with Neighbor
2. Have students work in their groups to name as many animals as they can that fit under these headings.

Hands-on Activity
3. List major causes of animal endangerment on the board: pesticides, illegal killing, habitat destruction, new species in area, and animals which have always been rare. Discuss each.

4. Give an example of an endangered species: the mountain gorilla. It lives in the forests of Rwanda, a country in Africa. Over a period of 50 years, a third of their forest was cleared to make room for farms. The gorillas became an endangered species. Ask students the cause of its endangerment.

Introduce Principle/Concept
5. Tell the students to make a list of endangered species. To begin, have them copy this list into their journals:

Mammals:
African Elephant
Arabian Oryx
Asian Elephant
Asian Lion
Black Rhinocerous
  Eastern
  Southern
Cheetah
Chimpanzee
Grevy's Zebra
Lowland Gorilla
Maned Wolf
Orangutan
Ruffed Lemur:
  Black and white
  Red
Snow Leopard
Spectacled Bear
Tiger:
  Generic
  Siberian
  Sumatran
White-cheeked Gibbon
White-handed Gibbon

Birds:
Bali Mynah
Guam Rail
Micronesian Kingfisher

6. Create a reference guidebook of Endangered Species to be donated to the school. Each group will be responsible for one chapter/animal. Randomly assign one of the endangered species to each team and explain the assignment. The chapter should include: a descriptive paragraph of the animal's food, shelter, lifestyle, cause of the destruction of its habitat, and basic facts; illustrations with labels of the animal in its habitat; any other pertinent information.

Home Activity/Parent Involvement
Complete research in preparation for the guidebook.

Student Data Sheet Master
Danger! Danger!

Lesson Assessment
Collect completed data sheet and chapters from each group. Allow representatives from each group to report orally on the information contained in their chapters. Save students' work in their portfolios.

Extension Activities

Additional Activities
1. Have a debate expressing both sides of hunting/saving endangered species.
2. Make an animal Bill of Rights. Depending on grade level, do this activity as a class or in small groups or individually.
3. Complete "Danger! Danger!" bar graph and table.

LESSON 6: A Trip to the Zoo

Introduction
In this lesson, the students will observe and gather information on the behavior and habitat of a zoo animal during a visit to the Lincoln Park Zoo.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. compare behavioral patterns of animals from various regions of the world.
3. compare and contrast specified environmental conditions.
4. recognize when an estimate makes sense.
5. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment
one 4.5 hour session

Materials
copies of student data sheets; clipboards or notebook to write on; pencils or pens

Advanced Preparation
Arrange to have the class visit the Lincoln Park Zoo.

Procedure for Trip

1. Before leaving, distribute all handouts. Read "You Are a Zoo Consultant!" to help students understand the importance of today's work. Review the three worksheets they will use to record their observations.

2. Remind students to be on their best behavior throughout the trip.

3. At the Zoo: Arrange to have the guided walking tour or special program upon arrival. Afterwards, separate into groups with one chaperone each. Each group should conduct its observations of animals and their habitats. Since they cannot actually get in the exhibits with the animals, point out that sometimes they may have to estimate the weight or size of an animal to get the data for their data sheets. Designate a meeting time and place for the end of the day.

4. After returning to school: Let students share the day's experiences. Begin to discuss their observation and findings about the various animals and habitats.

Home Activity/Parent Involvement
Parent chaperones might want to describe their reactions to changes at the zoo.

Special Notes
Prior to trip day:
1. Review appropriate trip behavior.
2. Familiarize students with zoo layout.

Student Data Sheet Masters
Independent Study at the Zoo
Beastly Behaviors
Do It Yourself Exhibit Critique
You are a Zoo Consultant!

Lesson Assessment
Teacher assessment of students observing the animals, recording information and completing their worksheets. Save students' work in their portfolios.

Extension Activities

Additional Activities
1. Divide into groups. Each group will compose its own letter to Zoo Director Kevin Bell describing their enjoyable visit or thanking the Zoo Educational Consultants for their informative talk/tour.
2. Do a creative writing activity where the students pretend they are an animal and describe how they felt being stared at or looking at the students.

LESSON 7: Zoo Consultant

Introduction
In this lesson, the students will design and create a zoo habitat for a specific animal. They will write a report describing their animals and the reasons and rationale for their habitat designs. Each group will give an oral presentation upon completion of project.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. compare behavioral patterns of animals from various regions of the world.
3. compare and contrast specified environmental conditions.
4. identify science-related careers and avocations.
5. analyze the ways in which natural resources and land are used (and recognize the need to conserve natural resources).

Time Allotment
one 40-minute session to create the design, and approximately three one-hour sessions over a three-day period to write the report.

Materials
copies of "You Are a Zoo Consultant!" (from previous lesson); encyclopedias, animal books and magazines; construction paper; shoe boxes and other assorted art materials; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure
Tap Prior Knowledge
1. Ask the students to report on the animals and habitats observed during the field trip. How would they advise the zookeepers on designing new habitats? Students should be able to justify their responses.

Share with Neighbor
2. On the board, list suggestions for a working plan for the project. Example: (a.) Review trip notes and observations. (b.) Research the animal's native environment. (c.) Develop a list of needed items for a new exhibit. (d.) Draw a rough sketch of your design or model of the habitat. (e.) Assemble the necessary materials to create the habitat. (f.) Assign tasks to each person in the group. (g.) Create habitat and write report. (h.) Evaluate project.

Hands-on Activity
3. Review with students their group's working plan. Have students work on habitat projects in their groups. Move from group to group and assist as needed.

Introduce Principle/Concept
4. Be sure students understand that they have to support their decisions using the data they have collected during the trip to the zoo. At the end of each session, students should check their progress against their working plans.

5. Upon completion of project, each group will give an oral presentation to the class. Encourage audience to ask questions for each group.

Home Activity/Parent Involvement
Bring materials from home to use in the habitat design. Students may work at home on their projects/reports. Request that parents provide necessary assistance.

Lesson Assessment
Assess each group's choice of animal and working plan. Note student progress each day and ability to work cooperatively. The completed habitat should be reflective of the animal's natural environment. The oral report should include information about the animal and how the habitat design/model contributes to the animal's survival. Save students' work in their portfolios.

Extension Activities

Additional Activities
1. Look in animal books and magazines for articles about zoos and animal habitats.
2. Design a habitat for the fiercest animal around.
3. Describe your reaction to your new habitat as if you were the animal for which it was designed.

Unit Summary

The student can demonstrate support for Lincoln Park Zoo by holding a fund-raising project whose proceeds go toward adopting a zoo animal. Get the *Adopt* brochure from Lincoln Park Zoo. Remind students that Lincoln Park Zoo is one of six remaining free zoos in the United States. Share the *Adopt* brochure with the class and read to them the costs involved in feeding the animals. Discuss how they can help the zoo remain free to the public.

Students can make buttons with pictures of endangered species or their favorite animals. The students can sell the buttons to families, schoolmates, friends. Have students first practice making designs and drawing an animal. Only after students have finalized their designs should they use the button maker. Upon completion of all buttons, students can conduct their sales.

Assist students in selecting an animal from the list, completing the adoption form, and mailing it to the zoo. Students can complete their buttons for homework. Parent volunteers can help students use the button maker. Button makers are inexpensive and useful for many school activities.

Teacher assessment can be made of student interest and participation in the project. Have students design "Save the Animals, Earth, Environment" buttons posters to increase awareness and publicity for their fund raising effort. This is an opportunity to tie in economic and marketing concepts, as well as address more of the recommended Instructional Program Objectives for the Illinois State Goals for Learning.

Zippity Zoo Dah

"Check It Out"
A rap song

Check it out, check it out!
Check it out, check it out!
Check out Lincoln Park Zoo!

Check out Lincoln's new habitats
for animals small and large.
Check out the endangered species
increasing to a grand size.

Check out the birds flapping their wings,
Flying across the new sandy savannas and things.
Check out the spectacled bear layin' in a tree
Trying to keep an eye on you and me.

Check out the chimps and orangs swinging in the air
Tellin' their keeper they like it up there.
Check out other primates: gibbons and lemurs
Visit their families and see tigers purr.

They are just a few things found at the zoo
So come one and all, especially you!
Check it out, check it out, check it out
At the great Lincoln Park Zoo!

By: Frana W. Allen Mark T. Skinner Classical School July,1993

Student Data Sheet Masters

Zippity Zoo Dah
Student Data Sheet Master 1.1

Happy Birthday, Lincoln Park Zoo!

Chicago's Lincoln Park Zoo celebrates a special birthday this year. It is 125 years old!

In what year did the zoo begin? _____

One hundred twenty five years ago, New York's Central Park Zoo gave Lincoln Park a pair of swans. The park began to receive mammals and birds as gifts from other zoos and donors.

In 1874, the park bought a bear for $10.00. In 1877, two bears, two fowls, two peafowl, a kangaroo, a condor, and a goat were purchased from an animal dealer for $275.00.

In 1882, a pair of buffalo was imported from the "western plains." Two years later, a calf was born. This was the first animal birth at the zoo. It was also the first known birth of buffalo in captivity.

Polar bears were purchased in 1884. An elephant, pair of tigers, a lion, and a camel were purchased from the Barnum & Bailey Circus in 1889.

Eighteen sea lions were shipped to the zoo from the Pacific Coast in 1889. A Sea Lion Pool was built. Before the fence around the sea lion pit was finished, some of the animals broke out. Two of them waddled across the street and into a restaurant for dinner. Neighbors complained that the mammals' barking kept them awake at night and asked that they be removed from the zoo.

Bengal Tigers, a pair of hyenas, birds, and 13 monkeys were represented in the zoo's collection. Then it was believed that wild animals were unlimited and could easily be replaced. By 1900, Lincoln Park Zoo had one of the largest animal collections in the United States.

*Adapted from "Lincoln Park ZOOREVIEW" Spring 1993

Happy Birthday, Lincoln Park Zoo!
Focus Questions:

First, think about the questions and write your own answers. Next discuss the questions and answers with the class.

1. How did the zoo obtain animals?

_____

_____

2. What do you think was the original purpose of the zoo?

_____

_____

3. What was happening to the buffalo on the "western Plains" of the United States? _____

_____

4. How did the zoo try to help the buffalo? _____

_____

5. What did people once believe about wild animals?

_____

_____

6. Do you believe that? Why or why not?

_____

_____

7. Draw a picture of one of the zoo's earliest animals below.

Zippity Zoo Dah
Student Data Sheet Master 2.1

A Modern Zoo

There have been many changes at Lincoln Park Zoo during the past 125 years. Animals were once purchased from dealers. Today, more than 95 percent of the mammals living in North American zoos were born in a zoo.

The animals' habitats have changed over the years. Polar bears were once kept in barred cages. Today the bears enjoy the largest polar bear pool in the United States. It contains 266,000 gallons of water. The zookeepers add slabs of ice to the pool on hot days. When not in the water, the bears can lay on the rocks above their pool.

Monkeys were often dressed for show or entertainment purposes. Today in the primate house, monkeys swing from tree to tree. Their living area or habitat has been designed to approximate their natural environment. Such a habitat allows animals to exhibit their natural behaviors.

The bird house was built in 1905. Its sides were once lined with rows of two-tiered wire cages that kept hundreds and hundreds of birds. Today a rain forest is one of several habitats which is home to many species of birds. In the rain forest, birds may live on the forest floor, the water's edge, on a rocky cliff, or in a tree. Living in their own special habitat has enabled birds to breed and hatch chicks. Within the last two years, over 120 baby birds have been hatched in the new habitat.

Lincoln Park Zoo once kept nine species of bears. Today it cares for only two species, the spectacled bear and the polar bear. The spectacled bear is the only bear native to South America. It is an endangered species. By breeding and caring for the bears, the zoo hopes to keep this species from extinction.

