unit

1 *Plants & Seeds*

Prior Knowledge

The student can

1. group by 10s
2. add and subtract with sums to 18
3. name geometric shapes such as square, circle, rectangle, oval (ellipse).

Mathematics, Science and Language Objectives

Mathematics

The student will

1. collect and summarize data on a graph
2. skip-count by twos and fives
3. demonstrate multiplication of four and five
4. measure length using standard and nonstandard units
5. construct geometric shapes
6. estimate the area of irregular shapes
7. find symmetry of objects
8. use addition and subtraction to summarize data
9. classify according to size, color and shape
10. write the cardinal numbers of sets less than 50.

Science

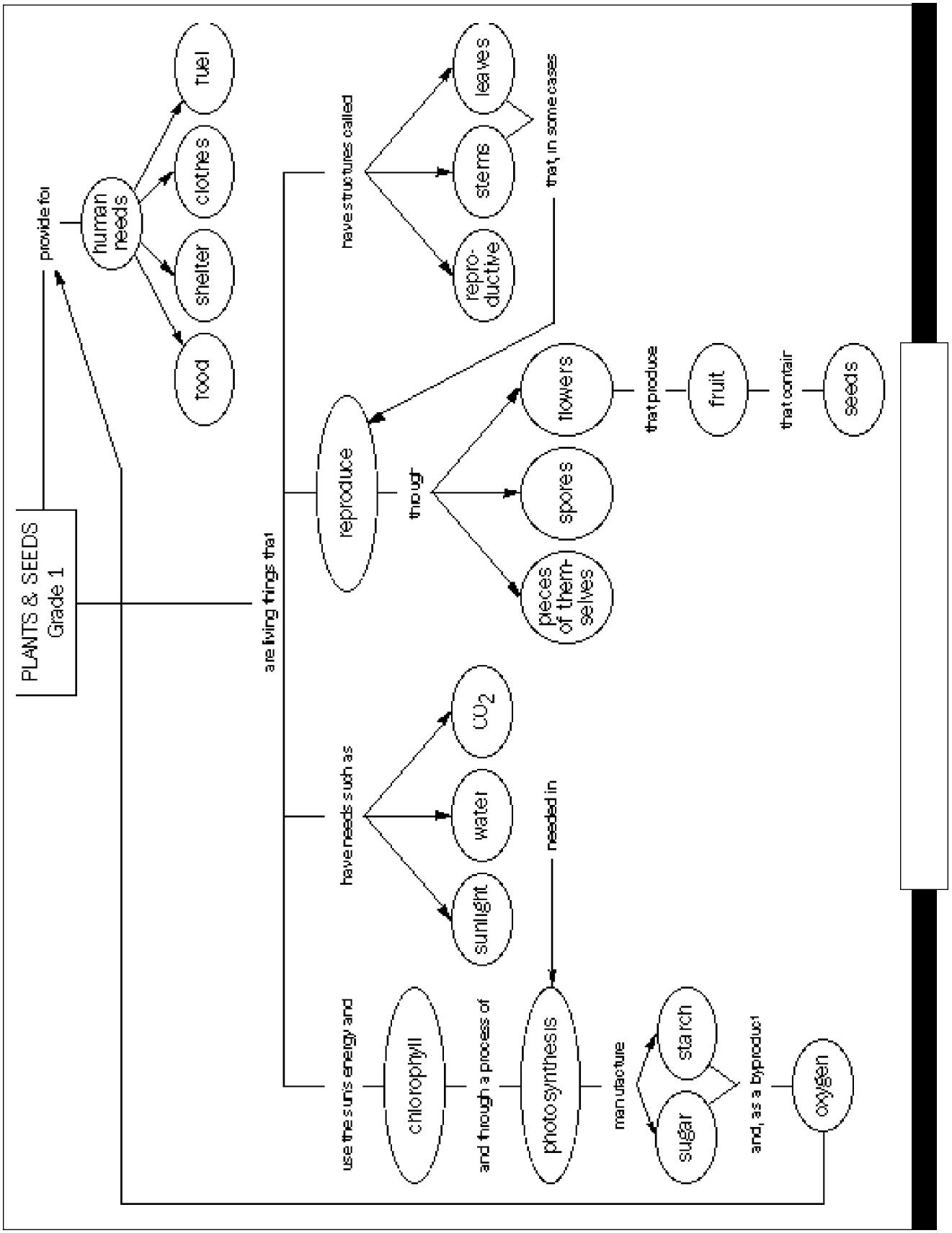
The student will

1. list, describe and identify plant parts
2. explain photosynthesis
3. measure time in days
4. compare and contrast changes in root and stem functions
5. identify cause and effect relationships of plant growth
6. describe a plant's reproductive system
7. list and describe growth of plants without seeds
8. describe growth of parasitic plants that don't require sun
9. predict results of phenomena.

Language

The student will

1. refer to favorite plant and seed books for information
2. describe experiments with plants and seeds
3. write or verbally describe a plant process
4. follow written directions to plant a seed
5. describe plants and seeds, verbally and in writing.


PLANTS & SEEDS
Grade 1
provide for
human needs
food
shelter
clothes
fuel
are living things that
use the sun's energy and
chlorophyll
and through a process of
photosynthesis
manufacture
sugar
starch
and, as a byproduct
oxygen
have needs such as
sunlight
water
CO_2
needed in
reproduce
through
pieces of themselves
spores
flowers
that produce
fruit
that contain
seeds
have structures called
repro-ductive
stems
leaves
that, in some cases

V O C A B U L A R Y

mold moho	nutrition alimento	plant planta	seed semilla	stem tallo
flower flor	bud capullo	node nudo	petal pétalo	germinate germinar
anther antera	stigma estigma	pollen polen	spore espora	photosynthesis fotosíntesis
leaf hoja	sprout brote, retoño	host hueste	sepal sépalo	one hundred cien
count contar	add sumar	subtract substraer, restar	group grupo	chlorophyll clorofila
parasite parasito	circle círculo	square cuadro	rectangle rectángulo	root raíz
embryo embrión, germen	own propio (a)	humus mantillo	fungus hongo, fungo	
vein vena, nervadura	phototropism fototropismo	ones unidades	tens decenas	
numeration numeración	place value valor de posición	group by tens hacer grupos de decenas		

● ● ● Teacher Background Information

Human beings, other animals and plants are the living organisms that exist on earth. Plants are the only organisms able to sustain themselves by producing their own food. In turn, they provide food for animals and humans, through the food chain.

Almost all plants have one common characteristic making them different from animals. Plants, such as trees, flowers, fruits and vegetables, produce **chlorophyll,** a substance that allows them to convert solar energy into nutrition, or food. Humans, as well as animals, on the other hand, obtain their nutrition either by consuming plants or by consuming other animals. Humans eat both meat and plants. Some plants, however, are not able to use sunlight and soil to produce their own source of energy. For example, molds are **parasites** obtaining their energy directly from the plant or animal they live on — **their host.** Furthermore, plants such as molds do not reproduce through seeds; they reproduce by creating spores.

Flowering plants grow from seeds. A sprouting seed must absorb water before it will start to grow. It must also have soil firmly packed around it and have warmth from the sun. Inside the seed is a tiny **embryo,** surrounded by stored food. When the embryo starts growing, roots grow downward and a stem grows upward. Once the stem breaks through the surface of the soil into the sunlight, the first two true leaves form and the plant begins to make its own food. When plants have water, sunlight and the proper minerals in the soil, they grow, manufacture food and give off oxygen.

Many plants do not have to grow from seeds. A potato, for example, is not a seed, but it can reproduce itself by growing roots from a specialized part of the potato. Other plants (some cacti) can begin to grow if a small piece of the plant falls on soil. After growing roots, if then the potato is anchored in the soil, it will receive nutrients and produce more potatoes. Some plants send out underground rhizomes that send up new plants periodically. Nonflowering plants grow from spores. Like a seed, a spore develops into an embryo. Unlike a seed, the spore does not contain food to enable the embryo to grow. The plant that develops must get its food from a host.

Molds are plants that grow on their hosts, taking nutrients directly from them. Molds do not require light or soil since they don't produce their own food the way other plants do, but they do require moisture. The food molds eat are the bread, jelly, cheese, fruit, flowering plants, rooting logs and leaves, etc. that they live on. These foods are called "hosts". Introduced information about molds so that there is no misconception about the two types of plants.

Although young children are familiar with plants, many may not have had the opportunity to examine them closely, to plant seeds and watch them grow. The first activities for this unit, then, will include working directly with plants to develop the main ideas and will include examining different aspects of plants and plant life. Students will learn about the parts of plants and their seeds and about the process of photosynthesis. Students will make distinctions among plants by examining and planting seeds, rooting vegetables and transplanting them. Students will grow molds and compare them to other types of plants.

Motivate students by having them design and construct terrariums to study plants and seeds and small animals. A terrarium is an artificial habitat for plants, which is often sealed so no new air can get in or out. Small animals placed in the terrarium will grow in an environment that sustains life.

Glossary

Leaves are where a plant's food is made by photosynthesis. Leaves take in carbon dioxide from the air, water from the soil and energy from sunlight.

Flowers are the reproductive parts of a plant. A flower's petals and its scent attract bees and insects to pollinate the flower. After pollination, the petals fall away and seeds develop in the part of a flower called the ovary. The ovary itself usually becomes what we call fruit.

Stems support the upper parts of plants. Water and dissolved nutrients from the soil travel up the stem in a system of tubes. Food from the leaves travels down the stems to the roots. Stems also store food.

Roots of plants anchor the plants in the soil. Water and minerals are taken from the soil through the roots. Many plants, such as carrots, store food in their roots.

Seeds contain a tiny embryo of a plant inside. The seed halves contain food that supplies energy and materials for growth until the plant grows its first leaves above the ground.

Petals are the brightly colored structures that form the outer part of the flower.

Buds are small lateral growths on the stem of a plant. Incompletely opened flowers, buds are not yet at full growth and development.

Nodes are thickened or swollen enlargements of a plant (as on the trunk of a tree).

Stigma is a portion of the pistil that receives the pollen grains.

Anther is the part of the stamen in seed plants that consists of microsporangia, develops and contains pollen and, though sometimes sessile, is usually borne on a stalk.

Sepal is a protective structure (like a petal) that covers the flower bud.

Pollen is a fine dust that on germination produces a tube that goes into the ovary.

Mold is a plant that does not produce its own food, growing directly on its host.

Slime Molds are naked creeping vegetative masses that live on hosts. Slime molds produce large flowing masses that join together and develop spores.

Spores are minute unicellular resting bodies that can produce a new vegetative individual when conditions become favorable.

Rhizomes are elongated tube-shaped stems or branches of a plant that produce shoots above and roots below the soil and from which a new plant can begin to grow.

Algae are unicellular vegetative and animal-like bodies. They produce chlorophyll that determines the plants' colors of green, brown, red.

Fungi are aquatic and terrestrial vegetative structures living on dead or decaying matter, or in symbiotic association with each other, **usually** for mutual benefit. A fungus has the form of a tubular branched filament that branches increasingly, intermeshing into irregular networks. Some filaments pack together in dense orderly patterns producing, for example, mushrooms. Like molds, fungi have the ability to produce spores and to disperse them for greater distribution.

Lichens are symbiotic associations of algae and fungi.

LESSON FOCUS

■ LESSON 1 *Plants Are Living Things*

BIG IDEAS Plants are living things that reproduce and have needs such as sunlight, water, and food including carbon dioxide and minerals. We can measure the growth of plants by length and area.

■ LESSON 2 *Using the Sun's Energy*

BIG IDEAS Photosynthesis is a process in which a plant uses light energy, chlorophyll, carbon dioxide and water to manufacture carbohydrates for plant food.

■ LESSON 3 *Flowers, Roots, Stems and Leaves*

BIG IDEAS Many plants have roots, stems, leaves and reproductive organs; the green leaves make plant food. Geometry helps us describe nature.

■ LESSON 4 *Plants Reproduce*

BIG IDEAS Plants reproduce through organs that we call "flowers", through organs that look like flowers or through making spores. One single plant can make many new plants and is said to "multiply" itself.

■ LESSON 5 *Pollination — from Flower to Fruit*

BIG IDEAS Pollination and fertilization are the first steps in the process of a new plant's development. We need large numbers to describe the many plants in nature.