There have been many important changes at the zoo. However, one thing has not changed. The zoo remains free to all visitors. It offers children and adults opportunities to see and learn about wild animals and the habitats in which they live.

A Modern Zoo
Focus Questions

First, think about the questions and write down your own answers. Next, discuss the questions and answers with the class.

1. How did the zoo obtain animals?

2. What do you think was the original purpose of the zoo?

3. What was happening to the buffalo on the "western plains" of the United States?

4. How did the zoo try to help the buffalo?

5. What did people once believe about wild animals?

6. Do you believe that? Why or why not?

7. Draw a picture of one of the zoo's earliest animals below.

Zippity Zoo Dah
Student Data Sheet Master 3.1

Where Do I Live?

Animal: _____

Sketch of our animal

HABITATS I might live in

FOODS I like to eat

Places that might SHELTER me

Things that might ENDANGER me

Recorder

OUR TEAM

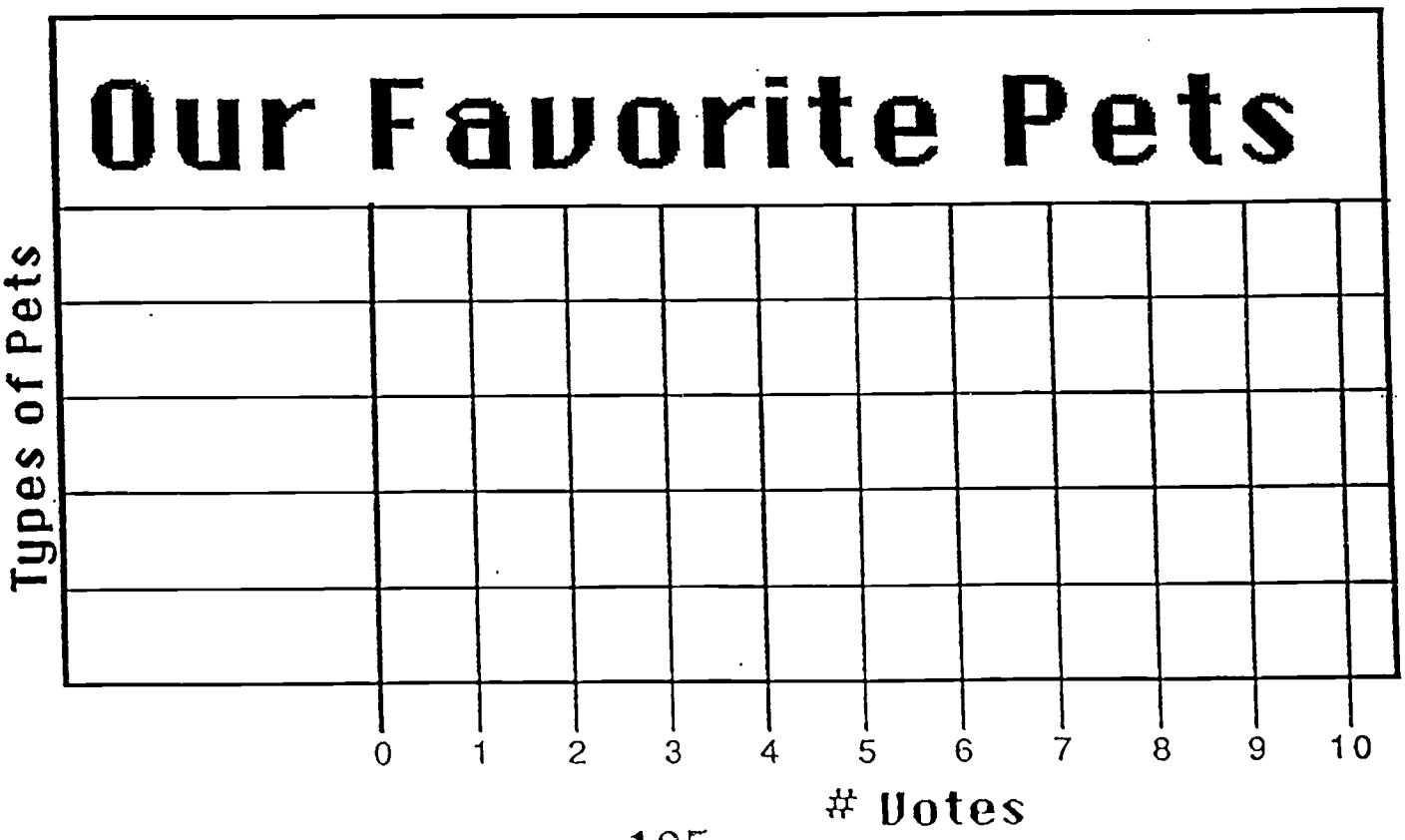
Reporter

Zippity Zoo Dah
Student Data Sheet Master 4.1

Our Favorite Pets

Our Favorite Pets	
Type of Pet	# Votes
dog	
cat	
fish	
hamster	
parakeet	

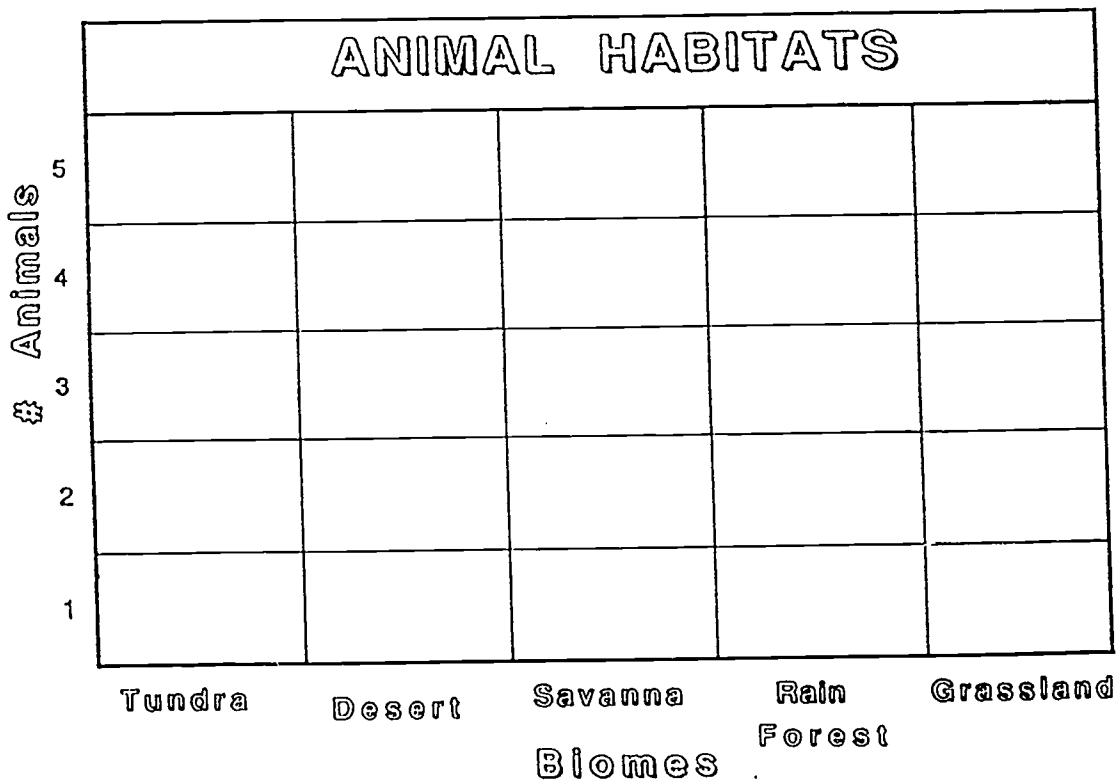
(Sample)



Zippity Zoo Dah
Student Data Sheet Master 4.2

Animal Habitats

Cut out the animal boxes at the bottom of the worksheet and glue them in the bar graph below to show where each one lives.



Polar Bear	Black Rhinoceros	Timber Wolf	Arabian Oryx	So. Amer. Tapir
Baringo Giraffe	Arctic Fox	Bactrian Camel	Lowland Gorilla	Asian Lion
African Elephant	Grevy's Zebra	Bornean Orangutan	Two-toed Sloth	American Bison
	Sable Antelope	Reindeer	Jaguar	

Zippity Zoo Dah
Student Data Sheet Master 4.3

Animal Habitats

Using the information from your bar graph, complete this table.

List the information in RANK ORDER, highest to lowest.

Biomes	# Animals

Study your bar graph and table to answer these questions.

1. Which biome has the greatest number of animals? _____
2. Which biome has the fewest? _____
3. Which 2 biomes have the same number?

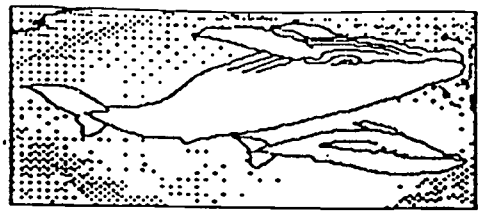
   _____
4. Which biome shows 3 animals? _____
5. In which biome is the timber wolf? _____
6. Name 2 ways that a VERTICAL bar graph is similar to a HORIZONTAL bar graph.

   _____

   _____
7. What is the major difference between the 2 graphs?

   _____

   _____



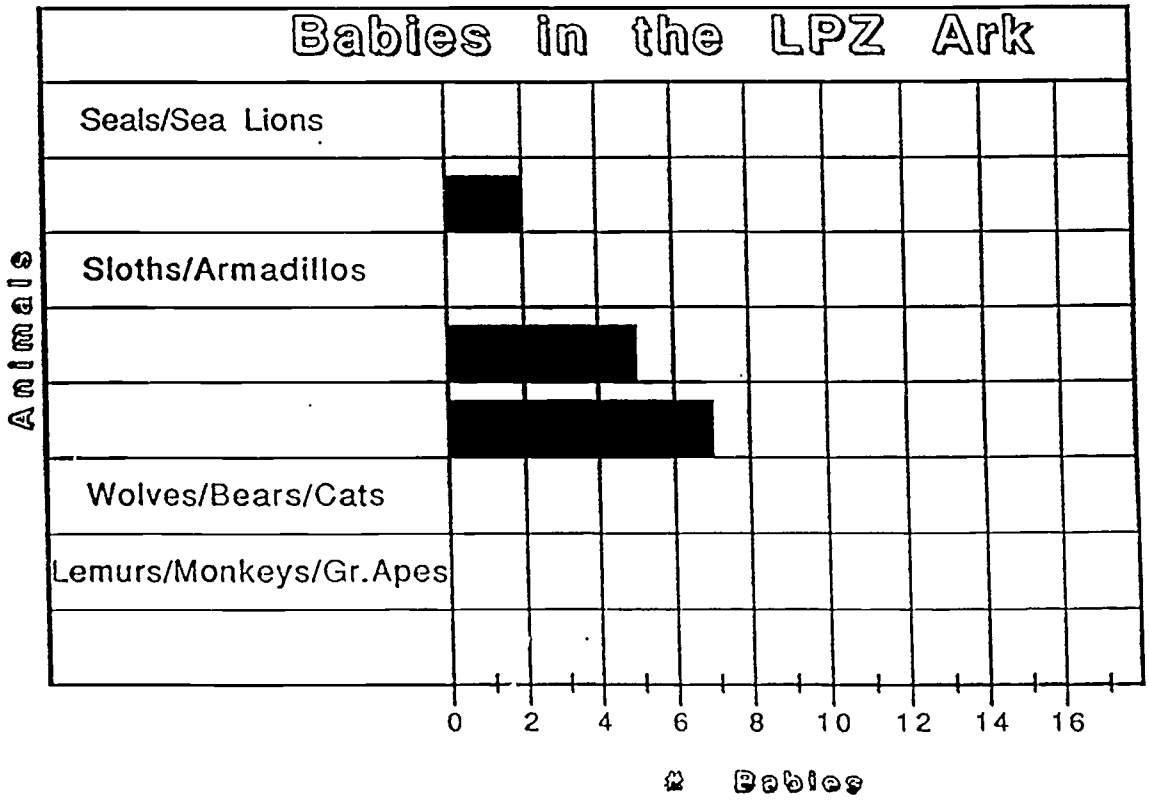
Zippity Zoo Dah

Student Data Sheet Master 4.4
Babies in the Ark

Work back and forth from the table to the bar graph to complete the missing information.

Babies in the LPZ Ark	
Animals	**# Babies**
Doves/Pigeons	5
Parrots/Macaws	2
Wolves/Bears/Cats	12
Sloths/Armadillos	4
Seals/Sea Lions	1
Opossums/Koalas	7
Lemurs/Monkeys/Great Apes	14

*** The bar graph is listed in rank order!!



Zippity Zoo Dah
Student Data Sheet Master 5.1

Danger! Danger!

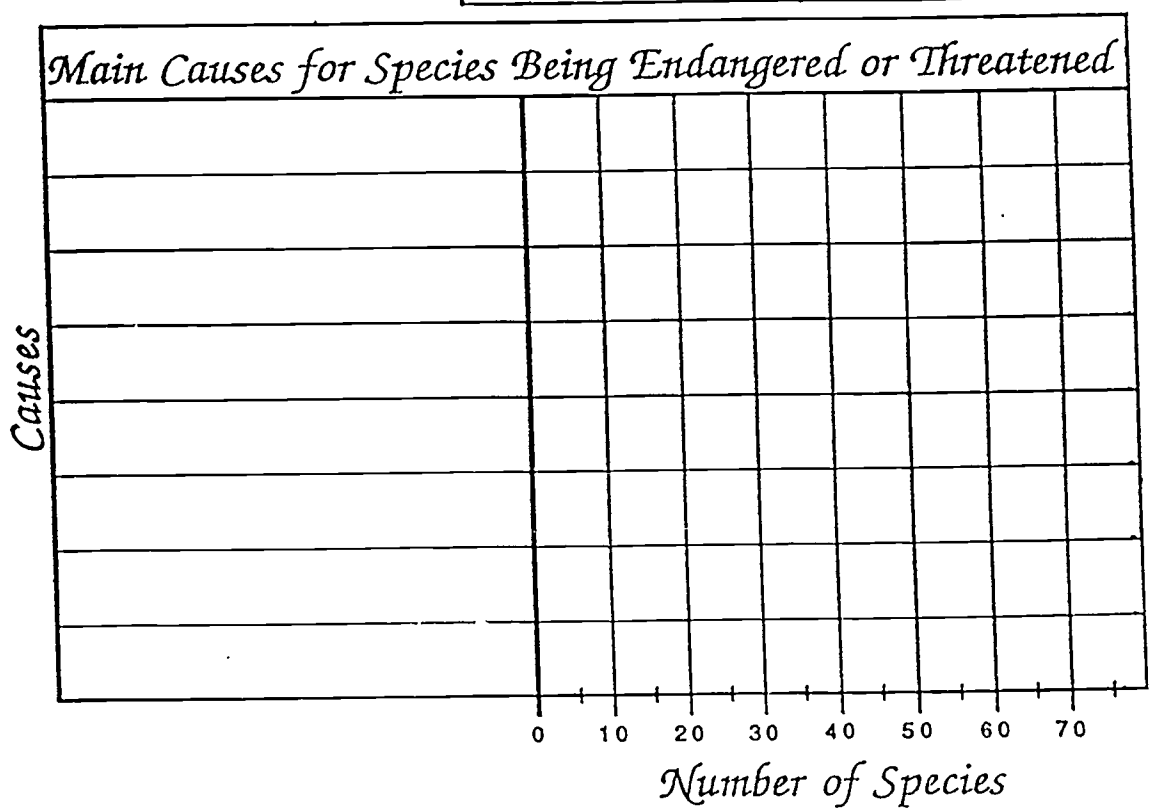
Many different things cause an animal to become endangered or threatened. The table at the right shows the major causes in the U. S. as of 1976.

Read the information in the table carefully. Then use that information to complete the bar graph. Write the causes in rank order in the graph.

Why do you think that Habitat Destruction was the number one cause?

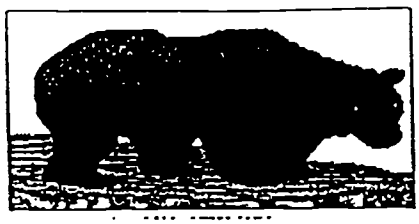
Main Causes for Species Being Endangered or Threatened

Causes	# Species
Pesticides	4
Illegal Killing	1
Always Rare	8
Controlled as Pests	10
Habitat Destruction	63
Past Exploitation	5
New Species in Area	20
Unknown	4



Zippity Zoo Dah
Student Data Sheet Master 6.1

Independent Study at the Zoo



Name of Endangered Species

Scientific Name

Family

Size

Maximum Age

Weight

Habitat Type:

Continent/Country:

Reason(s) for Endangerment:

Zippity Zoo Dah
Student Data Sheet Master 6.2

Beastly Behaviors

Observe the animal you have chosen for 20 minutes. In each box below, circle any behaviors you see. If you see a behavior that isn't listed, write it in the box titled "Other Observations."

Locomotion

walking	flying
hopping	soaring
jumping	swimming
running	diving
climbing	body surfing

Feeding

drinking
pouncing
lunging
stalking
lying in wait
looking alert
biting
collecting food

Social Behaviors

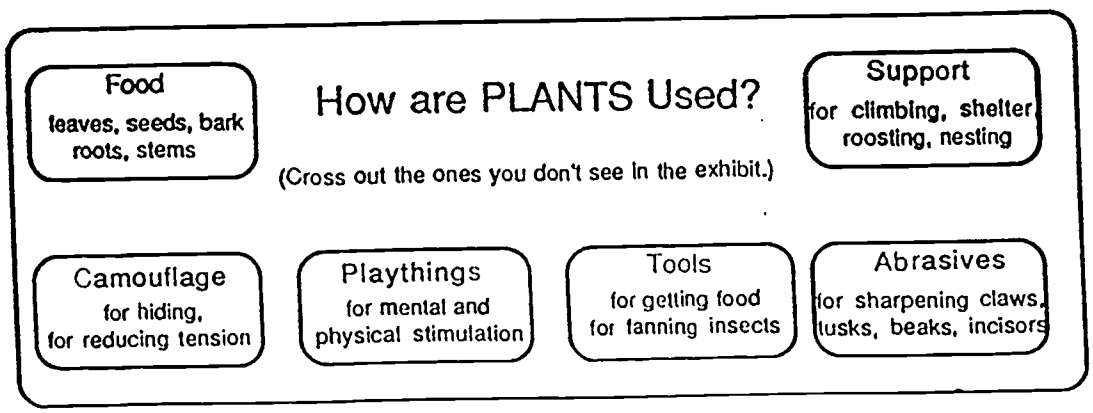
Friendly	Aggressive
head rubbing	head slapping
body rubbing	tail thrashing
circling	hard staring
playing tag	threatening call
sniffing	inflated posture
licking	
grooming	

Other Observations

Zippity Zoo Dah
Student Data Sheet Master 6.3

Do It Yourself Exhibit Critique

Yes/No DNA	Look for...	Description
	Space	Enough for comfort, with a generous flight distance from humans and other animals
	Sanitation	Clean, but not scent-free
	Lighting	Including sun or heat lamps to sunbathe in
	Temperature	Not too hot, too dry, too cool or too wet
	Ground Hardness	Soft for animals that dig, hard for those that must wear down their hooves
	Dust or Sand	For animals that like to take dust baths
	Water	To feed in, play in, bathe in, or build a lodge in
	Rubbing posts	For keeping horns, claws and hides in shape
	Climbing things	For exercising or escaping
	Privacy	Hiding places or visual shields
	Challenges	Playthings, food presented in a new way, interaction with the trainer



Zippity Zoo Dah
Student Data Sheet Master 6.4

You Are a Zoo Consultant!

There have been many changes at Lincoln Park Zoo during the past 125 years. One important change has bee the animals' habitats. Recent habitat changes have occurred in the Bird House, Lion House, and Primate House. Present plans are to construct a new Reptile/ small Mammal House, rebuild the Sea Lion Pool, and redo the outdoor lion and tiger habitats.

You are a consultant to the zoo. Your job is to advise the zookeepers on the appropriate habitat for a particular animal. To do this, you will need to do the following:
1. select an animal
2. observe and note the animal's behavior
3. observe and note the animal's zoo habitat
4. research and learn about the animal's natural habitat
5. design or make a model of an appropriate zoo habitat for your animal
6. write a report of two to three paragraphs which explains why your drawing, model, or diorama is well suited for your animal

You will receive worksheets to help you record you record your observations and to take notes on the animal's behavior and present zoo habitat.

The first three activities will be conducted on today's field trip. By being a good observer and taking good notes, you will be able to complete the remaining activities.

Enjoy your trip and become good observers and zoo consultants!

The Green Streets of Chicago

Community Resource Curriculum Development Project

by Joyce Grey

The Green Streets of Chicago

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the third-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Describe human dependence upon green plants.
Use a simple device to measure length.
Demonstrate that an inference can be made from direct observation.

SOCIAL SCIENCES
Recognize the need to conserve natural resources in our city and state.
Identify and locate main streets of Chicago on a city map.
Use a map key to interpret a map.

MATHEMATICS
Collect and record observations over a period of time and summarize them on a simple graph.
Use mathematics in other curriculum areas.

This unit is an extension of the Chicago Public Schools third-grade social studies curriculum in which the city of Chicago is a major topic of study. Its name is The Green Streets of Chicago because some neighborhood streets are considered green and they are lined with trees. In investigating the significance of trees and their uses, the students will be addressing several science, mathematics, and social studies objectives. We believe that as a subject for study in the schools and as a scientific mode of inquiry, geography provides an effective method for asking questions about places on the Earth and the relationships of places to the people who live there.

This unit begins with a tree-watching expedition through the community, where students note different kinds of trees and mark them with ribbons. The students will later measure and count trees, graph data, discuss various human uses of trees and note the importance of trees to human culture by locating city streets which have been named for trees. Through observations and discussions, students will gain an appreciation for the role that trees play in our physical environment. They will become environmentally aware of the importance of conserving and protecting trees: one of the Earth's greatest natural resources.

Content Background

When people first settled in the Midwest, they were suspicious of places where trees did not grow. The general feeling was that if trees did not grow, crops would not grow. Thus, they tended to settle in places with trees. Those were mostly along river valleys and in isolated clumps. At that time, English had no word to describe the natural grasslands where trees would grow, but they borrowed from the French to describe places where trees were lacking, and introduced the word"prairie."

Because the settlers were from the eastern United States or Europe, places where there were trees, they were used to trees and the resources from trees which helped them live their lives. Some trees were there and others grew when planted to produce their familiar resources. Many place names, such as streets, neighborhoods, towns and suburbs, were given tree names. Our people were, and still are, "tree people." Today, new subdivisions and suburbs often are enhanced with tree names since they appeal to prospective buyers who like the idea of having trees where they live. Sometimes places have tree names even when there is no tree in sight.