■ LESSON 6 *Seeds*

BIG IDEAS Seeds are the fertilized ovules of a flower that grow to adult plants when planted. Fruits carry the plant's seeds and vary in size, shape and capacity. Subtraction helps us compare by finding differences among plants.

■ LESSON 7 *Plants Provide Many Human Needs*

BIG IDEAS Without plants, people could not live on earth; plants give us oxygen, food, shelter, clothing, beauty and many other things. We can summarize data about plants in different kinds of graphs.

OBJECTIVE GRID

Lessons	1	2	3	4	5	6	7
Mathematics Objectives							
1. collect and summarize data on a graph	•	•	•	•	•	•	•
2. skip-count by 2's and 5's							
3. demonstrate multiplication by 4 and 5							
4. measure length using standard and nonstandard units	•		•	•			
5. construct geometric shapes			•				
6. estimate the area of irregular shapes			•			•	
7. find symmetry of objects							
8. use addition and subtraction to summarize data	•		•			•	
9. classify according to size, color, or shape	•	•	•	•	•	•	•
10. write the cardinal numbers of sets less than 50.	•	•	•	•	•	•	•
Science Objectives							
1. list, describe and identify plant parts	•	•	•	•	•	•	•
2. explain photosynthesis		•					
3. measure time in days							
4. compare and contrast changes in root and stem functions	•	•	•	•	•	•	•
5. identify cause and effect relationships of plant growth	•	•	•	•	•	•	•
6. describe a plant's reproductive system				•			
7. list and describe growth of plants without seeds				•			
8. describe growth of parasitic plants that don't require sun				•			
9. predict results of phenomena.	•	•	•	•	•	•	•
Language Objectives							
1. refer to plant and seed books for information	•	•	•		•	•	
2. describe experiments with plants and seeds	•	•	•	•	•	•	•

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Lessons	1	2	3	4	5	6	7
3. write or verbally describe a plant process	•	•	•	•	•	•	•
4. follow written directions	•	•	•	•	•	•	•
5. describe plants and seeds, verbally and in writing.	•	•	•	•	•	•	•

LESSON 1

Plants Are Living Things

BIG IDEAS Plants are living things that reproduce and have needs such as sunlight, water and food including carbon dioxide and minerals. We can measure the growth of plants by length and area.

Whole Group Work

Advance Preparation

Bring some plants to class. As these plants grow, they will be used in other activities. The plants need to be kept alive until the end of the unit and then may be taken home. See suggested schedule for initiating the activities.

One week prior to initiation of unit, plant four-to-six nonflowering plants such as jade, moss and ferns

Obtain: four-to-six flowering plants with flowers, roots and leaves
four-to-six vegetables such as potatoes, carrots, beans, cabbage, chiles
15-20 containers with lids
Magnifying lenses
A balance to mass the plants
Sheets of clear plastic to roll into tubes
Collection of buttons of various sizes
Play-money coins
Pinto beans
Glass tumblers
Sponges

Materials

Books: **Jack and the Beanstalk** by B. Schenk de Regniers and **Everything Grows** by Raffi & B. McMillan, placed later in the **Library Center**
Several different plants, at least one a flowering plant
A picture of a flowering plant
A collection of various types of seeds
Word tags: petal, bud, node, stigma, anther, sepal, leaf, stem, root

Encountering the Idea

Read the story of **Jack and the Beanstalk** to the students, stressing the unusual way the bean plant grew. Is this the way plants grow? Was the plant alive? How do you know? Show students several of the plants brought to class. Ask: Are plants living or nonliving things? How do you know? (They grow, live, die, reproduce, have needs, etc). The students examine plants by noting shape, color, types of leaves, flowers, patterns in the leaves or flowers, etc. Ask students to describe how the plants are alike. (They need water, food and sun.) Tell students that in order to learn more about plants, they will make individual terrariums (or one large class terrarium) in which they will plant seeds that they'll watch grow into

adult plants. See **Activity** — Making a Terrarium. Tell students that in order to study plants, we have to collect data, or information, about the plants so we can see how plants grow, change and reproduce.

Exploring the Idea

Students begin exploring plants by examining different types of plants — flowering plants and nonflowering plants (including vegetables) in the **Plant Center.** Tell students that observing a plant means looking at the different plant parts and guessing their function — what each part does. Point out that some of the plants have flowers and others do not. Do **Activity** — Plants. Tell students that they will continue making observations on a daily basis at the **Plant Center.**

Take a plant and examine its different parts. As you point to a part, ask students to name it, if they can. Tell them the function of each part. Use a picture to show the parts.

At the **Mathematics Center,** the students measure length and estimate area of the leaves.

How fast do plants grow? How much new area do they cover each day? Make a chart to keep track of how much the plants grow each day. Do **Activity** — Measuring Area or Cover. This is part of a daily (or weekly) observation routine to collect and summarize data on a table.

Seed Collection

Each student begins a seed collection: selects different seeds, glues them on a chart and labels them as she/he learns the names.

Getting the Idea

Reconvene the students and again, showing the various plants and/or pictures, have students point to each of the plant parts they have investigated: leaves, flowers, stems, roots and seeds.

Since each part of a plant has an important function, discuss it while pointing out the plant part.

Organizing the Idea

Tell the students they will be learning about living things — plants — in this unit and that in order to learn about living things they will have to make many observations because living things change. In order to collect and summarize data, we have to organize what we are going to do and how we are going to do it. At this point the students begin **Activity** — Making a Terrarium and **Activity** — Beans in a Baggie. Students begin **Activity** — Plants Have Special Needs. These activities require that students begin the activity and then make observations of the plants to note their growth and other change; consequently, the plants will need time to grow.

Closure and Assessment

What did we learn from reading **Jack and the Beanstalk**?

How do you know that plants are living organisms?

Can we see plants grow? If we can't, then how do we know that they are growing? (Measuring and counting help us see the differences in the plants.)

What things about a plant can we measure that show the plant is changing? (Area or cover and length.)

How do we measure cover or area? (With another cover, or with a unit area.)

How do we measure length? (With another length, usually a ruler that shows standard units of length.)

Name some of the important parts of a plant and point to (and/or draw) them as you say them.

What part of the plant makes a new plant usually? (The flower part.)

List of Activities for this Lesson

- ▲ Making a Terrarium
- ▲ Plants
- ▲ Measuring Area or Cover
- ▲ Plants Have Special Needs
- ▲ Beans in a Baggie

ACTIVITY

Making a Terrarium

Materials

Potting soil — activated charcoal, crushed rock, pebbles or broken clay pots
Small plants
Various containers (one-gallon clear wide-mouthed bottle; clear plastic shoe box; one-gallon plastic milk bottle cut in half; a large fish bowl)

Procedures

1. Select a display area in diffused light.
2. Determine how many and what type plants will be included in the terrarium. Determine the size of the plants by the size of the container.
3. Choose a container — glass or plastic. Humidity is the key to a thriving terrarium garden. Find airtight coverings that can be removed periodically.
4. Prepare the soil layer.
   a. Use only a sterilized commercial potting mix, or make your own.
   b. Make your own potting mix. Blend equal amounts of
      1. coarse river sand
      2. garden loam or good garden topsoil
      3. one half each charcoal and perlite
      4. spread mix on baking sheets and sterilize by baking in a 300˚ oven for at least 30 minutes
      5. place bottom drainage layer as follows
         (a) crushed rock, pebbles or broken clay pots
         (b) a second layer — charcoal
         (c) a top layer — potting mix.
   c. Use a fertilizer only initially. Fertilizers tend to speed up plant growth to an undesirable extent.
   d. Plant selected plants in the potting soil.
   e. Add stone, wood or accents.
   f. Add small animals such as newts and salamanders (optional).

Teacher Information

Large terrariums may be sealed; they continue to grow and develop for many months. The plants will continue to produce oxygen, and moisture will be released in the air and may form water droplets inside the container. The terrarium is then said to be **balanced.** As a class project, you may want to convert a 10-gallon aquarium by including plants and animals such as newts and salamanders.

It is important in balancing a terrarium that you choose plants that require similar amounts of moisture and sunlight.

ACTIVITY
Plants

Objective
The students describe the plants and seeds, analyze and categorize them.

Materials
Two flowering plants of any type, with flowers, roots and leaves
Two nonflowering plants such as jades, mosses, ferns
Two vegetables, such as potatoes, carrots, cabbage, beans, chiles

Procedures
1. Students examine each plant and describe it.
2. As students describe the plants, the teacher writes the appropriate name of the plant part on a strip of poster board to begin a vocabulary list. The list includes: roots, stem, leaf, node, flower, flower bud, petal, stigma, anther, seeds, sepal and others.
3. Students draw pictures of what they have observed and write the name by each new plant part they discover.
4. The students list the similarities and the differences between flowering and nonflowering plants in their journals.

M	*T*	*W*	*Th*	*F*
Week 1: Students plant beans in different containers. See **Activity** — Plants Have Special Needs Students place potatoes and carrots in containers. See **Activity** — Beans in a Baggie, Lesson 1 **Week 2:** 1. Initiate **Activity** — What Is Mold? 2. Begin Seed Collection **Week 3:** Some of the plants (from week 2) are turned upside down **Week 4:** Continue observation	Begin Seed Collection Observations made on a daily and weekly basis	Form Categories for seeds	Categorize new seeds	Begin observations as to growth — measuring length and area as soon as possible

Suggested Schedule

* Student groups, or the entire class, can make this chart.

ACTIVITY
Measuring Area or Cover

Objective

Students estimate circular and elliptical areas using nonstandard circular units; students say that the estimates are rough because the buttons (coins or disks) do not cover all the area.

Materials

Bread with mold growth (must be started a week before activity); buttons, coins, etc.

Phase I

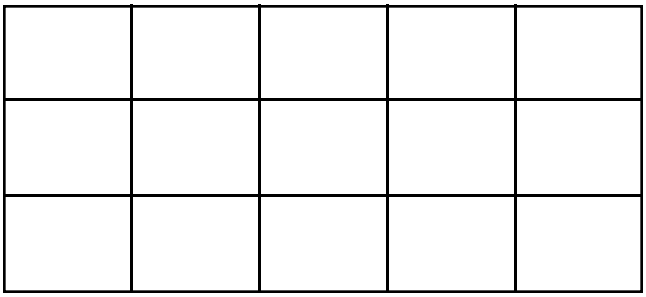
Students begin to measure with nonstandard units the growth of a mold grown on bread, using buttons of the same size or coins to blanket or cover the mold. In measuring an area the same size button, or coin is used to find the area. For example, students can use pennies. However, they can also use nickels. The area of the mold remains the same, but since nickels are larger, fewer nickels will cover the same area. The students make a chart to compare the growth using different circular areas for comparison.

	red button	***white button***	***dime***	***penny***	***nickel***	***quarter***	***other***
Day 1							
Day 2							
etc.							

Phase II

After students have estimated areas using a coin or disk, they use a grid on a transparent sheet marked in centimeters and determine the growth.

Copy the grid below on a transparency and have students estimate the growth of the molds in square centimeters.



Teacher Information

Students' first notion of area can be related to the idea of a cover or blanket. Students may have already had experience measuring length and the area contained in rectangular shapes. The problem in measuring mold growth, however, is that molds usually grow in circular or oval shapes. It is more difficult to measure circular areas than rectangular ones.

ACTIVITY
Plants Have Special Needs

Objective

Students plant beans in different containers and treat them differently to determine their needs for sunlight, water, air, nutrients and a place to anchor their roots, which is usually the soil.

Materials

For each student group:

20 - 25 beans; absorbent paper towels; four small plant pots or four large baby food jars; self-adhering labels; kitchen plastic wrap

Procedure

1. Label each pot or baby food jar with one of these labels:
   #1. no water
   #2. no sun
   #3. no air
   #4. has water, sun, air, soil
   #5. Fold a paper towel into fourths and label it: No Nutrients (soil).
2. Plant and water three - four beans in each pot or jar that has been labeled
3. **DO NOT WATER** the pot labeled: No Water.
4. Cover and seal the entire pot or jar labeled **"no air"** with plastic wrap.
5. Place three -four beans inside the folded paper towel; wet the towel.
6. Put each of the jars or pots and the paper towel in a window sill or sunny place. Place the one labeled **"no sun"** in a closet or another place where it will be in darkness.