There are over 30 streets in Chicago named after trees. Sixteen of those streets are located on the near north side of Chicago near Lincoln Park. Children will investigate the reason for this. Here is a list of streets associated with trees or green plants:

Arbor Pl 368 N
Birchwood Ave 7500 N
Catalpa 5500 N
7500N
Cedar 1120 N
Cherry 1100 N
N
Chestnut 854 N
Clover 4000 N
Cottage Grove 2200 S
Elm 1142 N
Evergreen 1300 N
Hazel 4200 N
Hyacinth 6100 N

Jonquil 7700 N
Linden 2400 N

Locust 900 N
Lorel Ave 2400 N
Lotus Ave 5500 N
Magnolia 1400 N
Mango 1600 N
Maple 1100 N
Maplewood

Oak 1100 N
Oleander 3000

Olive 5600 N
Orchard 1500 N
Poplar 2700 N
Walnut 234 N

Timeline for Unit

This unit is divided into six 40-minute sessions, and can be taught over the course of a few weeks. This unit was not developed for a specific time of the year, but it should be planned when the weather is suitable for outdoor excursions. The students will be planting trees outdoors as part of the final lesson.

Evaluation/Assessment

Using higher-order thinking skills, children will express opinions and report on the importance or necessity of protecting our environment. Given the opportunity as individuals or as members of a cooperative group, students can display their understanding of the unit's concepts in a variety of activities following each lesson. Portfolios will be kept to showcase student work and will be evaluated by both student and teacher.

Community Resources

Chicago Academy of Sciences
Ms. Carol Fialkowski
2001 N. Clark Street
Chicago, IL 60614
312/549-0606

Chicago Botanic Gardens
Lake Cook Road at Edens Expressway
Glencoe, IL 60022
708/835-5440

Chicago Historical Society
1601 N. Clark Street
Chicago, IL 60614
312/642-4844

Morton Arboretum
Route 53 and I-88
Lisle, IL
708/719-2465

Chicago Park District
Ms. Kathy Shanasky
425 E. McFetridge Drive
Chicago, IL
312/294-2241

Lincoln Park Conservatory
Fullerton Ave. and Stockton Drive
Chicago, IL
312/294-4770

Garfield Park Conservatory
300 N. Central Park Boulevard
Chicago, IL
312/533-1281

Career Connections

The careers available in the study of plants and trees include the following:

NATURALIST: one who specializes in animals, plants, trees, and the ecosystems of nature

ARBORIST: tree doctor; one who specializes in the care of trees

NURSERY WORKER: a person who grows trees

LANDSCAPE ARCHITECT: one whose professional skill is the decorative and functional alteration and planting of grounds, especially at or around a building site or in city parks

LUMBERJACKS: one who fells trees and transports the timber to a mill

TREE TRIMMER: one who prunes and cuts trees

HORTICULTURIST: one who cultivates trees and plants

Glossary

BARK: the covering on the outside of the tree that protects it from heat or cold and from animals

BROADLEAVED TREE: a tree that has wide flat leaves; broadleaved trees all produce flowers in order to make seeds; most broadleaved trees are deciduous

CONIFER: a tree that bears cones; most conifer trees have leaves like needles or small scales, and many are also evergreen

DECIDUOUS: a tree or shrub that loses its leaves at the end of the growing season, leaving it leafless during the winter

EVERGREEN: a tree that is green throughout the year, even during the winter and dry seasons

PALM: a tree growing up on a stout stem with a single bud which unfurls into a crown of feathery leaves

SAP: liquid food and water being carried around a tree

LESSON 1: Adopt a Tree

Lesson Introduction
Trees are the oldest and largest living things we know. Nearly everyone agrees that trees are important, even crucial. They provide shade from strong sunshine, barriers against wind, a play structure for children, a rest spot for adults, a source for fruits, nuts, beauty and so much more. When we look at trees, we immediately see their outside beauty, but how good are we at identifying the parts of a tree? In this Adopt a Tree lesson, the students will be able to list the basic characteristics of a tree as determined by their own observations.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. use a simple device to measure length.
4. demonstrate that an inference can be made from direct observation.
5. collect and record observations over a period of time.

Time Allotment
one 40-minute session, plus time to observe seeds and record changes in growth every four days

Materials
rulers or measuring tapes; journal notebooks; poster showing parts of a tree; construction paper or modeling clay; lima beans; soil; water; paper towels; copies of student data sheet; pens and pencils

Advanced Preparation
During a classroom discussion about the characteristics of trees, the students will be given a checklist of things for which they can look. Prepare the list:
* What are the size and shape of leaves?
* How big is the trunk of the tree? About how tall is it?
* What is the bark color and texture like?
* Is it alive or dead?
* Does it make any sounds?
* Does it have an odor?
* Do different parts of the tree smell differently, like bark, old leaves, new leaves?
* Do you think the tree and its parts might smell differently at different times of the year?
* Think about how the tree got here.

Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Ask the students "What do you know about trees? What makes some trees different and what do all trees have in common?" Point out that trees are a large part of our environment. Have them describe some of the many things trees provide for us. They are all around us. We see trees everyday in our backyards, in our neighborhoods, and in the parks.

Share with Neighbor

2. Allow the students some time to share their knowledge within their groups. How many trees can each group name? Challenge them to compile a list of different types of trees. Share these lists with the class.

Hands-on Activity

3. Take the students outdoors and have them touch trees, leaves, bark, and branches. Measure the trees with the rulers or measuring tapes. Using the "Interview a Tree" data sheet and the checklist you have prepared, instruct the students to make and record observations for about fifteen minutes.

Introduce Principle/Concept

4. Compare and contrast the observations made. Return to the classroom. Ask the students "What can you tell about the trees based upon your observations?" Each group of children can take turns reporting its findings from the tree "interview" to the class.

5. Show the poster and review the parts of a tree with the students. Help them identify each part. Distribute construction paper. Have each student create an illustration of a tree and label the parts. If desired, modeling clay can also be used to create a model of a tree.

6. Each part of the tree has a specific function for the welfare of the tree. Briefly explain what the roots, leaves, bark, and trunk or stem do for the tree. Trees are the giants of the plant world. They are so much bigger than other plants that they need a strong wooden stem or trunk to hold them up. The trunk supports the tree. It carries water up from the roots and food down from the leaves. The bark protects the soft inside parts of the trunk. Trees make their own food called sap. Leaves work like tiny food factories for the tree. Water travels through their veins. They soak up the sunlight that is needed to make the tree's food. Roots hold the tree in the ground. They soak up the water and minerals the tree needs in order to grow. Seeds need enough sunlight and water from the soil to grow. Seeds grow better away from the shadow of their parents.

Relate Activity and Concept

7. Have each group place five lima bean seeds in a damp paper towel or a shallow dish of soil. Wet the seeds and keep them moist.

8. After four days, direct each group to open one end of one of its seeds very carefully. Notice how the little plant inside has started growing. Record observations.

9. Wait four more days and open another seed. Compare the changes in the seed. Use the rulers to measure the growth of the seed. Explain that it is important for scientists to use tools like the ruler which provide uniform measures to make comparisons.

10. Continue to open a seed every four days. Each group, or if desired, each student, can write down observations of the change in the growth of a lima bean seed as one is opened every four days.

Connect to Other Everyday Examples
11. Each part of a tree has a job, as we have seen in this lesson. Explore with the students how each part of an animal has a job/each part of a human being has a job as well.

Home Activity/Parent Involvement
Instruct the students to use the checklist to gain knowledge from a tree in their own backyards or neighborhoods. Information should be brought back to class and can be shared with other students before being stored in the students' portfolios.

Summary
As a summary to this lesson, each child will write a creative story telling what would happen to a tree if one of its parts were missing. For example, what if a particular tree were missing roots, bark, leaves, or trunk?

Student Data Sheet Master
Interview a Tree (or your own list of questions)

Lesson Assessment
Collect the groups' lists of types of trees to assess prior knowledge. Note student participation in class discussion. By the end of the lesson, the students will be able to use the appropriate scientific vocabulary to label the parts of a tree as demonstrated by their own illustrations of a tree and its parts. Their creative writings should reflect an understanding of the functions of the parts of a tree.

To reteach the lesson, children could make a return visit to their adopted trees with another student or teacher and label an illustration.

Special Notes

It is advantageous to do this activity in the spring or summer. You may repeat the visits throughout the year and compare observations made each time. Look to see how the tree has changed. Look to see in what ways the tree has remained the same. Think and talk about what the tree might look like the next time you visit it.

Extension Activities

Additional Community Resource Excursions

Contact the Morton Arboretum, a local park or cemetery, or the Chicago Botanic Garden. Encourage the students to write to these organizations for more information as well.

LESSON 2: Identifying Trees

Lesson Introduction
Trees are divided into three main types: broadleaved, conifers, and palms. Broadleaved trees have large flat leaves that turn shades of yellow, gold, orange, red, and brown in autumn, and fall from the tree. Trees that lose their leaves this way are called deciduous. Broadleaved trees have flowers from which they make seeds to grow new trees.

Conifers make their seeds in cones instead of flowers. Most conifers are evergreens. Evergreens shed their leaves too, but not just in the fall. They grow new leaves before old ones fall. Evergreens often have tough needle-like leaves. They are able to withstand extreme temperatures. Thus, you will see them in the snows of the coldest winters and the heat of the hottest summers.

Palm trees grow in warm climates from a long stem or shorter thick stalk. Most have a single bud at the top of the stem from which a crown or fan of feather-shaped leaves extends. Palm leaves can grow up to 50 feet. The best known palms are dates and coconuts. Coconuts grow in the tropics and date trees grow in the deserts.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. demonstrate that an inference can be made from direct observation.

Time Allotment
one 40-minute session

Materials
sets of twenty cards with pictures and labels of trees on them; different color ribbons to mark trees; journal notebooks; pencils or pens

Advanced Preparation
Arrange the students into cooperative groups.

Procedure
Tap Prior Knowledge
1. Ask the students "What kinds of trees did you see during the last lesson?" Make a list on the chalkboard as the students give you some of the names they know. Add some others: maple, oak, locust, crabapple, pear, elmwood, cottonwood, poplar, and linden, for example.

Share with Neighbor

2. Distribute several cards with tree pictures and labels to each group and ask the students to categorize them somehow. Give them a few minutes to organize the cards. Try not to give them suggestions about how they should group the trees into categories. Let them come up with ideas on their own. Accept and share all appropriate responses.

3. When finished, discuss the categories they used. If none of the groups used broadleaved or deciduous, evergreen or conifer, and palm, then introduce the vocabulary and suggest that they try to regroup using these three categories.

Hands-on Activity

4. Take the students out for a walk. Bring along the colored ribbons. As they walk the designated area, have the students mark all the trees of the same species with a colored ribbon. This is a key. Introduce the concept of specific colors representing the types of trees.

5. The students should also collect one leaf from the ground near each tree specimen while they are outside. When they return to the classroom, they can share and compare their findings with the others in the group.

Introduce Principle/Concept

6. Review the scientific vocabulary of trees. As the students practice identifying trees and tree parts, this vocabulary should become more and more familiar to them. Have the students write journal entries summarizing the classification of tree types. Be sure that the number of trees of each type is included because the data will be used in the next lesson.

Relate Activity and Concept

7. Back in the classroom, classify the collected leaves according to vein patterns, edges, shapes, sizes, textures, thicknesses, and colors.

8. Have the students match each leaf to the name of the tree it came from. Create a key for the leaves.

Connect to Other Everyday Examples

9. Ask the students if they think they would see any palm trees growing in Chicago. Why or why not?

Home Activity/Parent Involvement

Have the students bring in leaves from trees in their backyards or neighborhoods. Ask them from what tree it came. Was the tree deciduous, conifer, or palm?

Lesson Assessment

Save tree models in students' portfolios. Note participation in class discussions and activities. Journal entries should demonstrate understanding of the scientific vocabulary used in this lesson.

Extension Activities

Additional Activities

Let the students make a book of pressed leaves. Put a leaf from each type of tree between two sheets of paper towel and press them under a heavy weight. Wait a week or two for them to dry, then place them in the students' portfolios.

Additional Community Resource Excursions

Arrange a visit to Garfield Park Conservatory.

LESSON 3: Graph a Tree

Lesson Introduction
What the students have learned in the scientific investigation of identifying trees can be integrated into the mathematical world. In this lesson, the students will take information from the nature walk and graph the data comparing the number of trees of each type.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. collect and record observations over a period of time and summarize them on a simple graph.
3. use mathematics in other curriculum areas.

Time Allotment
one 40-minute session

Materials
sample line, bar and pie graphs of simple data: eye color, hair color, etc.; samples of actual graphs taken from newspapers, magazines, business reports, household sources; student observation notes; graph paper; rulers; pens and pencils

Advanced Preparation
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge
1. Ask the students "What do you know about graphing?" See if they can identify what a graph is and why/how is it used. A graph is a way of representing data in a visual manner.

Share with Neighbor
2. Distribute a sample line, bar, or pie graph to each of the groups. Give the students some time to try to read it together. Encourage them to ask each other questions and try to answer them using the graph they have. Share the different types of graphs with the class. Note how different kinds of charts and graphs can be used to convey the same information.

Hands-on Activity
3. Using the notes from the student observation, help the class set up a line graph of the types of trees observed. Let each group compile its own data or make a total for the entire class if you wish to work together.

4. Distribute graph paper and rulers to each student. Label the graph with a title. Draw a horizontal and a vertical axis and label them. Put the types of trees along the horizontal axis and the number of trees found along the vertical axis.

Introduce Principle/Concept

5. Explain that there are two sets of numbers involved in a line graph. One is called the independent variable and the other is called the dependent variable. The independent is the one which has categories or numbers that are not affected by the data collection. In this case, it is the names of the types of trees you are counting. The dependent variable, then, is the one that may change depending on the specific situation and methods of data collection. The independent variable is always along the horizontal axis. The dependent, or the variable you are measuring, is always along the vertical.

Relate Activity and Concept

6. Work with each group or as a class to graph the data. Let the students compare their graphs with each other. If desired, the students can choose a different type of graph, such as a bar graph or a pie chart, to construct using the same data. They can also choose a different variable to graph for more practice. They can measure the diameter of some trees with a tape measure. Then, as above, they can graph the data.

Connect to Other Everyday Examples

7. Share some samples of actual graphs used in newspapers, magazines, business reports, and household sources.

Home Activity/Parent Involvement

The students will make a second graph of the number of trees and tree types found in their backyards or neighborhoods.

Lesson Assessment

Observe understanding of the concept of graph construction while the students are involved in making their graphs. Store individual student graphs in the students' portfolios.

Extension Activities

Books to Read

A Tree is Nice by Janice May Udry, Harper Children's Books, 1987

LESSON 4: Green Streets

Lesson Introduction
Chicago is a city of trees and trees have given Chicago its character. Trees help us recall the city's rich history. Chicago has paid homage to its heritage by lining its streets and boulevards with trees. This lesson will help the students discover more about the influence of trees in our city.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. identify and locate the main streets of Chicago on a city map.
3. use a map key to interpret a map.

Time Allotment
one 40-minute session

Materials
city maps of Chicago, laminated; wipe-off markers; strips of paper with tree street names in a bag

Advanced Preparation
Laminate the maps if you would like them to be reusable. Since the emphasis in this unit is on saving trees, it would be a good idea to model the idea of reusing. Have students help you laminate them prior to the activity.

Arrange the students into cooperative groups.

Procedure
Tap Prior Knowledge
1. Ask the students "Do you know of any streets which are named after trees?"

Share with Neighbor
2. Give the students some time to brainstorm a list of streets in their groups.

Hands-on Activity
3. Distribute a city map of Chicago and a wipe-off marker to each student. Instruct them to circle the streets which are named after trees. Let students in groups help each other. How many streets did they find? Where are they primarily located? In the north, south, east, or west section of the city?

Introduce Principle/Concept

4. There are over 30 streets in Chicago named after trees. The majority of these streets seem to be located on the near north side of Chicago near Lincoln Park. In order to create a neighborhood identity through trees, a community must select those trees that best suit and enhance it. A community in which mature trees survive and more are planted regularly demonstrates a sense of time, history and continuity on the land. It takes 10 years or longer to produce a reasonably mature tree. Few urban land users stay in their homes longer than five years. Trees can establish pleasant conditions and transitions between buildings, open spaces, streets and fields. Trees produce maximum greenery and climate control with minimum effort, and provide diffusion and filtering of light and heat, which warm climates need. Trees also develop the sense of shelter and security.

Relate Activity and Concept

5. Use the maps and the map key to find parks, museums, landmarks, and rivers within Chicago. Although the concept of this lesson is streets with tree names, the students can take this opportunity to practice their map reading skills.

Home Activity/Parent Involvement

Let each student reach into the bag and pull out a slip of paper with a name of a tree which has a street named after it. Instruct them to work with their families to put together a short report, either wirtten or oral, on that specific tree. Stress the role which the tree plays in the city environment. These reports will be shared with the class in a later lesson.

Lesson Assessment

Given a Chicago map, the students should be able to locate at least 10 streets named after trees. Their detailed reports on a specific tree should reflect an understanding of how trees have been important to Chicago's identity.

Extension Activities

Books to Read

Streetwise Chicago by Don Hayner and Tom McNamee, Loyola, 1988

Additional Community Resource Excursions

Arrange a trip to Lincoln Park to identify and locate trees named after streets.

LESSON 5: What Comes from Trees?

Lesson Introduction

Each year, people cut down millions of trees. Experts say people cut down too many trees. This is unfortunate because we need trees for many reasons. Trees are an extremely important part of our natural environment. Trees help us in many ways. Trees help clean the air we breathe. They take carbon dioxide from the air which is emitted from factories and the exhaust of cars. The carbon dioxide which is taken by the trees helps trees and other plants to grow. In turn, they produce oxygen. Trees also provide homes for many animals. When trees are cut, these animals may lose their homes and die. We must continue to replant trees and keep up our forests because there are times when we have to cut our trees to provide our population with products that we need. Recycling does help, too. What are some of the products that come from trees? In this lesson, we will explore some of them.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. recognize the need to conserve natural resources in our city and state.

Time Allotment

one 40-minute session

Materials

magazines; scissors; giant tree silhouette; examples of products that come from trees including desks, chairs, rubber ball, maple syrup, apple pie, pencils, paper, gum, root beer, soap, and medicine; journal notebooks; pens or pencils

Advanced Preparation

Gather some of the above materials to use as examples of products that come from trees. Make a giant silhouette of a tree to use for the collage.
Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. Ask the students "Where does wood come from?" Elicit several responses and continue asking about paper and rubber, etc.

Share with Neighbor
2. Allow the students to brainstorm) generate a list of products that come from trees. Write the list on the chalkboa.

Hands-on Activity
3. Distribute magazines and scissors and have the students cut out pictures from magazines of products that come from trees.

4. Continue to become more familiar with these products by gluing the pictures on a giant silhouette of a tree to make a collage of tree products.

Introduce Principle/Concept
5. Initiate a discussion with the students about the importance of conserving our natural resources. Trees are one of these resources. Trees give us food, clothing, shelter, and something beautiful to appreciate in our environments.

Relate Activity and Concept
6. After the students have investigated and found many different products which are derived from trees, they will realize how important it is to conserve them. Have them imagine what it would be like in a world without a specific product, such as paper. Give them some time to write a journal entry. Put the writing in their portfolios.

Connect to Other Everyday Examples
7. Explain to the students that, just as animals become endangered, trees like the Dutch Elm are in danger of becoming extinct due to disease. If this happens, we will lose valuable products.

Home Activity/Parent Involvement
Encourage the students to search their homes and come up with at least 10 products that come from trees. They will share these findings with the class.

Lesson Assessment
Evaluate the students' knowledge of tree products by reviewing their journal entries and the lists generated as a home activity. Display the collage in the classroom or somewhere in the school.

Extension Activities

Books to Read
The Giving Tree by Shel Silverstein, Harper Children's Books, 1964

Additional Activities
The students can create a skit or play describing what it would be like without trees in the world.

LESSON 6: Planting and Protecting

Lesson Introduction

This is the last lesson and the culminating activity of the Green Street Unit. The students have learned the anatomy of a tree and discovered how to identify trees. They have practiced counting leaves and measuring trees. They know that we obtain many products from trees. They know that trees help keep our environment clean and cool. They have learned the value of trees in our society. They have used their imaginations to hypothesize what it would be like if the trees in our world suddenly disappeared. We never want this to happen. We must protect our trees. We must continue to plant trees in the forest, along highways, in parks, along our streets, and in our own backyards. In this lesson, the pupils will learn how to plant a tree.

Specific Lesson Objectives

The students will:

1. use appropriate scientific vocabulary.
2. describe human dependence upon green plants.
3. recognize the need to conserve natural resources in our city and state.

Time Allotment

one 40-minute session

Materials

small trees; spade; shovel; water; mulch; soil; copies of student data sheet; pens or pencils

Advanced Preparation

Make sure that the trees the class is going to plant are compatible to the soil content of the area. Check with the Chicago Botanic Garden or the Morton Arboretum. Arrange the students into cooperative groups.

Procedure

Tap Prior Knowledge

1. From the previous lessons, children should know some of the benefits from planting trees. Review some of them by letting them offer suggestions: Trees help prevent the soil from washing and blowing away. Trees absorb noise pollution. Trees provide shade and moderate temperature extremes. Trees bring pleasant images of the natural environment to mind and provide places to play and relax.

Share with Neighbor

2. Allow the students to share the reports on specific trees which they prepared at the end of Lesson 4.

Hands-on Activity

3. Take the class outside once again and plant the trees in the designated area(s). Be sure to follow planting directions carefully. Remind the students that they will be responsible, at least in the beginning, for caring for the trees.

Introduce Principle/Concept

4. Explain to the class that planting offsets a portion of the carbon we put into the atmosphere. Trees take in carbon dioxide in the food making process. On the average, a mature tree consumes about 13-25 pounds of carbon dioxide each year. We put carbon dioxide into the air when we use light bulbs, color televisions, and air conditioners which use electricity produced by electrical generating plants which use fossil fuels.

5. During the last century, we have increased the carbon dioxide in the air by 25 percent. This is directly involved with global warning. Global warming refers to a warming of the atmosphere surrounding the Earth. The five warmest years have occurred in the last decade. A significant rise in temperature could melt the ice caps and flood cities around the world.

Relate Activity and Concept

6. When students are planting, they will get direct experience in environmentalism and have a better understanding of the need to conserve. Explain that we breed animals in captivity to keep them from becoming extinct, and we must plant trees to keep them from dying out like the Dutch Elm.

7. In summary, discuss the steps used in tree planting. Let students draw pictures or write journal entries about their experiences. Be sure each student includes some reasons for conservation and some suggestions for preserving our natural resources.

Home Activity/Parent Involvement

Children can be given a small tree to plant in their homes or yards. Distribute the "Plant a Tree" instructions for the students to keep.

Student Data Sheet Master

Planting a Tree

Lesson Assessment

Collect the students' writings, which should demonstrate their knowledge of how natural resources need to be conserved. Each student should tell why we need trees and how we can perpetuate them.