The students observe the plants at approximately the same time every day. They make observations in their journals and chart and date the entries on the growth of each of the plants. When the plants have had time to grow, the students speculate about the needs of each plant. They give reasons for why the plants grew or not and what the plants needed. They also explain how they know that a plant needs all these things.

Plants Need Water, Sun and Air

Each student group has a set of plants that have been given different care treatments. The students review what each plant **was given and was not given.** The students collect the data from each of the groups and combine it into one class chart.

The student groups organize the data and refer to it and discuss which of the plants have grown and which ones have not and speculate as to what caused some of them to die.

	no water	*no sun*	*no air*	*no soil*	*water / sun / air / soil*
Day 1					
2					
3					
4					
5					

ACTIVITY

Beans in a Baggie: Part 1[1]

Advance Preparation

Prepare for this activity during the first day of the unit and continue during the third lesson; it takes about four days for the seeds to germinate.

Objective

Students make and record observations of plant growth and measure length and time.

Materials

For each student group:

Two clear plastic tumblers (or clear plastic bags)
Two sponges that will fit around the inside of the tumblers
Eight to 10 beans that have been soaked overnight for each tumbler
Powerful magnifying glass

Procedure

1. Place a wet sponge around the inside of the plastic tumblers.
2. Place the beans evenly between the sponge and the tumbler (some of the beans close to the rim of the tumbler), all the way around.
3. Place one tumbler in a warm, sunny place, and place the other in a closet.
4. After the beans have begun to germinate, take out a single bean from each of the tumblers and examine under a magnifying glass. Measure the length of the sprout in centimeters daily. Compare the two sprouts.
5. Make predictions about the growth of the beans.
6. Draw pictures in the journals.
7. Each student group makes a chart:

A Bean Grows

	Predict	*Observed*	*Date*
1. Which grows first, the stem or the root?	_____	_____	_____
2. How many days will it take for the bean to sprout?	_____	_____	_____
3. How many days before the leaves come out?	_____	_____	_____
4. How long is the root the first day it shows?	_____	_____	_____
5. How long is the stem the first day it shows?	_____	_____	_____
6. What color is the root the first day?	_____	_____	_____
7. What color is the stem the first day?	_____	_____	_____

[1]Students continue this activity in Lesson 3.

LESSON 2

Using the Sun's Energy

BIG IDEAS Photosynthesis is a plant process in which a plant uses light energy, chlorophyll, carbon dioxide and water to manufacture carbohydrates for plant food.

Whole Group Work

Materials

Book: **A Sunflower as Big as the Sun** by S. Ellentuck
Growing plant with large leaves
Cardboard squares or black construction paper
Apples, oranges, potatoes, celery, carrots, turnips; 24 soda crackers
Medicine droppers; tincture of iodine (one bottle)
Lugol's solution[1]

✘ Warning ✘

Lugol's solution is highly toxic, as is tincture of iodine. Warn students **not to taste** any of the materials containing the iodine.

Word tags: photosynthesis, chlorophyll, sugar, starch, iodine
Reference books and encyclopedias for students to read about sugar and starch

Encountering the Idea

Read **A Sunflower as Big as the Sun.** After reading, ask the students why the villagers were concerned? Why do you think a sunflower has that name?

Students discuss the idea that all living things — humans, plants and animals — need food in order to live. They discuss how this food is obtained. What do we like to eat? What do animals like to eat? Horses? Cows? Cats? Dogs? What is a plant's food? Yes, plants need water. What else? Tell the students that they have begun some activities that will help them learn how plants make their own food.

Exploring the Idea

At the **Science Center,** students work in pairs.

1. The students observe that leaves reach for the sun. Place one of the plants next to a window for three days. If the sun is shining brightly, the students can see the plants begin to seek the light in a matter of a few hours. Rotate the plant 180˚ and allow it to stand for another three days. Students make observations of the plant on a daily basis and describe what they see. (The leaves of the plant turn toward the window. Rotating the plant changes the direction of the leaves, but within a few days they turn back toward the light.)

[1]Test for starch: Lugol's solution may be purchased from commercial suppliers of science educational materials, obtained from a local high school or prepared: dissolve 10 g of potassium iodide in 100 ml of distilled water; then add 5 g of iodine. Only a few drops of the solution are necessary for the test. A change to a blue-black color is a positive test.

2. Students continue with **Activity** — Leaves, Sun, Roots and Gravity, in which they grow a plant and then turn it upside down and keep it in that position for several days. The students observe how the leaves turn to the sun and the roots turn downward.
3. The students complete **Activity** — Sugar and Starch.
4. Select for special observation one of the plants with large leaves that has been growing for several days. Completely cover one of its leaves with pieces of cardboard, or black construction paper, and seal with tape to ensure that no light gets to that leaf (sandwich the leaf in between the two pieces of paper). After the plant has grown in the sun several days, remove the cardboard from the leaf. The students describe the difference in the color of that leaf and of the other leaves. Ask the students to note the similarities and the differences between that leaf and the leaves of plants that were grown without light (in the closet).

Students continue with **Activity** — Flower Magic.

Getting the Idea

After the students have had an opportunity to conduct all of the experiments above, ask them what they think a plant needs besides water. Yes, plants need light. They need the energy from the sun to produce food. The process of producing plant food is called **photosynthesis.** Write the word **photo - synthesis** on a poster board. Ask the students to read the first part and tell what it sounds like. "Photo" refers to light. The second part, "synthesis", means to "put together." "Photosynthesis", then, means to put together with light. The students discuss what is "put together with light." (Water, nutrients from the soil, carbon dioxide from the air and light energy are synthesized into sugar and starch through photosynthesis.)

Discuss with students what they found when they tested the fruits and vegetables. How did we test for sugar? (Tasted.) Where did the sugar come from? The plants manufactured it. How did we test for starch? (Used the iodine test.) Where did the starch come from? The plants made it.

Ask the students to describe what happened to the leaf covered by paper that could not get sunlight. Yes, it turned pale yellow to white, like the plants in the closet. When a plant is using light to produce food, it is green. That means that **chlorophyll,** a substance produced by the plant, is working to change the sun's energy into food for the plant.

Green plants produce food and oxygen from water, carbon dioxide, minerals and light energy through the process of photosynthesis. They take in carbon dioxide from the air, water and minerals from the soil and energy from sunlight. During photosynthesis, carbon dioxide and water unite in the presence of chlorophyll to form sugar and oxygen. The green plant uses some of the food it makes to grow and produce leaves and fruit. The plant converts the remaining food to starch and stores it. Where was starch stored in the plants we observed?

If students show interest about why plants turn toward the light, you may discuss the following: Plants contain a chemical called **auxin** that promotes the lengthening of plant cells. A buildup of auxin occurs on the dark side of the plant stem. The extra auxin causes the cells on the dark side to grow longer forcing the stems to bend toward the light. This movement toward light is called "phototropism". "Photo" means light and "tropism" means movement.

Applying the Idea

In groups of four, students discuss and report on the following problem: Suppose you had some very special plants that you were growing, and the sun did not shine for many days. One day your special plants began looking wilted and had lost some of their green color, even though you had watered them and taken care of them. What could you do to help them until the sun came out again?

Closure and Assessment

1. What was the lesson(s) learned in **A Sunflower as Big as the Sun**?
2. Verbally explain, or draw and label, how plants make their own food. What do they use and what do they produce during photosynthesis?
3. What is photosynthesis? (A process.)
4. What is chlorophyll? (A substance manufactured by plants.)
5. What part of the leaf faces the sun?
6. Using a fruit and/or a vegetable, show where a plant makes and stores its food.
7. How do plants make sure they get enough sunlight?

List of Activities for this Lesson

▲ Leaves, Sun, Roots and Gravity

▲ Sugar and Starch

▲ Flower Magic

ACTIVITY
Leaves, Sun, Roots and Gravity

See Advance Preparation, page 9

Objective

Students observe that plant leaves turn toward the sun for energy and plant roots turn downward in the direction of gravity.

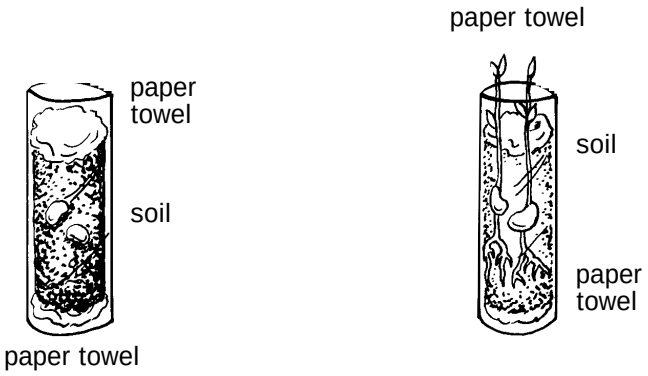
Materials

For each student group:

Several beans; planting soil; a clear plastic tube, approximately six inches long and about 1 1/2 inches in diameter, can be made of a plastic sheet wrapped into a tube and sealed to prevent water from seeping out—the two ends of the tube are left open; absorbent paper towels; water

Procedure

1. Plant the beans in the moist soil inside a plastic tube; plant the beans close to the edge of the tube. Secure the soil and seeds in the tube by placing wet paper towels into each end of the tube.
2. Place the tube on one end in a sunny, warm place and secure it so it will not turn over.
3. On a daily basis, water the beans through the paper towels.
4. After the beans have sprouted and the roots and stems are visible, turn the tube upside down and secure it in the same location.
5. When the plant begins to turn its roots and leaves, the students make and write their observations.
6. After several days, place the tube right side up; again the students make and write their observations.



Discussion

1. Explain in your own words what makes the plants' leaves turn up? (Phototropism.)
2. Explain in your own words what makes the plants' roots turn down?

ACTIVITY
Sugar and Starch

Objective

The student say that sugar and starch are two foods produced by green plants.

Materials

For each student group

two soda crackers; pieces of bread, corn tortilla; medicine dropper; tincture of iodine; apple, orange, pineapple, potato, celery, carrot, turnip, other fruits and vegetables

Procedures

1. Students cut open the fruits and vegetables and describe them, noting that the inside part is moist, both in fruits or a vegetables.
2. The students taste the fruits and vegetables and describe the taste — sweet, sour, salty, or bitter. What is the texture of the food? Grainy, smooth, has fibers, hard and tough to bite, "mushy", other. What food is in the fruits and vegetables? Yes, sugar and starch.

✘ Warning ✘

Lugol's solution is highly toxic, as is tincture of iodine. Warn students **not to taste** any of the materials containing the iodine.

3. On a piece of potato, the teacher places a couple of drops of iodine. The students note that the iodine turns blue. The teacher explains that the test for starch in a food is that if the iodine turns blue, then the food has starch.
4. The students test the various fruits and vegetables for starch on different parts of the plant. The students should not taste items that they have tested for starch with the iodine.

plant	*taste*	*texture*	*test*	*Where is starch? stem, roots, fruit*

Discussion

1. What is a test? When we say that we are testing for starch in a plant, what does that mean?
2. Which foods have starch? Which foods do not have starch?
3. Where did you find that foods store the starch?

ACTIVITY

Flower Magic

Objective

Students describe how a plant winds its way toward light.

Materials

Shoebox with lid; paper cup; three pinto beans; cardboard; scissors; tape; potting soil

Procedures

1. Fill the cup with potting soil.
2. Plant the beans in the soil.
3. Moisten the soil and allow the beans to sprout (about five to seven days). Be sure to keep the beans moist, not wet.
4. Cut two cardboard pieces to fit inside the shoebox. Cut holes in each of the cardboard pieces to allow the plant to pass through.
5. Secure the cardboard with tape to form a maze that the plants will follow.
6. Cut a hole in the lid.
7. Place the bean plant inside the shoebox at one end.
8. Secure the box lid with the hole on the opposite end from the plant.
9. Open the lid daily to observe the plants' growth.
10. Water the soil as needed.
11. Continue to observe until the plant grows out the hole in the lid.
12. Students discuss their observations with the class.

LESSON 3

Flowers, Roots, Stems and Leaves

BIG IDEAS Many plants have roots, stems, leaves and reproductive organs; the green leaves make plant food. Geometry helps us describe nature.

Whole Group Work

Advance Preparation

Early in the day, place the carnations or the celery stalks in the jars of colored water. In time the students observe that the celery or carnations are turning the same color as the water they were in.

Materials

Book: **The Pumpkin Patch** by E. King
Counting or Cuisenaire rods or different-size geometric shapes
Five to eight different types of plants; several large blades of grass for each student group
Select one plant that has a large root that can be examined by a powerful magnifying lens
Three stalks of celery cut at an angle or three white carnations with stems cut at an angle
Three jars containing water colored dark red or blue with food coloring
Magnifying glasses
Word tags: parallel, intersecting, symmetry,

Encountering the Idea

Read **The Pumpkin Patch.** Begin discussion by reviewing the idea that all living things need food to grow and reproduce. What is a plant's food? Water, and what else? Tell students that they will complete a number of activities at the **Science Center** that will help them answer this question. At the **Mathematics Center,** they will discover how geometry helps us describe nature.

Exploring the Idea

Students complete **Activity** — Important Leaves.
Students complete **Activity** — Fall Leaves.
Students work on **Activity** — Beans in a Baggie.

Activity 1: Parts of Plants

In this phase of the lesson each student group takes five to eight different types of plants per group and separates each plant into the parts they can detect. The students examine the plants by cutting them into parts, labeling the parts and drawing them in their journals.

Each group reports what they found. As they describe their plants in color, stems, roots and flowers, ask them to pay special attention to the leaves. How are

the leaves alike or different? Do they have smooth or rough (saw-tooth) edges? Do the leaves have something that looks like veins? Students draw their observations. The teacher gives the students the appropriate name for each plant part and writes the names on a poster board. Each student can point to: the stem, the leaf, the root and the flower. Point out other parts if the students ask about them.

Plant	
Color	_____
Leaves	_____ edge
	_____ veins
Stem	_____
Roots	_____
Flowers	_____

Activity 2: Roots and Stems

At the **Science Center,** the students describe to each other their observations of the carnations and/or celery stalks placed in the jars of colored water and draw the results in their journals.

At the **Mathematics Center,** the students

1. complete **Activity** — Petal Fun.
2. complete **Activity** — Tens and Ones.
3. complete **Activity** — Math Trees.

Getting the Idea

In light of the new information the students have received about roots, stems and leaves, discuss photosynthesis. Discuss chlorophyll.

Additional questions for discussion

1. Describe these leaves to someone on the telephone who has never seen them.
2. What is the same about these leaves?
3. How are some of the leaves different?
4. What can you say about the color of these leaves?
5. What can you learn by touching the leaves? By smelling them?
6. What can you say about the shapes of the leaves?
7. How long were your longest and/or shortest leaves?
8. Why did different students get different measurements for their leaves?
9. How did the leaf look different when you looked through the magnifying lens? How were the veinlike structures the same or different? Can you use a word from geometry to describe the veins on these leaves? (Networks, parallel, intersecting.)

Organizing the Idea

Each group draws and labels with the appropriate names in their journals the plant parts they observed. The students may place several plants in a book to press. After the plants have been pressed, students discuss the function of the

roots, root hairs and stems of the plants. (Roots: to anchor the plant, and to obtain water and food or nutrients; stem: to transport the water to the leaves, flowers.) The students attach plants to cardboard and label the appropriate parts.

Students report to the class the results of the new plant growth in the "Baggie" experiment.

The students hypothesize as to why the plants turned the color of the water in the experiment with the carnations or celery stalks in the jars. After they offer suggestions, tell them that the tiny tubes they could see in the cuts are called **xylem.** The xylem run up the stalk to the flower petals or leaves. The colored water moves through the xylem allowing the color to be distributed throughout the cells in the petals, causing the color change. Minerals in the soil are carried to plant cells in this way, providing nutrients to the flowers and leaves. The minerals dissolve in water as did the red and blue coloring. The mineral-water solution travels up to the leaves and flowers, where the dissolved materials remain, as did the red or blue color.

Closure and Assessment

Performance Assessment

1. Draw three parallel lines.
2. Draw a network that shows the veins of some leaves.
3. Draw in sequence the growth of roots, stems, leaves and flowers.
4. Draw a tree that has one line of symmetry.
5. Draw a flower that has two lines of symmetry.

Written Assessment

1. Why are leaves important to plants?
2. What color are plants that make food through photosynthesis? (Usually green with some exceptions, i.e. the Wandering Jew.)
3. What is the function of roots? Stems? Flowers?

List of Activities for this Lesson

- ▲ Important Leaves
- ▲ Fall Leaves
- ▲ Beans in a Baggie
- ▲ Petal Fun
- ▲ Tens and Ones
- ▲ Math Trees

ACTIVITY
Important Leaves

Objective
Students say that plants take in carbon dioxide and use it to manufacture their food in the green leaves.

Materials
Leaves gathered previously (include a bean plant and grass leaves); heavy book; picture of a plant similar to the one below; sheet of paper; magnifying glass; knife or single-edge razor blade

Procedures
1. Use the leaves you brought to school and spread them flat on your desk.
2. Look at them carefully and compare their roots, stems and leaves.
3. In what ways are they alike? In what ways are they different? Can you think of reasons why?

Network of veins (bean)

Veins run parallel (grass)

Choose some of your most interesting leaves and spread them out on a piece of paper. Put a heavy book on top of them. This is called "pressing". After several days, remove the weight.

Leaves are very important to plants and to many forms of life on earth.

4. Select a bean leaf and a grass leaf. Describe each one. How are the leaves alike? Different?
5. Each leaf has veins. Are the veins arranged in the same way? The bean leaf has a main "spine" and tiny veins extend from it. The grass has veins that run alongside each other, parallel to each other.
6. What are the veins for? Cut a leaf at a vein. Look at it with a magnifying glass. What is in it? (A liquid.)
7. What do you think that liquid is?

Teacher Information
Leaves are important to many plants because leaves manufacture food through their "chlorophyll factories." Plants also "breathe" through their leaves. In the daytime, during photosynthesis, leaves give off oxygen. In darkness, their chlorophyll factories shut down, but the plants still produce carbon dioxide. During this time they also use oxygen or respire as we do. Pressing, preserving and displaying leaves in creative ways may add aesthetic dimensions to the unit. One way to preserve leaves is to laminate them in a dry-mount press. Pressing them with a warm iron between sheets of waxed paper will also preserve them.

ACTIVITY
Fall Leaves

Objective

Students measure length and width and estimate area.

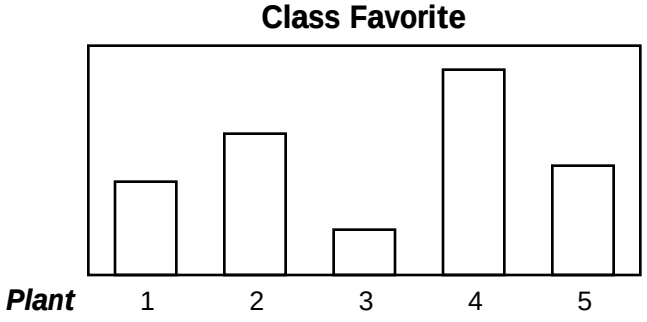
Materials

Poster board for group record of investigation; rulers; magnifying glasses; leaves collected by students taped or glued and labeled on a large poster board

Procedures

1. Using the magnifying glasses, the students describe the leaves on the "leaf board" to each other and record their observations.
2. The students measure at least four of the leaves.
3. The students point out the leaves' veins, the colors, the type of edge (smooth or rough) and the size.
4. The students decide where, on the leaf, they will measure the length and width.
5. The students estimate the area with coins or the square centimeter grid and record it.
6. The students report the length of the longest or shortest leaf, and the widest or most narrow leaf, and the one with the largest or smallest area.
7. The children select and graph their favorite leaf on the "leaf board."
8. The students draw a picture of what the leaf they selected looks like through the magnifying glass.

Plant	*Leaf (color, edge)*	*Length*	*Width*	*Area*



ACTIVITY

Beans in a Baggie: Part 2[1]

Advance Preparation

Prepare for this activity during the first day of the unit and continue during the third lesson; it takes about four days for the seeds to germinate.

Objective

Students make and record observations of plant growth and measure length and time.

Materials

For each student group:

two clear plastic tumblers (or clear plastic bags)
two sponges that will fit around the inside of the tumblers
eight to 10 beans that have been soaked overnight for each tumbler
Powerful magnifying glass

Procedure

1. Place a wet sponge around the inside of the plastic tumblers.
2. Place the beans evenly between the sponge and the tumbler (some of the beans close to the rim of the tumbler), all the way around.
3. Place one tumbler in a warm, sunny place, and place the other in a closet.
4. After the beans have begun to germinate, take out a single bean from each of the tumblers and examine under a magnifying glass. Measure the length of the sprout in centimeters daily. Compare the two sprouts.
5. Make predictions about the growth of the beans.
6. Draw pictures in the journals.
7. Each student group makes a chart:

A Bean Grows

	Predict	*Observed*	*Date*
1. Which grows first, the stem or the root?	_____	_____	_____
2. How many days will it take for the bean to sprout?	_____	_____	_____
3. How many days before the leaves come out?	_____	_____	_____
4. How long is the root the first day it shows?	_____	_____	_____
5. How long is the stem the first day it shows?	_____	_____	_____
6. What color is the root the first day?	_____	_____	_____
7. What color is the stem the first day?	_____	_____	_____

[1]Students began preparing this activity in Lesson 1.

ACTIVITY
Petal Fun

Objective

Students use counting to mass and descibe flower petals.

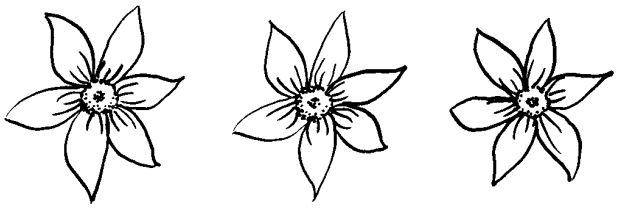
Materials

Four flowers for each student group

Balance to mass leaves; objects to mass leaves and/or flower petals, such as paper clips or staples

Procedures

1. Students examine different flowers, count the number of petals and describe the shape of the petals.
2. The students make flower shapes of their own and describe them, noting the differences between the shapes of their flowers and the ones they examined.
3. Students count the total number of petals. In counting the petals, for example, they count three groups of six petals each, which gives a total of 18, or they skip-count by twos and fives.
4. The students find symmetry in the flowers, if the flowers have it. For example:



Questions

1. How many leaves are on each branch of the flower? Count by twos and also by fives to check.
2. How are the flowers the same or different in shape, size and thickness of the leaves and of the petals?
3. How much does a leaf mass? Since you cannot mass one leaf with your scale does that mean that leaves do not have mass? Explain.
4. How many leaves do you have to put together to begin to mass them with the balance you have in class?

Plant	*Number of petals on the flower*	*Mass of 5 petals (staples)*

5. Do flowers have different numbers of petals?
6. Do some numbers appear more often than others? Which ones? Are two, three and five common numbers?

ACTIVITY
Tens and Ones (Decenas y Unidades)

Objective

The student counts any given set of leaves (or seeds) by grouping by 10s and ones.

Materials

Cuisenaire rods; laminated place value chart; three sets of dot number strips with zero through nine dots on each strip; erasable markers; pair of dice; Unifix cubes; popsicle sticks in singles and bundles of 10

Prior Knowledge

1. The students can count to 10 (make sets of 10), can make any number of sets of 10 (three sets of 10, etc.).
2. Students can count by saying the number names and matching them one to one with the objects in a set, e.g., making cube chains of a given length lesser than or equal to 10.
3. Given a set lesser than or equal to 20 objects, students can group by 10s and write on a place value chart (PVC) the number of 10s and the number of ones in the set.
4. Given a numeral lesser than or equal to 20, students can represent it with cubes or other counting objects.

Procedures

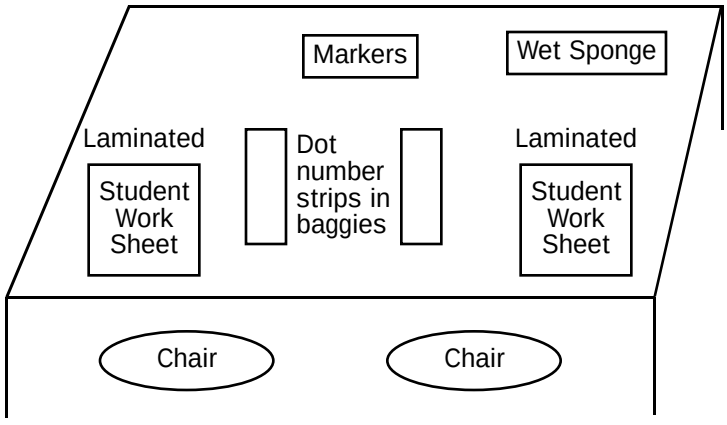
At most two students work at the center.