Extension Activities

Books To Read

The Lorax by Dr. Seuss, Random Books Young Readers, 1971

Student Data Sheet Masters

The Green Streets of Chicago
Student Data Sheet Master 1.1

Interview a Tree

Be patient with your tree and give it plenty of time to answer you during the interview. Ask it the following questions or think up some of your own:

1. What is your name?

2. How long have you lived in this particular place?

3. Why did you choose to live here?

4. How do you eat and drink? What are your favorites?

5. How old are you? How old do you think you will get?

6. How deep do your roots go?

7. What is your job here in the park?

8. In what ways do you help others?

9. What was last winter like? How do you get through the cold weather?

The Green Streets of Chicago
Student Data Sheet Master 6.1

Planting a Tree

1. Choose a proper location for your tree.
   Remember that it's going to grow so leave room!

2. Keep your roots moist all the time.
   Dry roots will not keep the tree healthy.

3. Dig a hole big enough to spread the roots apart
   when you put the tree in it.

4. Place the tree in the hole at the proper depth.
   Gently add loose soil.

5. Add more soil and pat it down with your hand or foot.

6. Surround the area with wood chips to keep the soil
   from blowing away.

7. Water regularly if it doesn't rain often.
   Keep watch the tree for changes!

I'm Just Like the City of Chicago!

Community Resource Curriculum Development Project

by Kerry Bacia
Cindy Fowler

I'm Just Like the City of Chicago!

Rationale
This unit is intended to meet the following Instructional Program Objectives for the Illinois State Goals for Learning at the third-grade level:

BIOLOGICAL AND PHYSICAL SCIENCES
Use appropriate scientific vocabulary.
Identify parts of the human body.
Describe the functions of the human circulatory system.

SOCIAL SCIENCES
Recognize major physical features of Chicago.
Identify and locate main streets of Chicago on a city map.

MATHEMATICS
Acquire confidence in using mathematics meaningfully.
Relate physical materials to mathematical ideas.
Use mathematics in other curriculum areas.

Content Background
The circulatory system is made up of the heart, blood, and blood vessels. The heart pumps the blood, circulating it to every part of the body and back in about 30 seconds. The circulatory system has three main functions: it carries digested food to cells, brings oxygen to the cells, and carries cell waste materials to organs that remove them from the body.

Blood is liquid tissue. There are about 5 2/3 liters (6 quarts) of blood in the human body. The liquid part of the blood is called the plasma and is mostly water. There are three kinds of solid materials in blood: red cells, white cells, and platelets. Red cells look like very small discs with both sides pushed in. They pick up oxygen from the lungs and carry it to the cells in the body. They pick up carbon dioxide (waste when cells burn oxygen) and carry it to the lungs where it is given off. White cells are larger, but less numerous, than red cells. They can leave the walls of the blood vessels and move among the cells. They destroy bacteria and other disease germs. Platelets are much smaller than red blood cells. They help blood clot.

The blood moves around the body in closed tubes called blood vessels. There are three kinds of blood vessels in the body: arteries, veins, and capillaries. Arteries are blood vessels that carry blood away from the heart. Veins are blood vessels that carry blood back to the heart. Capillaries are very tiny blood vessels between the smallest arteries and veins.

The heart is a strong muscle shaped like a pear and about the size of a fist. It slants downward and lies to the left of the middle of the chest. It acts as a pump by contracting and relaxing. A pulse is the beat that can be felt in the arteries every time the heart contracts or beats. The surge of blood through the arteries makes the artery walls expand and produce a beat. You can feel the pulse by placing a finger (not thumb) on an artery in the wrist or neck. If you count the number of pulse beats in a minute, you can tell how fast the heart is beating or contracting.

(Content information in the unit overview taken from: *Science for the Elementary School, 5th ed.* by Edward Victor, New York: MacMillan Publishing Co., Inc. 1985, p. 571-4.)

Timeline for Unit

This unit is divided into six 40-minute sessions. Time should also be scheduled for one short field trip (2 1/2 to 4 hours) and a culminating activity. Allowing for "runover" time, a two-week period is suggested for this unit. Realistically the unit could be done at any time of the year, if you follow the adjustments in the Special Notes section of Lesson Six. It would be ideal, however, if the unit were taught when the weather is mild enough for students to be outdoors.

The first two lessons introduce the circulatory system and the functions of its components, such as the lungs. Lesson Three introduces the uses of a grid and coordinates to name or find locations. Lesson Four provides a transition from large, body map grids to smaller, hand-held map grids. Lesson Five allows students to find similarities between their own bodies (circulatory system) and the organization of the city through the use of maps and a discussion of figurative language. Lesson Six is an opportunity to turn all of the newly acquired location/map skills to problem solving in a real-life situation. Activities at the end of the unit are a way to celebrate or show-off to peers and adult members of your school community.

Evaluation/Assessment

Assessment is discussed in every lesson in this unit and is accomplished in a variety of ways including oral discussion, written work, visual displays, map work, and hands-on activities. Although not mentioned directly in the lessons, keeping a portfolio of work produced would give an excellent picture of an individual student's growth in understanding the concepts introduced.

Community Resources

John G. Shedd Aquarium
1200 South Lake Shore Drive
Chicago, IL 60605
312/939-2426
Hours: Daily, 9-6. Closed New Year's Day and Christmas. Admission: Includes aquarium and oceanarium--adults, $7; children 6-17 and senior citizens, $5; children under 6, free. On Thursday, the admission is $4 for adults and $3 for children 6-17 and senior citizens.
The aquarium has an extensive educational program that includes group tours, teacher workshops, courses, teaching materials, and lectures.

Field Museum of Natural History
Roosevelt Road at Lake Shore Drive
Chicago, IL 60605
312/922-9410
Hours: Daily 9-5. Closed New Year's Day, Thanksgiving, and Christmas.
Admission: Adults, $3; children 2-17, senior citizens and students, $2; families, $10; children under 2, free. Thursday, free.
Participatory programs, classes, workshops, lectures, field trips, and guided tours are among the museum's educational offerings. Music, dance, and plays also are presented, frequently in conjunction with special exhibitions. Among the facilities are classrooms, theaters, stores, a library, and a McDonald's restaurant.

Adler Planetarium
1300 South Lake Shore Drive
Chicago, IL 60605
312/322-0304
Hours: Daily, 9:30-4:30; Friday, 9:30-9. Closed Thanksgiving and Christmas.
Admission: Free. Sky Shows: $3; children 6-17, $1.50. Children's Sky Shows, $1.50.

NOTE: The above are provided for your use with Lesson Six. All other resources are listed at the end of their respective lessons.

Career Connections

The careers available in the study of anatomy and city planning include nurse, doctor, cartographer, engineer, mortician, sports or health specialist, and city planner/architect.

Glossary

ARTERY: a blood vessel that carries blood away from the heart

BLOOD VESSEL: the closed tubes that the blood flows through

CIRCULATE: "to circle." Blood circulates (circles) all around your body

COMPASS: a tool used to determine direction

COORDINATE: in math, one set of numbers that helps determine the location of a point in space

GRID: a pattern of horizontal and vertical lines forming squares of the same size

HEART: a strong muscle, shaped like a pear, that pumps blood through your body

LUNG: a pair of organs in your body that provides your blood with new oxygen

ORIENT: to locate a place in relation to the points on a compass

PLASMA: a yellowish fluid that makes up a little more than half of your blood

PLATELET: small, oddly-shaped cells that help the blood to clot (form a scab) when you are bleeding

RED BLOOD CELL: a cell that picks up oxygen from the lungs and carries it to the rest of the body

VEIN: a blood vessel that carries blood back to the heart

WHITE BLOOD CELL: a cell that destroys bacteria and other disease germs

LESSON 1: *The Magic School Bus*

Lesson Introduction
This lesson is designed to begin your unit with an overview of the internal workings of the human body and to provide a general theme for the entire unit.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. identify parts of the human body.
3. describe the functions of the human circulatory system.

Time Allotment
one 40-minute session

Materials
recycled materials to make models; *The Magic School Bus Inside the Human Body* by Joanna Cole

Advanced Preparation
Put students in groups of four and appoint a secretary. These should be permanent cooperative groups for the duration of the unit.

Procedure

Tap Prior Knowledge
1. Begin your lesson by asking students what they know about how their bodies work. This will bring you a surprising amount of information and possibly a surprising amount of misinformation.

Share With Neighbor
2. Ask students to list as many internal body parts as they can. You may have to explain that "internal" means inside their bodies, as opposed to what they can see on the outside. Allow them approximately five minutes to make their lists. Have one student from each group come up and write the name of a body part on the chalkboard.

Hands-on Activity
3. Have the students work in their groups to construct small models of the human body using recycled materials and the list the class just produced. Compare the models of each group. Label the internal body parts on the models.

Introduce Principle/Concept
4. Tell the students to look at the list and ask them if they can briefly tell how any of the body parts function. For instance, the heart pumps blood. Tell the students that different parts of the body work together and when they do, they form a "system." Label the functions of the internal body parts on the models.

Relate Activity and Concept

5. Show them a book called *The Magic School Bus Inside the Human Body*. It is an adventure story and they will need to listen especially carefully for two things: THING #1--Listen for body parts that work together. THING #2--Listen for anything about the blood, heart, and lungs.

6. Read the story to the class stopping along the way for any healthy curiosity questions. When finished, ask the children to add more items to those already on the board. Having them offer suggestions while you write them down will save time at this point.

7. Ask them what they noticed about different parts of the body working together. Ask about the function of the heart and what it means to "circulate." What other parts of the body work with the heart? (lungs, veins, arteries, blood vessels) What are parts of the body working together called? (a system)

8. Tell students that they will be learning about a system that circulates blood throughout the body called a circulatory system. Ask them to name the internal parts that they think belong in the circulatory system.

Connect to Other Everyday Examples

9. Tell students that their lives are touched by many different systems. Ask if they can think of any. If it's hard for them to get started, give a few hints: A person from this system comes to your house every day, sometimes bringing something you want, sometimes something you don't. (postal system)
This system provides for your education. (school system)

Home Activity/Parent Involvement

The above are examples of systems that serve people in the community. Are the students a part of a system at home? How do they contribute to the care of the home and the people with whom they live? Who else in the home helps them do this? Is a family a system? Invite the students to talk it over at home and try to think of any others.

Lesson Assessment

Assessment is oral, continual, and built into the lesson. If you would like a clearer picture of each child's knowledge base entering the lesson, have each individual child make a list. Then allow them to compare and add additional items when they share in their groups. Additional, shared items should be added in a different color ink.

Tips for Reteaching

1. Students who have difficulty with the above material may benefit from focused attention on the circulatory system alone. There are several good anatomy coloring books available, including one by Dover Publications.

2. Attention should be paid to diverse learning styles. Some students can benefit from modeling parts of the circulatory system, such as the heart, from colored clay.

Extension Activities

Additional Activities

The video "Science Rock," from the Schoolhouse Rock Series, includes songs about body systems, weather, and other science subjects. It includes the song "Do the Circulation," and it is a catchy tune that scientists will find enjoyable and informative. Don't be surprised if your kids walk around singing it after a couple of times!

Additional Community Resources Excursions

Robert Crown Center for Health Education
21 Salt Creek Lane
Hinsdale, IL 60521
708/325-1000
Hours: Mid-September to mid-June
Monday through Friday 9:45-2:30 (School groups only)
Admission: K-2, $1.75/3-up, $2.
This facility has 27 programs designed to augment regular classroom instruction.

INSTRUCT STUDENTS TO WEAR COMFORTABLE CLOTHING FOR THE NEXT LESSON. DRESSES ARE NOT TO BE WORN. STUDENTS WILL BE WORKING ON THE FLOOR.

LESSON 2: Human Body Maps: The Circulatory System

Lesson Introduction
This lesson provides the students with an opportunity to construct a customized visual aid which will be used throughout the unit.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. identify parts of the human body.
3. describe the functions of the human circulatory system.
4. acquire confidence in using mathematics meaningfully.
5. use mathematics in other curriculum areas.

Time Allotment
one 40-minute session

Materials
brown butcher paper (in lengths as long as your tallest child--a roll would be even better); pink construction paper 11 x 18 for the lungs; red construction paper 1/2 of 8.5 x 11 for the hearts; teacher-created tracing patterns for lungs and heart; thick red, black, and blue markers; 1 pair of scissors for each pair of students; at least four 3 x 5 index cards per child; white and colored chalk for teacher; glue

Advanced Preparation
Create the tracing patterns for the lungs and the heart. This exercise requires a great deal of floor space, and desks may need to be moved to the periphery of the room. Hall space may also be used if it is available. Arrange the students into their cooperative groups.

Procedure
Tap Prior Knowledge
1. Ask the students "If you are on a trip or vacation and don't know where you are going, how can you get help?" Let them discuss their answers as a group.

Share With Neighbor
2. Have each group pick its best answer and put it on the chalkboard. You may get a variety of answers such as: ask a policeperson, stop at a gas station, read a map. Acknowledge all safe, correct answers. If nobody mentions the possibility of a map, bring up the subject of maps yourself.

Hands-on Activity
3. Tell the students that they are going to make a personal body map to help learn about the circulatory system. Each child will need: a length of brown paper at least 6" longer than they are tall (this offers an opportunity for them to

estimate and measure accurately); one large sheet of pink construction paper; one half sheet of red construction paper; four index cards. Each group will need: one teacher-created lung pattern; one teacher-created heart pattern; two pairs of scissors; two of each of red, blue, and black markers.

4. Ask students to choose a partner within their groups. Instruct one student from each pair to spread out the brown paper and lie down. Then, have the partner trace the student's outline on the brown paper with a black marker. Remind students to work slowly and carefully. Repeat the procedure for the other student.

5. Instruct each student to cut one copy of a heart, and two copies of a lung.

6. While these activities are going on, you should be drawing your own outline on the chalkboard in white chalk. This could be the perfect job for the partnerless student! Use blue chalk to draw in a reasonable facsimile of veins which carry blood to the heart. Use red chalk to draw the arteries which carry blood away from the heart to the rest of the body. You may need to refer to the chart or diagram of the circulatory system mentioned in the background information. An anatomy coloring book would be very helpful.

Introduce Principle/Concept

7. Introduce the circulatory system. Since students will be working at varying paces, invite groups of students to come up as they complete the tracing and cutting so they can receive small group instruction regarding the function of veins and arteries. Use your models of heart and lungs to demonstrate placement.

Relate Activity and Concept

8. When you are satisfied that each group understands, have the students return to their places and finish their body maps. They can draw in the veins and arteries with the markers and glue the heart and lungs in their proper places. Students can place their names on the map. As soon as the glue is dry, roll them up and secure with a rubber band. Store them for Lesson 3.

Home Activity/Parent Involvement

Students are to take the components of the circulatory system and put each one on an index card. There will be a card for heart, lungs, veins, and arteries. Have them use their own words to briefly explain the function of each component.

Lesson Assessment

This lesson can be assessed by pupil/teacher interaction, and successful completion of the body map. Also, collect the cards which the students prepare at home and review to be sure they understand the functions of the circulatory system components.

Tips for Reteaching

With regard to this lesson, peer tutoring is advised and encouraged both for students who may have missed the lesson because of absence, and those who are having difficulty with the concepts. Peer tutoring offers an opportunity to increase self-esteem and confidence on both sides. Identified tutors (those who pass lesson assessments) are rewarded with positively motivated responsibility, those with difficulty learn from peers without having excess attention drawn to them by having to do additional work with the teacher. Also see additional activities.

Extension Activities

Additional Activities

The following two activities are recommended where time is available and will increase the student's understanding of the heart as a pump:

1. Measure Pulse Beat*

By using the first two fingers of your right hand, feel for the pulse on your left hand at the base of the thumb where the left hand joins the wrist. Count the number of pulse beats in one minute. Now jump up and down 15 to 20 times or exercise vigorously and take your pulse beat for one minute again. Note how much stronger and faster the pulse beat becomes.

2. Make a Stethoscope*

Make a stethoscope from three funnels, a glass Y-tube or T-tube, and two long, plus one short pieces of rubber or plastic tubing. Let the children take turns listening to heartbeats. Compare the heartbeats when they are quiet with their heartbeats after they have jumped up and down 15 to 20 times or exercised vigorously.

(*adapted from *Science for the Elementary School, 5th ed.* by Edward Victor, New York: MacMillan Publishing Co., Inc. 1985, p. 591-2.)

LESSON 3: Travels Through My Body

Lesson Introduction
In this lesson, the students will learn to use coordinates to find locations on a clear grid which is superimposed on their body maps.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. acquire confidence in using mathematics meaningfully.
3. relate physical materials to mathematical ideas.
4. use mathematics in other curriculum areas.

Time Allotment
two 40-minute sessions

Materials
one large clear plastic grid for each group of four children (see specifications in teaching outline); overhead projector; several overhead transparency copies of the above, one to be used in this lesson by the teacher, and one for each group for lesson 4; personal maps; one green dry mark (wipe off) marker per group; one picture of each student (picture-day proofs are ideal for this if they are available); 1/2 sheet of yellow construction paper; crayons, markers, or colored pencils

Advanced Preparation
This lesson requires more advance teacher prep than most of the others. You will be creating a handy teaching tool that can be used for a variety of math and science activities. Purchase enough 4'6" x 4'6" sheets of clear plastic so that each of your groups has access to one. Inexpensive plastic sheeting can be bought at Woolworth's. It is approximately 4'6" wide and you will pay so much per foot according to thickness. Choose a mid-range thickness. You will also need a thick black permanent marker and a yard stick. Move furniture out of the way and place newspaper on the kitchen floor, in case the marker bleeds through. Lay the plastic sheet on the floor.

Using the yardstick and marker, measure and make markings for a three-inch border. Within the border, along all sides, make guideline markings every six inches. Connect by drawing lines between parallel markings on opposite sides of frame work to form a grid of 6 x 6-inch squares. Extend lines through borders, except at corners. Number the frame spaces at the top and bottom 1-8. Letter (capitals) the frame at each side A-H. You will need to make a line-up dot in the middle of row A on the vertical line between spaces 4 and 5. Repeat for as many sheets as are needed. You will also need to make a representative transparency for the overhead.

Arrange the students into their cooperative groups.

Procedure

Tap Prior Knowledge

1. Begin the lesson by turning on the overhead to show the transparency of the grid. Place a colored dot in the center of any square on the grid. Ask your students if anyone can describe the location of the dot. You may get a variety of answers, including "it's 6 across and 4 down." etc. If no one picks up the letters and numbers along the periphery, bring them to the students' attention and ask if there is a way that these symbols could be used to name the dot's location. After some discussion you should come to the conclusion that the preferred way to name a location would be letter first, then number. For instance: D-6.

Share With Neighbor

2. Give several more examples of dots and ask individual students to name the location. Have students work in their groups.

Hands-on Activity

3. When you are satisfied that they understand, tell them that the letter and number symbols are called coordinates and that you are now going to do something slightly different. Name the coordinates, and ask for volunteers to come up and put a dot in the location that you name.

4. Have one person in each group come and get a large, plastic sheet grid and a green dry marker. Have another person in the group collect the body maps from storage. Have each group of students spread their grid out on the floor (you will be using floor and hall space again, if available). Tell students that they will be locating parts of their bodies using their personal body maps and the grid. Each person in the group will get a turn.

Introduce Principle/Concept

5. Show the students how to use a grid. Draw attention to the line-up dot at the top of the grid. Instruct them to begin by each, in turn, placing their body maps underneath the grid and lining up the middle of the top of the head with the dot. The students are then to give the coordinates for the following parts of their bodies:

H=heart
RL=right lung
LL=left lung
HD=head
RF=right foot
LF=left foot
RH=right hand
LH=left hand

6. Remind students that their body maps are reversed, so that when they are looking at them face to face, their left lung is on the right side and vice-versa. Also explain to them that a location can be named by more than one square if it covers more than one. For example: a lung may cover two squares so the correct location might be C-5/D-5. Each student in the group should record data in a separate inside corner of the grid.

7. When individual students finish, they should signal the teacher (in a manner of your choice) to check the data. Make sure it has been recorded and checked by group members, as another student may be working on the grid by the time that the teacher is able to join the group.

Relate Activity and Concept

8. Finished students are then to draw their own facsimiles of the magic school bus on yellow construction paper with themselves as the bus driver.

9. When all in the group are finished and the grid is once again available, the students are to create a list of coordinates that will take their partners on a journey through their bodies. Each partner must follow the coordinates and take the journey.

10. At the end of these activities, body maps and grids should be collected and stored. If you have enough board room both in and outside the classroom a few body maps and overlays would make a nice display You could ask students from another class to look at the location data in the corners of the grid and decide whose body map is depicted.

Lesson Assessment

Assessment is built into this lesson in several forms including the oral assessment in the introduction of the lesson, the verified individual data displayed in the corners of the grid, the identification of the body map on display, and the coordinate journey, both the taking of it and its creation.

Tips for Reteaching

In a step by step, hands-on lesson such as this it is recommended that the teacher circulate among the students during the entire lesson, providing immediate support and remediation for any difficulties, thereby remediating within the context of the activity itself. If a student is having difficulty in understanding the grid system, it may help to teach him or her how to play the game "Battleship" by Milton Bradley, which uses a similar grid system. The object of the game is to sink battleships by guessing possible coordinates.

Extension Activities

Additional Activities

See "Battleship" in Tips for Reteaching.

LESSON 4: Downtown Chicago

Lesson Introduction
This lesson is designed to provide a smooth transition of skills learned in the previous lesson to their application in the use of a street location grid map.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. recognize major physical features of Chicago.
3. identify and locate main streets of Chicago on a city map.
4. acquire confidence in using mathematics meaningfully.
5. relate physical materials to mathematical ideas.
6. use mathematics in other curriculum areas.

Time Allotment
one 40-minute session

Materials
each group will receive: overhead size transparency grids; 8 1/2 x 11"
enlargement of the downtown area lying within the following boundaries:
11th Place to the north
23rd St. to the south
Wabash Ave. to the west
Lake Michigan slightly past Meigs Filed to the east

Advanced Preparation
Your first task in preparing for this lesson is to find a suitable map of downtown and enlarge the Burnham Park/Museums area. There are several options. Rand McNally, on Michigan Avenue downtown, carries all manner of maps. Maps of Illinois and the Chicago area often have insets of the downtown area. *Chicago on Foot*, a book that list thirty-six neighborhood walks, has a lovely map of this area on page 118. (See extension activities). Once you have your map copy, superimpose your transparency grid. When you have lined up your grid so that you are covering all of the desired locations, mark your map master copy so that the students will have guidelines for the lesson. Make copies for groups. At this time, make note of the locations of the above mentioned sites and their coordinates for use in the lesson.

Arrange the students into their cooperative groups.

Procedure

Tap Prior Knowledge

1. Begin your lesson by asking students to think about taking a class field trip. Tell them that their field trip will take them downtown and ask them what kinds of places they might find downtown that would contribute to their learning (museums, library).

Share With Neighbor

2. With regard to museums, ask them to name some that they have heard of, or have visited. Allow them some time to share within their groups.

Hands-on Activity

3. Pass out the grid transparencies and the maps. Ask students what these items might have to do with planing the field trip. Explain to the students that they will be locating a few museums and other landmarks on a map of the Burnham area of Chicago using the grid/coordinate system that they learned about in the previous lesson.

4. Have the students work cooperatively in their groups while the secretary records answers on a sheet of paper that is to be turned in at the end of the lesson. Tell the students that you will give them five coordinates, or sets of coordinates, for which they must write down the museum or landmark depicted on the map location. Then have the group list (horizontally) some of the things you can learn about at each place.