Completed Center
1. Ana 3/25
2. Joe 3/25
3. Rosa 3/26

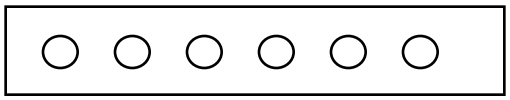
NUMERATION (PLACE VALUE)

PLACE VALUE BOARD

Tens	Ones
Decenas	Unidades



1. Remove **dot number strips** from the plastic bag and shuffle. Place the strips face down on the table. The first player (FP) picks up one number strip and then another. Using the two numbers from the strips, the player finds the total number of dots by counting and writes the corresponding addition number sentence on the laminated student work sheet. The sum of the two numbers on the number strips is the number that the student will construct on the adjacent PVC. The second player (SP) checks the first. They take turns writing the number sentence and constructing the numbers.
   Dot number strip for six:



6 + 7 = 13

T	O
D	U
1	3

2. Roll **a pair of dice**, one at a time, to get two numbers that will represent the 10s place and the ones place. The first die gives the 10s place. The second die gives the ones place. The student constructs the number with Unifix cubes and writes it on the PVC. Players take turns.
3. Shuffle and stack **numeral cards** that have a given number of dots on one side and the corresponding numeral on the back. The FP picks a card; the SP picks a second card. The FP makes the corresponding numeral using rods, cubes, popsicle sticks, etc. The SP checks. The two players alternate making the numeral and writing it on the work sheet.
4. Continue these activities, but the numbers change to sets lesser than or equal to 20. Students may add more numbers as they begin to understand the concept.

Assessment

Do student assessment for this activity on an individual basis. The teacher need not give more than three examples of each of the two tasks below to check for mastery of the objective. Students who are unsuccessful in the assessment repeat the activities playing both with students who have completed the work in the activity and those who may need more work.

1. The teacher gives the student a number of objects lesser than or equal to 20. The student counts the cubes to 10 and says or writes the corresponding number of 10s and ones on a laminated place value chart.
2. The teacher gives the student a numeral lesser than or equal to 20. Then the student constructs a number with the corresponding number of 10s and ones using cubes, rods, etc.

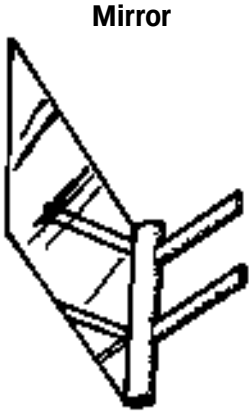
ACTIVITY
Math Trees

Objective
The student constructs trees using given shapes. The student finds lines of symmetry, if shapes have them and finds parallel and intersecting lines.

Materials
Different-size counting sticks, Cuisenaire rods and geometric shapes
Small mirror per student group

Procedures
Students work in pairs or small groups.

1. The students make tree shapes using different-size Cuisenaire rods, counting sticks and geometric shapes.
2. The students describe and discuss the shape of their trees to their partners. In counting branches, they skip-count by twos and fives.
3. One way students can observe the trees is by looking at the opposite edges of the rods. These edges are parallel to each other. When two or more lines drawn on a sheet of paper are always the same distance apart from each other, we say they are parallel. When lines touch or cross, we say they intersect.
4. Students find other edges on the rods that are parallel. Which ones intersect?
5. Students find lines of symmetry in the trees.
6. Using a small mirror to help them, the students make a mirror image of the trees they make.



7. The tree and the image together make a symmetric figure.
8. Does this figure have a second line of (approximate) symmetry?
9. Repeat the above activities, as appropriate, with flowers and leaves.

LESSON 4

Plants Reproduce

BIG IDEAS Plants reproduce through organs that we call "flowers", through organs that look like flowers or through making spores. One single plant can make many new plants and is said to "multiply" itself.

Advance Preparation

Place a carrot or potato in water, as shown in **Activity** — Plants Without Seeds, a week prior to the implementation of this lesson. Mold is also needed and can be grown in a few days on a piece of cheese, bread or some jelly placed in a plastic bag in a dark, warm place.

Whole Group Work

Materials

Flowering plant or picture of one; mold growing on cheese, bread or jelly; a potato with several eyes; ferns, or mosses; magnifying glasses; potatoes, others from **Activity** — Plants Without Seeds; three different simple flowers such as the lily, poppy or pansy, for each student pair

Word tags: reproduce; womb; multiply; flower; seed; organ; spore

Encountering the Idea

Begin discussion of the lesson by telling students that all living things die, but before plants die they make new plants that are copies of themselves. Ask students how animals are born. Some form in the mother's womb while other animals hatch from eggs. Ask students to express their ideas of how new plants begin. Show student a variety of seeds. Ask students where the seeds come from. Yes, the seeds come from flowers. What is their function? In the learning centers, we are going to discover why flowers and seeds are important. Are there other ways that plants reproduce, other than by producing seeds?

Before students go to the centers, show a piece of mold growing on bread, jelly or cheese. Tell students that this is a plant also. How can it grow without soil or light? If these plants don't have flowers, how can they reproduce, make new plants?

Show the potato growing in water only. How can this plant grow in water only? Where will it gets its food? Does the potato plant have flowers? How will new plants be produced?

Tell students that in the centers they will explore the different ways plants reproduce.

Exploring the Idea

At the **Science Center:**

1. The students observe the growth and reproduction processes and discuss them on a daily basis using the beans planted in **Activity** — Beans in a

Baggie, from **Lesson Three.** Students make drawings in their journals and label the parts of the plant as it emerges from the seed.They will see that the seed divides in half, roots appear, then the stem and leaves, as the beginning of a new plant.

2. Students work on the **Activity** — Plants Have Special Needs to see that, in general, plants need soil and light to grow and reproduce. As they work on **Activity** —Molds and Fungi, students discover that there are plants that reproduce by forming spores, which are not the same things as seeds. They will note these differences during the **Organizing the Idea** phase of the lesson.
3. The students complete Activity — Plants Without Seeds.
   At the **Mathematics Center,** the students complete **Activity** — Plants Multiply.

Getting the Idea

Referring to the flowering plant, point to the flower and tell students this plant needs flowers to make new plants, if you can see them on the plant; otherwise use a picture or diagram of a flower with seeds.

Referring to a fern, point to the spores that appear on the underside of the leaves, if you can see them on the plant; otherwise use a picture or diagram of a fern. Tell students that this plant **does not need** flowers to make new plants; instead it reproduces by creating spores.

Referring to a potato, point to the “eyes”. Tell students that this plant **does not need** flowers or spores to make new plants; instead it reproduces by developing shoots or rhizomes. Point to them, if you can see them on the plant; otherwise use a picture or diagram.

The students discuss plant reproduction by examining the plants and pictures of the reproductive organs of plants, including seeds, spores and rhizomes, pointing to the different parts as they appear in the pictures.

What is the difference between a seed and a spore? (A seed contains a food supply for the embryo to live on until it can produce its own food. A spore is a small body that has a protective shell and that can begin to produce a new plant **only** if conditions are appropriate and the spore is on an appropriate host.)

Tell students that scientists have identified more than 350,000 kinds of plants. These plants fall into two basic categories — flowering and nonflowering plants. Those that produce flowers grow from seeds while nonflowering plants such as ferns, mosses, molds and mildew grow from spores.

The students discuss the differences in methods of reproduction of these plants and that of the beans.

Organizing the Idea

Students make a chart of different plants and indicate method of reproduction, such as **Flower, No Flower** or **Spore.** They draw pictures on the chart of the plants and the reproductive organs or the spores.

Applying the Idea

1. Complete this drawing of a plant that reproduces by flowering.

2. Each student brings to class two plants that the class has not studied yet. Each student group determines whether the plants are flowering plants or whether they reproduce through spores or rhizomes (shoots). The group reports on results to the class.

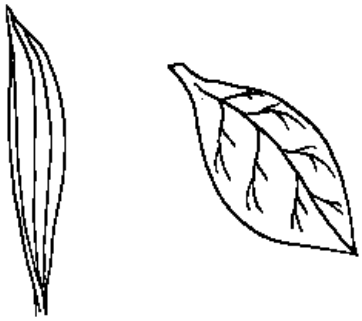
Closure and Assessment

Given a fern, a potato and a lily (or any representative of the different types of plant reproductive mechanisms) ask student to use the plants to describe the different ways that plants reproduce.

Ask students to describe how a plant can "multiply" itself, producing many more individual plants from a single plant.

Which pod has more peas? Show me in two different ways how you can tell. (By one to one matching, and by saying that one pod has five peas and the other has only three; five is greater than three.)

Which of these leaves shows parallel veins and which one shows a network?



List of Activities for this Lesson

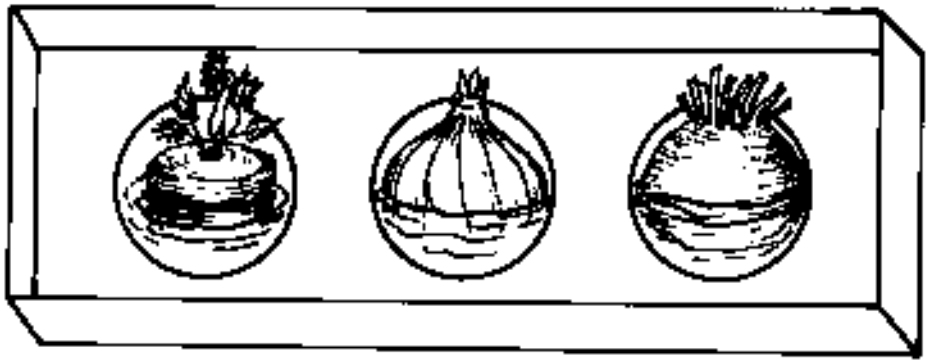
- ▲ Plants Without Seeds
- ▲ Plants Have Special Needs from **Lesson 1**
- ▲ Molds and Fungi
- ▲ Plants Multiply

ACTIVITY
Plants Without Seeds

Objective
Students name three plants that grow without seeds.

Materials
Toothpicks; water; margarine containers or plastic tumblers; container lids; fresh carrot top (about 1/2-inch height), small potato, small sweet potato, onion cut in half and beet top (about 1/2-inch height)

Procedures
1. Place the carrot top, onion section and beet top in individual container lids. Be sure that the carrot top (the green part) is outside the water.



2. Insert three or four toothpicks evenly spaced into the potato, and do the same with the sweet potato. Place them into a plastic tumbler half-filled with water.

3. Add water to each plant at least daily for two weeks.
4. After the plants begin to sprout, the children discuss their observations. They can count and chart the growth of the sprouts. The students compare the rate of growth of the plants. Which grew the fastest? Slowest? Which has the most growth?
5. After two weeks, the students transplant some of the vegetables into a pot to keep in the classroom.
6. The students continue to observe the growth of each plant. The students discuss any differences between the plant's growth without soil and the growth after being potted.

ACTIVITY
Molds and Fungi

Objective

Students predict that molds and fungi grow on living things or things that once lived, but not on metal or rock.

Materials

Moist bread, jelly, cheese, avocado, orange, grapes, cake, cream or milk, other foods
Margarine container with lids (clean and thoroughly rinsed of soap)
Powerful magnifying glasses
Miscellaneous living (or once-living) and nonliving things, such as cut-up fruit, melons, potatoes, cheese, bread, wool, nails, magnets, rocks and wood
Containers of mold from previous activities
Student drawings
Books and pictures from the Media Center, public library, and home

Part I

Procedures

1. Place each food (it must be moist) in a separate container and cover with its lid.
2. Place each sealed container in a dark, warm place.
3. In about six days remove the lid of each container and observe the contents.
4. What has happened to the food?
5. The students select different food items from the table.
6. Put each item in a plastic container with the top sealed and predict on which food the strange plants will grow or not grow.
7. Place the containers in a warm, dark place.
8. After five or six days, open the containers and observe the results.
9. Were the predictions correct?

Part II

Procedures

1. Participate in a class discussion. Share and compare findings among students.
2. Students ask any questions they may have.
3. Students use pictures they have drawn and containers to design a display and bulletin board about molds and fungi.

Discussion

(Can be done during the **Getting the Idea** phase.)

1. Do these plants need light to grow? Soil? Why?
2. What is their shape? Draw it on your chart.
3. Where did they get their food (nutrients)?
4. What is the color of these plants? Do they have stems? Leaves?
5. Do these plants have an odor?
6. Where do these plants grow?
7. Do these plants have seeds? Flowers? Why? Why not?
8. How do they make new plants? (They make spores.)

Extension

This activity will introduce molds and fungi in a controlled environment. Most children have seen molds and fungi but only in the context of something that has "spoiled". Molds and fungi can be both harmful and helpful in our lives. The containers used in these activities should be clean and thoroughly rinsed. Soap residue may retard the growth of molds and fungi.

This activity is designed to help students see relationships, to reason and to hypothesize. The most obvious conclusion should be that molds and fungi grow on living (or once-living) things and not on nonliving things. Molds use the once-living materials for food. Given enough time and proper conditions, mold will cause wood to rot, but probably not within the time allowed for this activity.

Select one material such as bread and repeat the activity, changing one variable, for example, dry bread in a warm, dark place compared with moist bread for the same length of time in a warm, dark place. Will dry bread support the growth as well as moist bread? Repeat in a freezer.

Teacher Information

After the students have studied molds and fungi, the teachers can prepare an informational audio tape. The tape is optional but it may help answer questions or reinforce concepts identified during the discussion. Try to help children discover the answers through sharing among themselves and through reference sources. Avoid telling them more than is necessary. The following are concepts you may want to include on the audio tape or in your summary:

1. Most molds look slimy. Many are white or clear, but they may be a variety of colors.
2. Molds and fungi grow best in warm, damp, dark places. Mold is a problem in parts of the United States where the climate is humid and warm.
3. Mold often damages food, leather, clothing and paper. Some molds cause diseases in man, plants, food, crops and animals.
4. Many molds and fungi are helpful. They cause wood, leaves and other materials to rot, forming humus that makes the soil rich. Man uses fungi to make drugs, such as penicillin. Molds and fungi also produce carbon dioxide, which green plants use to make food. Some fungi grow on cheese and help ripen it.
5. Mold and fungi reproduce by releasing spores, which travel through the air or are carried by animals.

ACTIVITY
Plants Multiply

Objective

Students join equivalent groups of objects to find the sum as an introduction to the concept of multiplication as repeated addition.

Materials

One unshelled pea pod for each student.

Procedures

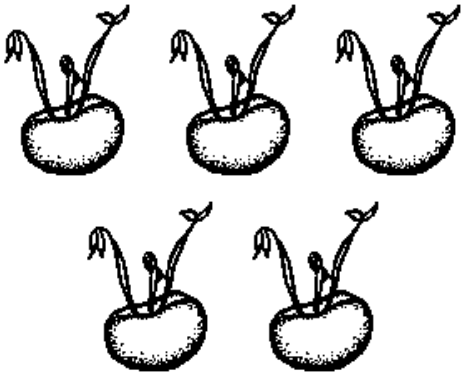
1. Students open the pea pod and remove the individual peas. Do not use those peas that may be rotten or judged incapable of germinating. Students draw a picture of the pod in their journals.
2. Count the peas.

Discussion

1. Suppose each pea is planted and grows to an adult plant. How many plants do you now have?
2. Each new plant produces four pea pods. How many pea pods do you have?
3. Each of these new pods produces four peas.
4. Draw a picture of the pea pod you started with and count the plants, pods and peas of the new plants. Skip by twos, threes or fives to help count correctly.

Peas in the Pod

One Plant from Each Pea in the Pod



Peas in Each Pod in Each Plant

Five peas give us five plants. Each plant has four pods. **4 + 4 + 4 + 4 + 4 = 20. 4 groups of 5 is _____ pods.**

Each pod contains five peas. **5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 50.** Then, 10 more 5 — **5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 50 , or 20 groups of 5 is _____ peas.**

From one pea pod having five peas, we now have 100 peas. **Why do plants multiply?** (The numbers get large very fast.)

5. Draw other pea plants and the peas using different numbers. Work with your partner to count the plants, the pods and the peas.
6. What happens if you start with small numbers in each pod? With large numbers?
7. What would happen if you opened a pod that had only one pea? Draw it.
8. What would happen if you opened a pod and it did not have any peas in it? Draw what would happen.

LESSON 5

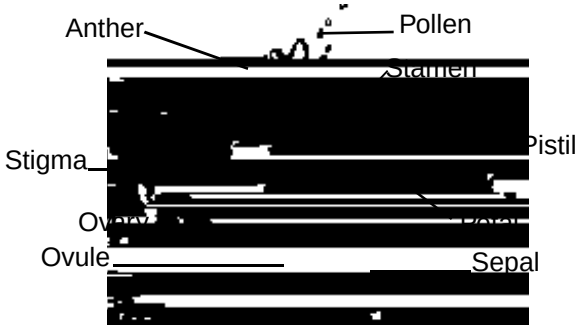
Pollination — from Flower to Fruit

BIG IDEAS Pollination and fertilization are the first steps in the process of a new plant's development. We need large numbers to describe the many plants in nature.

Whole Group Work

Materials

Magnifying glasses
Three flowers for each student (three different simple flowers such as the lily or poppy)
Diagram of the parts of a flower (as shown below) — petals, stamens, anthers, stigma — for each student group
A rose that has a "rose hip" still attached
Reference books on flowering plants
Word tags: anther, stigma, pollen, ovule, carpels, fertilize, germinate, pollinate



Encountering the Idea

Each group of students gets a flower to look at while the teacher begins the lesson. Show students a flower such as a lily or another simple flowering plant. Tell the students that they will be studying the flowering plants. Why are the flowers important to this plant? Yes, the flower is the part that will produce new, individual plants. Ask students to point out and describe the various parts of the flower, if they can. Let them try to guess what the function of each part is. Tell them that at the learning centers they will learn what the parts of the flower do and why that function is important.

Ask the student to suggest questions that they might answer during the lesson such as:

- Why do flowers usually have such beautiful and bright colors?
- Why do some flowers have such a beautiful scent?
- Why do some flowers have thorns?
- When does an adult plant begin to make a new plant?

Exploring the Idea

At the **Science Center,** students

1. complete **Activity** — The Parts of a Flower
2. complete **Activity** — Rose Hips as described below.

Take a rose plant that has a fertilized, well-developed red receptacle. Cut across the receptacle to show a cross section. This rose has been pollinated and fertilized by pollen to germinate into a new plant.

Dried out flower petals and sepals

At the **Mathematics Center,** the students examine the pollen grains contained in a flower. Students estimate the number of pollen grains each might contain. They discuss how to write a large number that would tell how many grains each pollen container holds. Students take turns telling the class the largest number they know and how it is written. Is this number large enough to count all the pollen seeds in one flower? Students use a 100s, 10s and ones chart to show large numbers. They may add a column for the 1,000s if they need to.

Thousands ***Millares***	***Hundreds*** ***Centenas***	***Tens*** ***Decenas***	***Ones*** ***Unidades***

Students can place pollen grains on a sheet of white paper to count them. They can group by 10s, then by 10 10s, 10 100s, if necessary, and so on to help them see how many grains it would take to group 100, 1000, and so on.

Students complete **Activity** — Nature's Pollinators.

Getting the Idea

After the students have had an opportunity to dissect and study the various parts of the flowers, they reconvene to discuss what they observed. Tell the students that each part of the flower is necessary to produce seeds that will become become new adult plants. A flower contains the seeds that grow into new plants. A flower changes into a fruit in order to produce more plants like itself.

Dissect a flower and point to each part. For the process of plant reproduction to begin, grains of **pollen** (male cells from the **anther**) are carried to the **stigma** (female part) from one plant to another. This process is called "pollination".

When the pollen lands on the stigma, it produces a tube that goes to the **ovule** and **fertilizes** it. This tube is so small that usually we can't see it even if we use a magnifying glass. After the seeds are fertilized, the **seed receptacle (or fruit)** begins to grow very large and the petals fall off. As the fruit grows, it usually becomes packed with nutrients, is sweet and may give off a scent to attract birds. The birds eat the fruit and the seeds, but the birds cannot digest the hard-coated seeds. Then the birds scatter the seeds in their droppings. What do you think will happen if one of those seeds lands in moist soil?

How does pollen get from the anther to the stigma? Nature has found many ways to fertilize plants. In **Activity** — Nature's Pollinators, what did you learn about how pollen travels from one place to another?

Pollen often causes allergies in people as the pollen is spread by the wind to many places. People breathe pollen in and can react to it by developing an allergy.

Organizing the Idea

The students write and draw observations in their journals. In their descriptions the students use numbers to state quantities and say if these are estimates or actual counts (e.g., number of petals in each flower, number of stigma, anthers, etc.). Descriptions should include color, shape and approximate size. The students in each group take turns editing their partner's work before students present it to the class.

Applying the Idea

Each student brings to class two flowers that the class has not studied yet. Each student group identifies as many parts of the flower as possible. The group reports on results to the class.

Closure and Assessment

Oral Interviews

1. Why are fruits sweet and full of nutrients? (To feed the plant embryos; to attract birds, bees and other insects in order to pollinate the plant.)
2. Why are some flowers colorful, and why do they have a sweet scent? (To attract birds, bees and other insects in order to pollinate the plant.)
3. What is pollen, and what does it do? (Pollen is composed of the tiny grains on anthers that fertilize the flower.)

Performance Assessment

Draw in a set of pictures the sequence for plant reproduction. (The flower is pollinated, a tube grows into the ovule and fertilizes it for the new plant to begin developing.) Students could also create a class mural.

List of Activities for this Lesson

▲ The Parts of a Flower

▲ Nature's Pollinators

ACTIVITY
The Parts of a Flower

Objective

The student can name and describe at least four parts of a flower.

Each student group dissects a lily and two other flowers. They put each dissected flower on a sheet of white paper to see the parts through the magnifying glasses. Using the labeled picture of a flower, they help each other find the stamens (male parts) and carpels (female parts). The students draw the flowers in their journals, coloring the parts as they see them. The students complete the following activity:

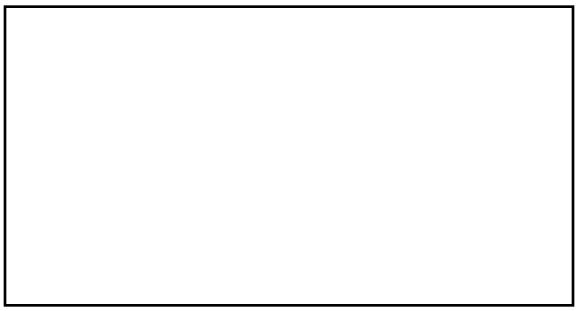
Materials

Three to five flowers; transparent tape; magnifying glasses; white paper; roll of plastic wrap

Procedures

The students study one flower at a time. The teacher says:

1. Put your flower on a sheet of white paper and examine it to find the flower parts that are the same as the ones in the pictures.
2. Use a magnifying glass and take apart the flower carefully.
3. First find the petals, then the sepals and then the pistil.
4. Find the stamens and the anther.
5. Preserve your flower for further study by taping the parts to your sheet of white paper. Label the parts before you forget what they are.
6. Cover your paper with plastic wrap and place it where it will not get damaged. Complete a chart, as below.
7. Ask your teacher to help you find out why each part of a flower is important.



Name of flower	Petals	Leaves	Anther	Stigma	Seeds' shape	Pollen color	Perfume odor
	Shape	Shape	Shape	Shape			
	Color						

ACTIVITY
Nature's Pollinators

Objective

Students list and describe at least three methods by which plants are pollinated and seeds scattered.

Materials

Reference and picture books about the pollination of flowers.

Procedures

Ask students:

1. If you wanted to get pollen from an anther to a stigma, how could it be done?
2. Allow students to suggest ways for example: carry it in a bucket; toss it; let the wind carry it; get someone to do it for you.
3. How does nature do it?
4. Students make a chart to show how nature pollinates its flowers.
5. Students discuss what they learned in the reference books about pollination.
6. How does nature pollinate flowers?
7. Make a wall chart as below.