Introduce Principle/Concept

5. Discuss the use of a compass and the importance of being able to orient oneself so that one knows for sure which way the directions of north, south, east, and west lie.

Relate Activity and Concept

6. Talk about the Chicago saying that, "The lake is always east." Have them put an E on the lake on their maps. Where would they place the W for west?

7. Once students have correctly placed all of the directional letters, start asking them questions like "Is the Aquarium north or south of the Field Museum?" Ask several questions of this nature about all of the mentioned sites, making sure they understand how to find out.

Connect to Other Everyday Examples

8. Ask for volunteers to describe a building or site on the map using directional clues only. Give an example like "I am thinking of a place that is south of the Field Museum, and south and west of the Planetarium." Ask the students to look at their maps and find this place. You may want to list their possible choices on the board.

9. When you are satisfied that they understand, you may want to conclude the lesson by telling them that they will use this newly learned skill on a field trip. Collect maps and grids and store for later use.

Lesson Assessment
Collect museum identification group answer sheet and review to be certain that the students understand the grid concept.

Tips for Reteaching
Individual help from teacher will be beneficial to students who are having difficulty with using a grid. Basically, this lesson assesses whether or not the student can apply the same skills as Lesson 3 in a slightly different context.

Extension Activities

Books to Read
Suggest that the students read *Chicago on Foot: An Architectural Walking Tour* by Ira J. Bach, Follett Publishing Co., Chicago. This book is a collection of 36 walking tours in Chicago and surrounding areas which feature architecturally significant buildings. Although we used downtown Chicago in this lesson, you may find a walk in this book that is closer to home, and/or more significant to your students. You may also get ideas for additional field trips. Many times walks include museums or sites that offer tours or workshops.

Gallery Books puts out a wonderful, tri-fold cardboard map of downtown that folds out to a 30-inch length. It comes in a clear plastic case and includes plastic stickers of famous buildings and museums. On the reverse side of the map are three scenes from Chicago history, including an Indian village, the Chicago fire, and a rail station scene. It also contains a section that tells about the landmarks depicted on the map. It is called *A City Grows Up--Chicago* by Frances Todd Stewart and Charles P. Stewart, III, illustrations by Barbara Ernst Prey, maps by Peter Freyvogel. Gallery Books are available for bulk purchase for sales promotions and premium use. For details, write or phone the Manager of Special Sales, Gallery Books, 112 Madison Ave., New York, NY 10016, or call (212) 532-6600.

Additional Activities
1. Students might do a research project (with parental help) to find out how archaeologists use grids to mark the exact location of the artifacts that they find on a dig.

2. You might provide students with with a grid sheet of one-inch squares, where one inch equals one foot, and ask them to make a floor plan of their bedrooms including furniture.

LESSON 5: My Body is Just Like the City of Chicago!

Lesson Introduction
This lesson is a prime opportunity to introduce students to the difference between literal and figurative speech.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. identify parts of the human body.
3. recognize major physical features of Chicago.

Time Allotment
one 40-minute session

Materials
a single human body map; a large map of Chicago and suburbs; a sense of humor; imagination

Advanced Preparation
Attach a personal body map to the front board or another visually prominent area in the room. Do the same for the map of the Chicago area and suburbs. Collect four or five of your favorite figures of speech such as:
I'm so hungry I could eat a horse!
She's always a day late and a dollar short.
You're getting on my last nerve!

Arrange the students into their cooperative groups.

Procedure

Tap Prior Knowledge
1. Begin the lesson with one of your phrases. Ask for a volunteer to tell you what it means. Point out the difference in the real (literal) meaning and what is (figuratively) meant. Use your other examples the same way.

Share With Neighbor
2. Ask the students to work in their groups to see if they can think of any other examples. After some joyful and possibly hilarious discussion, draw attention to the body map on the board. Ask them what the most important part of the map is and why (the heart is because it is the pump and without it, the body dies).

Hands-on Activity
3. Now refer them to the map of the Chicago area. Have students point out the downtown area. Let them practice identifying the relationship of items on a city map. Note the roads and highways leading to and from the downtown area. Note the train systems and the waterways. What types of buildings were built as

a result of convenient transportation, either along the river or near a major highway? What factors were involved in the development or planning of the city of Chicago? Have students point out the suburbs. Ask if anyone has relatives living in the suburbs. Discuss how the suburbs are different from the city. What makes them different?

Introduce Principle/Concept

4. Ask students if they have ever heard the expression "The Heart of the City." Ask them what they think it means. Of the areas discussed, what area do they think people refer to figuratively as the "Heart of the City" (downtown).

Relate Activity and Concept

5. Compare this concept to what has already been learned in prior lessons about the systems of the human body. In the body, what carries blood away from the heart? (arteries) In the city, what pathways carry people out of the city at the end of the day? (streets) Main streets are often figuratively referred to as "main arteries."

Home Activity/Parent Involvement

On a sheet of paper, have the students write down the room at home which is the "heart" of the house. Have them explain why they picked that room.

Lesson Assessment

Note student participation in the class discussion to assess understanding of the concept of maps. Collect the written homework assignment and store in the students' portfolios.

Extension Activities

Additional Community Resource Excursions

CTA Travel Information: 836-7000

You can call this number and request as many copies of the "Systems Map" as you need for the students in your classroom. This map includes the downtown area and would be another good example of various parts (bus lines, train lines, stations) working together to form a "system" for transportation.

LESSON 6: From Here to There: Field Trip

Lesson Introduction
This lesson gives students an opportunity to use the skills they've learned in a real setting, for a real purpose.

Specific Lesson Objectives
The students will:
1. use appropriate scientific vocabulary.
2. recognize major physical features of Chicago.
3. identify and locate main streets of Chicago on a city map.

Time Allotment
anywhere from 2 1/2 to 4 hours depending on your choice of activities and organization

Materials
an (inexpensive) compass for each group; previously-created maps of the Burnham area, two for each group (one for the students and one for the adult chaperone); previously-created overlay grid transparencies (could be stapled to student maps); copies of student data sheets; one adult chaperone per group (ideally) or one adult chaperone per two groups; a field trip reservation at the area museum of your choice; a bus reservation

Advanced Preparation
You will need to make a reservation for a field trip to the museum of your choice. Try to schedule your reservation for 11:30 or 12:00 with a short visit (45 minutes to an hour) afterwards. Bus drop off and pick up will be at this museum. With regard to chaperones, try to get them to school by 8:30 the day of the trip for an orientation with regard to their roles in the exercise. If this cannot be done, you may have to write a letter of explanation. Prepare a copy of the day's itinerary for your chaperones. You should plan to leave school by 9:15.

Student Data Sheet Master
Instruction Sheet for Field Trip

Procedure for Trip

1. Let's assume that you have chosen the Field Museum for your luncheon and trip. Have the driver drop you off at the north entrance of the museum. Each group leader should have the following:
1. compass
2. maps (one with overlay- students, and one without-chaperone)
itinerary/instructions

2. As soon as students have assembled into their groups, the group leaders should hand out the compasses, student maps, and instruction sheets. Groups

are to separate themselves, carefully read the instructions, and begin their journeys. Stress the importance of meeting at the original sight promptly at the prearranged time.

3. A sample itinerary may look something like this:
8:30 Chaperone Orientation Meeting
9:00 Attendance/collect bag lunches
9:15 Board buses/leave school
9:45 Arrive at the museum/organize group
10:00 Begin exercise
11:00 Meet the rest of the group to compare answers
11:30 Lunch
12:00 Visit the museum
1:00 Board the buses to return home.

4. To help your trip run as smoothly as possible it would help to take time out and discuss the itinerary, procedures, and your behavioral expectations of students the day before the trip. You can also pass out instruction sheets to give them a preview (and hints as to how to go about it) but these should be collected for redistribution the following day. Issues of safety should be discussed with both students and chaperones as groups will be crossing streets during their journey.

Enjoy your trip!

Unit Summary

The preparations have long been completed, the concepts taught, the deed done, the knowledge constructed and demonstrated. What's next, you say? It's time for the culminating activity! An opportunity for your students to demonstrate their vast amount of newly constructed knowledge to their peers and maybe even other members of your school community.

Below are some suggestions for culminating activities that can take as little or as much time as you want depending on your development of the idea. You could assign a class project or allow students to pick several small group projects within a range of your choice and then have a classroom activity fair! The important thing is that your students receive "praise and admiring looks" for their accomplishments which will go a long way toward building confidence and self esteem.

ACTIVITIES:

1. Have students construct a "Burnham Park Museum" board game. Suggestions for components: 2 spinners, one directional and one to indicate the number of board spaces to travel; humorous instruction cards: "Go to the Egyptian exhibit at the Field Museum and kiss your mummy!"; bonus point question cards: "What kind of whales can you find at the Aquarium?"; "Where could you look up to reach for the stars? Send your playing piece to that location now."

2. Make a giant grid on the playground using chalk. Have one student form other classmates into a letter, shape or design by giving each a coordinate on the grid. (This may take advance planning by the caller on a smaller grid). If there is a classroom window that overlooks the playground, send someone up with a camera to take pictures of each caller's configurations.

3. Learn the song "Do the Circulation" from the science rock video mentioned earlier. Add choreography and perform it for the first grade or kindergarten.

4. Make a clay relief model (attached to a board) of the circulatory system including the heart, lungs, and part of the main artery and veins. Label your model and explain to someone at a different grade level the function of each of these parts in the human circulatory system.

5. Write two free verse poems, one about the real heart and how it functions in the body, and one about the figure of speech "broken heart." Have you ever had a broken heart? P.S. Don't get too mushy! Copy your first poem on the outline of a real heart. Copy your second poem on the outline of a Valentine Heart. Teacher Note: You might want to point out that a Valentine Heart is like a visual figure of speech. It's not the real shape of a heart, but everyone knows that it is meant to represent love, or the heart.

Student Data Sheet Masters

I'm Just Like the City of Chicago!
Student Data Sheet Master 6.1

Instruction Sheet for Field Trip

Student Names: Chaperone Name:

YOUR MISSION:
To boldly go where no third grade children have gone before! You are to locate and walk to three locations listed below, using your compass, your map, and your group leader to guide you. Remember, be careful out there!

DESTINATIONS:
1. Aquarium
2. Planetarium
3. Soldiers Field

Find the above destinations in order. Start each leg (a figure of speech meaning part-- not a real leg, if it were a real leg you would need three!) of your journey by using your compass to help you face in a northerly direction outside the entrance to each building, then, with the help of your map and you chaperone, answer the questions below and figure out which way to go next.

FROM THE FIELD MUSEUM TO THE AQUARIUM
1. Use your compass to help you face north.

2. Turn your map so that the N is at the top.

3. Look at your map and answer the following questions:

Is the Aquarium north or south of the Field Museum?

Is the Aquarium east or west of the Field Museum?

Please Return

Community Resource Curriculum Development

Evaluation Form

Name_____School_____

Address_____

City_____State_____Zip _____

Grade level(s) taught: _____

Subject area(s) taught: _____

Which unit/lesson(s) did you teach?

Describe the overall effectiveness of the activities:

Were the materials lists complete?

Did the lessons fulfill the stated objectives?

Were the diretions/steps clear?

Were the Student Data Sheet Masters helpful for your students?

What activities did the students enjoy most? Least?

What suggestions do you have for the revision of the CRCD curriculum?

Thank you for your help in evaluating our curriculum. We are planning to revise the materials for distribution to other teachers so your input is extremely valuable to us. Please return your evaluation to:

Community Resource Curriculum Development Project
The Chicago Academy of Sciences
2001 N. Clark Street
Chicago, IL 60614