Nature's Pollinators

Pollinators	*How*	*Type*
Insects		
Honey bee	Has a special basket on its legs to carry pollen to other plants	Cross-pollination
Bumblebee	Brushes pollen on its body and carries it to the stigma	Self-pollination
Butterfly Moth	Sucks nectar through a long tube, a proboscis	Cross-pollination
Fly	Pollen sticks to its body and it carries the pollen to another flower that smells rotten	Cross-pollination
Wind	Carries pollen to other plants	Cross-pollination
Water	Causes dry pods to explode seeds into air	Cross-pollination
Hummingbird	Hovers, inserts beak into flowers. Brushes pollen onto its head while the stigma receives pollen from another plant	Cross-pollination

LESSON 6

Seeds

BIG IDEAS Seeds are the fertilized ovules of a flower that grow to adult plants when planted. Fruits carry the plant's seeds and vary in size, shape and capacity. Subtraction helps us compare by finding differences among plants.

Whole Group Work

Materials for the Seeds Center

Book: **More Than Just a Vegetable Garden** by D. Kuhn or **The Carrot Seed** by R. Krous
Beans grown in the **Activity** — Beans in a Baggie
Seeds of the following plants: tomato, bell pepper, apple, banana, orange, lemon, peach, avocado, pea pod (in halves to count the seeds)
One or two fruits that can be studied each day to help students focus on task
Magnifying glasses
Fresh apple, orange, tomato, nuts, other fruits
Sheets of white paper

Procedures

In preparation for this lesson the students bring their seed collections and do the following:

1. Visit a vacant lot or field in late spring or early fall.
2. Try to find plants in the field that that have bloomed and are producing seeds or "turning to seed."
3. Try to find seeds from trees. (Nuts, other trees.) Try to include dandelions.
4. Collect as many different kinds of seeds as you can.
5. Put the seeds you have gathered on a clean white sheet of paper on your desk. Examine them with a magnifying glasses.
6. Begin discussion on and comparisons of the seeds during the **Getting the Idea** phase of the lesson.

Encountering the Idea

Read **More Than Just a Vegetable Garden** or **The Carrot Seed.** Show an apple, an orange, a tomato. What are these? Yes, they are fruits. Cut several in half to show the core containing the seeds, the fleshy part containing the food for the embryo and the protective skin. In preparation for this lesson you collected a number of seeds that we will not study. You will discover many new things about seeds. You might even learn that something is a seed that you had no idea is a seed!

Exploring the Idea

In the **Science Center,** the students

1. do **Activity** — Parts of a Seed
2. do **Activity** — Looking At Seeds.

In the **Mathematics Center,** the students
1. do **Activity** — Nutty Patterns
2. do **Activity** — Estimating, Counting and Sorting Seeds
3. do **Activity** — Seeds Travel.

In the **Drama Center,** the students read **Little Brother of the Wilderness: The Story of Johnny Appleseed** by M. LeSueur and write and enact a skit.

Getting the Idea

How is a fruit, like an apple, formed? What part of the tree is it? How was the tree fertilized? The plant ovule was fertilized and grew into a seed. The fruit contains the seed. If the seed is planted in the earth, it is now capable of becoming a new plant. We planted bean seeds that had been fertilized. When we put them in a plastic bag with water in it, they germinated and began to grow.

The following questions can serve to guide the discussion on how seeds scatter.

- How do you think these seeds got to the field where you picked them up?
- Find a white dandelion top. Examine one of the tiny white tufts. Find the seed. What does the seed have to help it travel? What makes it travel?
- Examine your pant legs and socks. Did you help a seed to travel?
- Make a list of ways that you discovered that help seeds travel.

Applying the Idea

Problem-Solving

1. Ask students: Can you think of a fruit that does not have seeds? Why do you think that all fruits have seeds? At the grocery store or supermarket look for seedless grapes. Buy a few or obtain a few from someone who grows grapes. Examine them closely. Do they have seeds? Report to the class.
2. Give a student an apple seed and ask the students to show the different parts — the coat, the spongy part containing the food for the embryo and the embryo. The students tell the class why they think that a plant as large as an apple tree can grow from this tiny seed.

Closure and Assessment

At the grocery store or supermarket, look at the vegetable and fruit section and list the names of the plants that you see labeled on the counters. Find at least three plants and describe them in as many ways as possible; be sure to notice each plant's method of reproducing.

List of Activities for this Lesson

▲ Parts of a Seed

▲ Looking At Seeds

▲ Nutty Patterns

▲ Estimating, Counting and Sorting Seeds

▲ Seeds Travel

ACTIVITY
Parts of a Seed

Objective

The student points to three parts of a seed (such as a bean or a nut) and tells the function of each part.

Materials

Different kinds of seeds (lima beans, pinto, butter); two beans per student
Magnifying glasses, at least one per two students

Procedures

Students soak beans (lima or pinto) overnight in water, then make observations of the major seed parts and compare a dry bean with the one soaked overnight. The students to try to find three parts to the seeds that have split into two parts overnight.

1. The students collect data on the dry bean as given in the chart below.
2. Students place beans (one per student) in a cup to soak overnight.
3. The students open the soaked bean and use a magnifying glass to look at the three major parts. (The outer coat or seed coat; the spongy part or stored food; and the embryo or beginning plant containing the root, stem and leaves.)

	Color	*Texture*	*Mass*	*Length*	*Other*
Dry Seed (before soaking)					
Soaked Seed					

Discussion

This can be a part of the **Getting the Idea** phase of the lesson.

1. Point to the coat, the stored food and the embryo of your seed.
2. What color is the coat? The food? The embryo?
3. How many pieces did the seed open into?
4. Did your germinated seed have a stem and a leaf? What about your partner's seed? Why did they look different?

ACTIVITY
Looking at Seeds

Objective
Students make observations of size, shape and color of various seeds and count the seeds in a piece of fruit.

Materials
Assorted pieces of fruit such as apples, oranges (in sections), avocado, peach, cherry, banana, tomato, grape
Record for each piece of fruit per student group

Procedures
1. Students make observations of each piece of fruit.
2. They draw the shape of the fruit on the sheet provided for the data.
3. Students count the seeds and draw and describe seed shapes.

Name of Fruit _____
(picture)

Shape and color of fruit _____

Shape and size of seeds _____

Color of seeds _____

Number of seeds _____

Discussion
After students complete their observations of the fruits they were given, they discuss the following ideas.
1. Which fruit has the most seeds? The least? How do you know? What is the difference between the two amounts?
2. Where are the seeds located in the fruit?
3. Are the seeds inside a container or loose inside the fruit? Are they attached? Why are they attached to the fruit?
4. Are all seeds the same size?
5. Which fruit shape is the most common? Seed shape? How do you know?
6. What is the difference in size between the largest seed and the smallest seed?

ACTIVITY
Nutty Patterns

Objective
Students name, count and sort assorted nuts and draw graphs to summarize information.

Materials
Various unshelled nuts (can be brought to class by students); nut shapes; nut shape pattern cards[1]; nutcracker

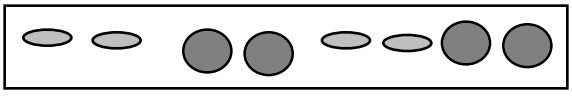
Procedures
1. Students have a bag of assorted nuts; the children sort the nuts and place them on a floor graph. The students discuss how the graph was made and what it shows.
2. The students change the real graph to a representational graph by drawing pictures of nuts corresponding to the number of nuts in each category. The representational graph is placed on the chalk board.
3. The students talk about the attributes of the nuts. Students also taste each type of nut. Students discuss their observations about the attributes and tastes of each nut.
4. Students use a nutcracker to crack the nuts. They discuss how the nuts look without the shells.
5. Show the students an example of a pattern card and tell them they will make their own patterns with the nut shapes at the **Plant Center.**

Discussion
1. What are nuts? (Seeds.) What did we find out about these nuts? How did we sort these nuts? How are these nuts the same and different? Where do nuts come from?
2. How many walnuts... peanuts... almonds... etc. do we have?
3. Which nut is there more of? Which nut is there less of?
4. How can we show how many nuts we have if we don't want to use the nuts?
5. What kind of patterns can you make using the shapes of nuts?
6. Which nut do you like best? Why?
7. Which is the class favorite? The least liked? Make a graph.

Walnuts
Almonds
Peanuts
Pecans

FLOOR GRAPH: Place nuts on the floor in their own category

[1]Pattern card: a laminated card with a pattern on it for students to duplicate or change.



ACTIVITY
Estimating, Counting and Sorting Seeds

Objective

Students count seeds by grouping by 10s and ones and saying the number; students find differences between estimates of the numbers and actual counts.

Materials

Various amounts of dry pinto beans, lima beans, lentils, corn, sunflowers and any other seeds available at the supermarket; cups; paper to draw chart and record data

Procedures

1. Each student receives an assortment of seeds in a cup.
2. The student sorts the various seeds into separate labeled containers.
3. The students estimate how many seeds are in each cup.
4. The students find the number of seeds in each cup and compare with their estimates.

Seeds

	Pinto	***Lima***	***Lentil***	***Corn***	***Sunflower***	***Other***
Estimate						
Counted						
Difference between the two						

Order the labeled cups having the least to the most seeds.

_____

_____

_____

_____

_____

How many seeds in all? _____

To find the number of seeds in all, group the seeds into groups of 10. Put down how many 10s you have and how many ones you have left over. Now, read the number. Ask your friend or your teacher to help you if you are not sure.

_____ 10s _____ ones

_____ (number or numeral)

ACTIVITY
Seeds Travel

Objective
Students name at least three ways in which seeds scatter.

Materials
Paper or plastic bags; magnifying glasses; scissors or knives; white paper

Procedures
1. Direct students to visit a vacant lot or field in late spring or early fall. Be sure you wear long pants and stockings.
2. Explore the field. Try to find plants that have bloomed and are producing seeds or "turning to seed."
3. Look at trees in your neighborhood (especially in the fall). See if you can find seeds or nuts on or around these trees. Be sure to include dandelions.
4. Collect as many different kinds of seeds as you can. How many different kinds of seeds did you collect?
5. Put the seeds you have gathered on a clean white sheet of paper on your desk. Examine them with a magnifying glass. How many seeds of each kind did you find?
6. How do you think seeds travel?
7. Find a white dandelion top. Examine one of the tiny white tufts. Find the seed. What does the seed have to help it travel? What allows it to travel?
8. Estimate and then count how many seeds are on one dandelion top.
9. Examine your pant legs and socks. Did you help a seed to travel?
10. Make a list of ways that you discovered that help seeds travel.

Organizing the Idea

Students complete a chart, similar to the one below, naming the scattering agent, the method by which the seed scatters and the plants whose seeds scatter in that way.

Scatter Seeds

What	*How*	*Which Plants*
Wind	seeds explode, some seeds have parachutes	balsam flower, thistles, poppy
Water currents	float	lotus
Birds	scatter undigested seeds in droppings	many kinds
Cattle, etc.	seeds stick to hair with hooks	burrs

LESSON 7

Plants Provide Many Human Needs

BIG IDEAS Without plants people could not live on earth; plants give us oxygen, food, shelter, clothing, beauty and many other things. We can summarize data about plants in different kinds of graphs.

Whole Group Work

Materials

Book: **The Giving Tree** by S. Silverstein, **The Lorax** by Dr. Seuss and Aesop's fable "The Fox and the Grapes"
Magazines
Reference books on medicinal herbs
Chart
Word tags: oxygen, shelter, clothing, beauty, cotton, milk, rice krispies, oatmeal, bread, bacon, eggs, environment, conservation

Encountering the Idea

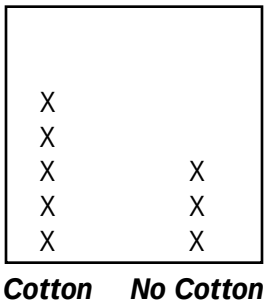
Read **The Giving Tree.** What did the tree provide?

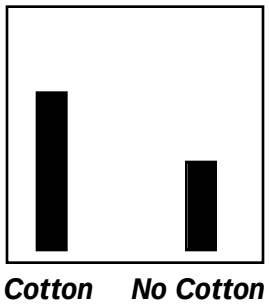
In a brainstorming session, list things plants provide. Put them into categories such as food (candy), shelter, clothing, beauty, things we use (pencils, furniture, wood carvings, medicine) and beauty (flowers, perfume, cosmetics). Students may look in magazines to help them suggest things to put on the list.

Before going to the learning centers, the class participates in a collection of data on the number of students wearing cotton clothing or not wearing cotton, and complete a graph on a chart summarizing the information. Some clothes are blends of cotton and rayon, etc. Where would students place these? The graph shows two categories — Cotton and No Cotton. Each student who is wearing a piece of clothing made of cotton puts an X on "Cotton", and each student not wearing cotton puts an X on "No cotton."

Exploring the Idea

In the **Mathematics Center,** students count the Xs and summarize the information. In addition to the graph showing the Xs, draw a bar graph to represent the same information. Students discuss in their groups which graph they like better and why. Do both graphs give the same information?





Students list the foods they had for breakfast or lunch and underline or highlight those foods they ate that came directly from plants.

Students begin work on **Activity** — Grapes to Raisins.

Getting the Idea

Plants are the key to life on earth. They provide food for themselves, for animals and for human beings. What other things have we found that plants provide?

Tell students that in ancient times plants were the main source of medicines and are still a very significant source of medicines today. Plants were often grown in special gardens and studied for their ability to cure illness. **Aloe vera** and **jojoba** are very popular in making cosmetics. **Ginseng** is a root used in China to aid the recovery from illness. **Peppermint** is used for stomach ailments. **Foxglove** contains a medicine to treat heart disease, and the **cinchona tree** produces quinine that is used to treat malaria. There are some plants that produce products that can cure illness **or** promote death. **Cocaine** can be a powerful anesthetic, but it can also be deadly. The **opium poppy** produces morphine, codeine and heroin — which if used appropriately can help people relieve pain, but these substances can also be deadly if misused.

After reviewing the lesson on **photosynthesis,** students discuss how in the process of photosynthesis, plants use carbon dioxide but release oxygen, as they make sugar and other carbohydrates. Without plants, the oxygen that humans require could not be replenished, and we would die.

Organizing the Idea

In the **Science Center,** students work on **Activity** — Fruit and Vegetable Nutrition.

At the **Writing Center,** the students count the Xs in each category in the Cotton/No Cotton Graph and summarize the information by completing the following sentences:

_____ students wore _____ clothing today.

_____ students did not wear _____ clothing today.

Students write in their journals about medicinal herbs and the illnesses they treat. Students list the parts of their school and/or house that are made of wood.

After reading in reference books, the students make a list of medicinal herbs and the illnesses they treat.

Read Aesop's fable "The Fox and the Grapes."

Applying the Idea

Save Our Planet

Read aloud Dr. Seuss' book, **The Lorax.** What did the trees have to say about the environment and conservation of plants?

The Story of Paper

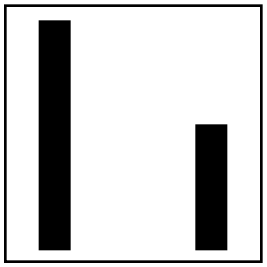
Use pictorial library books or the encyclopedia to help explain how paper is made. Involve the class in a newspaper recycling drive by having them bring in old newspapers from home.

Closure and Assessment

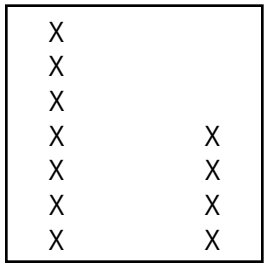
Oral Interview

In a first grade class in your school, the children collected information about flower preferences. They summarized this information on a graph.

- What can you tell from the first graph? From the second graph?
- Do you know how many children liked roses? How many liked lilies?
- Can you tell which flower was preferred? Roses or lilies? Why?
- What information do you need to tell you how many children liked roses? Which graph gives you this information?
- Lead students to construct their own questions such as: How are the graphs the same? How are they different? Which one do you prefer to use to get the most information? Why?



Liked Roses ***Liked Lilies***



Liked Roses ***Liked Lilies***

Performance

Design and illustrate or construct a plant of your own. Decide: its method of reproduction; its habitat (where it lives: desert, wet climate) size, color, leaf structure, etc. Show the plantto your teacher and to your parents.

Explain your choices when you show your plant.

Writing

Name at least three ways plants are important to humans. List the most important one first and tell why.

Why are plants and trees important to our health?

Why do plants need us?

List of Activities for this Lesson

▲ Grapes to Raisins

▲ Fruit and Vegetable Nutrition

ACTIVITY
Grapes to Raisins

Objective
The students say that raisins come from grapes.

Materials
A pound of grapes; two boxes; chart for recording observations; pieces of fine gauze

Date	*Box 1 Observations*	*Box 2*
1	Look, taste, smell	

Procedures
1. Show grapes to class and ask them if they know how they grow. Students describe the grapes: look, feel, number, color, taste and smell.
2. Students speculate what will happen to grapes if they are left out in the sun.
3. Put the grapes in two boxes, cover the grapes with a fine gauze. Put one box outside in direct sunlight or in a sunny spot by a window. Leave the second box inside the classroom, away from the sun.
4. Record daily student observations. List “no change” if none is observed.
5. After some of the grapes have changed color, the children count and sort the grapes by color. Record the results.
6. When all the grapes have turned into raisins, the students discuss what they found out about grapes and raisins.
7. Was there a difference in the results in the two boxes?
8. Did all the grapes turn into raisins? Did any of them rot?
9. Repeat this with banana slices, apple slices, green chile peppers.

Discussion
1. What effect did the sun have on the grapes? Why?
2. How long did it take for all of the grapes to turn into raisins?
3. Did all of the grapes change at the same time? Why do you think that happened?
4. How is a raisin like a grape? How is it different?

Teacher Information
Grapes dry fastest in hot, dry weather, so the best time to do this investigation is in September or in early October. It may take up to three weeks or more for all the grapes to turn into raisins.

Objective

The student names at least three fruits and three vegetables and lists three human nutrition resources they provide.

Materials

References in which students can find out if rice is a grain like wheat, etc.

Corn, fresh or canned, or corn meal; carrot; cabbage; tomato; peanuts or pecans; apple; orange; banana; pear; bread; grains of rice or rice meal; pinto beans; other fruits, vegetables, roots or grains that serve as food

Procedures

1. Students apply the iodine test to each of the foods brought to class.

U N I T A S S E S S M E N T

Give a student a peanut. Ask her/him to open it and describe the peanut, pointing out three major parts and to complete the sentences.

A  is a ___(seed)___. It has ___(3)___ parts which are the  that protects the growing , the spongy part that is stored , and the that is the new ___(plant)___.

Individual Interviews

Oral

Give a student a cactus, a succulent or some other plant and have him/her describe it.

- Does it have leaves? Stem? Root? Flower? Seeds?
- What is its shape? Where does it live? What can you predict about this plant? How would you guess it reproduces? Flower/seeds? Spores? Using a piece of itself? Why? (The exact answer is not as important as the student being able to hypothesize and give reasons.)

Written

1. Students recall the steps for changing grapes to raisins by rewriting their observations into a written report. The students take the report home for parents to read.
2. Make two charts; one in the shape of a grape, and the other in the shape of a raisin. The students write words that describe grapes and raisins on the appropriate chart.

References

Annotated Children's Books

Carle, E. (1987). *The tiny seed.* Saxonville, MA: Picture Book Studio.

Beautifully illustrated, this book gives a simple description of a flowering plant's life cycle through the seasons.

Cobb, V. (1989). *This place is wet.* New York: Walker and Company.

Focuses on the land, ecology, people, and animals of the Amazon rain forest in Brazil, presenting it as an example of a place where there is so much water that some houses need to be built on stilts.

Cole, J. (1973). *Plants in winter.* New York: Thomas Y. Crowell.

This book describes how various plants survive during the winter. Leafy and evergreen trees and plants with underground stems, bulbs, shoots and seeds are differentiated.

Cross, D. H. (1983). *Some plants have funny names.* New York: Crown Publishers.

This book "covers some unusually named plants that grow in North America. The information is brief, a few pages on each, perhaps just enough to encourage observation. There are facts on what the plant looks like, its uses, where it can be found. Included are jack-in-the-pulpit, lady's slippers, Indian pipe and marshmallow. The drawings with just a touch of color are appealing and the style of writing is clear and simple."

Demarest, C. L. (1991). *No peas for Nellie.* New York: Macmillan Publishing Company.

Nellie tells her parents all the unusual things she would rather eat then her peas, and while doing so she finished eating them all.

Ehlert, L. (1987). *Growing vegetable soup.* San Diego: Harcourt Brace Jovanovich.

Beautifully illustrated, this book tells how a father and child grow vegetables and then make them into a soup. It has a soup recipe.

Ellentuck, S. (1968). *A sunflower as big as the sun.* Garden City, NY: Doubleday.

Everytime Uncle Vanya brags about his sunflower, the sunflower grows. The villagers become concerned when the sunflower prevents them from getting sunlight.

Florian, D. (1991). *Vegetable garden.* San Diego: Harcourt Brace Jovanovich.

Beautifully illustrated with little text, this volume tells how a family plants a vegetable garden and helps it grow until harvested.

Jaspersohn, W. (1989). *How the forest grew.* New York: Greenwillow Books.

This book traces the growth of a Massachusetts hardwood forest. The book recounts each stage of the forest's growth and explains the reasons for the succession of different types of plants and animal life.

Jordan, H. J. (1960). *How a seed grows.* New York: Thomas Y. Crowell.

Begins by explaining that the seeds of different plants are different and grow differently. Then suggests that the student plant and care for some bean seeds in order to observe how they develop; thus, it effectively teaches the beginner how a seed grows into a plant.

King, E. (1990). *The pumpkin patch.* New York: Dutton Children's Books.

Text and photographs describe the activity in a pumpkin patch — from planting to harvesting.

Krauss, R. (1945). *The carrot seed.* New York: Harper and Row.

Easy to read with good illustrations. This is a simple story of how everyone kept telling a boy that the carrot seed would not grow.

Kuhn, D. (1990). *More than just a vegetable garden.* New York: Silver Press.

Discusses how seed plants are alike and different, the purpose of a flower on a plant, and helpful/harmful garden insects.

LeSueur, M. (1947). *Little brother of the wilderness: The story of Johnny Appleseed.* New York: Alfred A. Knopf.

Patent, D. H. (1990). *An apple a day: From orchard to you.* New York: Cobblehill Books/Dutton.

This may have to be read by the teacher. It shows an overview of how apples are planted and harvested.

Raffi. (1989). *Everything grows.* New York: Crown Publishers.

This volume contains photographic illustrations to an original song depicting many different living things and their growth.

Schenk de Regniers, B. (1985). *Jack and the beanstalk.* New York: Atheneum.

In verse form and good illustrations, this is the classic tale about the magic beans.

Selsam, M. E., & Hunt, J. J.(1976). *A first look at flowers.* New York: Walker Publishing Company.

This introduction to plant study includes illustrated pages on bacteria, algae, bryophytes, fungi, ferns, gymnosperms, and angiosperms. The author shows how each class differs from the others, and provides games where the reader is invited to match names and pictures.

Selsam, M. E., & Hunt, J. (1978). *A first look at the world of plants.* New York: Walker and Company.

Text and corresponding back-and-white illustrations direct children's attention to flower shapes, arrangement on the stalk, petal formation, location and number of stamens and pistils, etc. Nine flowers pictured in the text appear again on the last pages for a recognition test.

Silverstein, S. (1964). *The giving tree.* New York: Harper and Row.

As a young boy grows up, the tree gives her leaves, her apples, her branches, her trunk, and finally a stump.

Wexler, J. (1987). *Flowers, fruits, seeds.* New York: Prentice-Hall Books for Young Readers.

Photographs of plants and trees present an array of flowers, fruits and finally seeds; the text make the point that the function of flowers is to produce fruit and that of fruit, to protect seeds, from which plants grow.

Teacher References

Simon, S. (1970). *Science in a vacant lot.* New York: Viking Press.

A book of projects involving nature study in a typical empty city lot.

Webster, V. R.(1982). *Plant experiments.* Chicago: Children's Press.

A manual of simple experiments with plants.