

Dear Teachers,

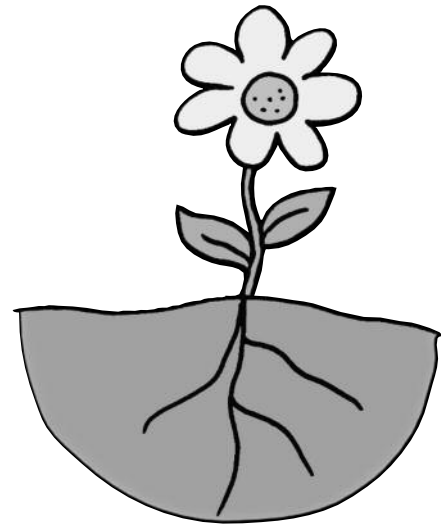
The following pages have been designed with you in mind. Flip through this book to find exciting, hands-on ideas for teaching about plants with a pocket chart! (LER 2206)

Pocket Chart Science — Plants has been developed to provide creative teaching ideas and reproducible activities to support the use of a pocket chart. Suggested activities are designed to attract all types of learners. They encourage listening, speaking, observing, and manipulating words and pictures to teach children plant form and function. In addition, this book contains 150 ready-to-use cards to aid you in teaching about plants. The cards display illustrated pictures and/or words to use within each lesson, and are color-coded for handy organization. For easy reference, a Cards-At-A-Glance chart is located in the back of the book. It shows what is pictured and provides labels for the types of living things on each card. Also included is a Reading List to help you build a classroom library filled with plant concepts.

This book quickly becomes a compact storage file! Tear out the sheets of cards along the perforated lines. Laminates the cards for extra durability, cut them, and store them in the pocket provided on the back cover of the book. As you use them, tear out the blackline master pages for photocopying, then use the folder pocket on the inside front cover for storage.

Pocket Chart Science

Plants

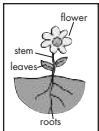
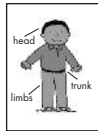


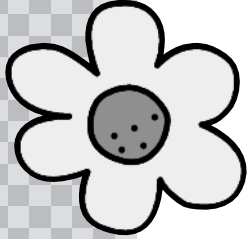
Introduction Strategies:

1. Take a class a walk outdoors, and ask children to point out plants they know. Make a list of questions children would like to answer about plants. At the end of this unit, review the list. Take another walk outdoors and allow children to share what they have learned. You might even hold a plant scavenger hunt, asking children to gather examples of specific plant parts covered in this unit.
2. Have children make collages that show how plants are important in their lives. They can collect actual plant specimens, photos of plants, and pictures from magazines. Also, have children think about how plants play a special role in holidays. What are some plants that are connected to holidays such as Christmas, Halloween, and Valentine's Day, for example?
3. Set up a class garden to maintain and observe for the duration of this unit. You might plant seeds or buy plants that are already growing in pots. Teach children to care for the plants, and use this class garden to demonstrate concepts presented for each of the activities.

Teaching Notes: What is a Plant?

Cards needed: (blue ☀)

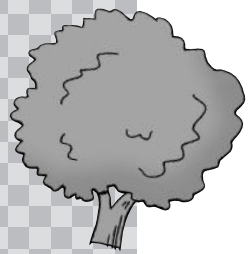
		yes	no	people	plants	grow (mature into adults)
		reproduce	die	energy	alive	produce food
		cells	muscles, bones, blood	body divided into parts		



Background information:

Scientists have identified more than 400,000 species of plants. Like animals, plants are living organisms that grow, mature, reproduce, and die. They require energy from food and water to survive. However, plants differ from animals in the following ways:

- Plant cells have thick walls made of a material called **cellulose**.
- Plant leaves and stems contain **chlorophyll**. This green substance absorbs energy from the sun and uses it to fuel a food-making process called **photosynthesis**.
- Plants do not have the ability to move. They lack muscles and bones.
- Plants often have unlimited growth throughout their lifetime.
- Plants don't have sense organs.
- Plants have different parts than animals. Instead of a head, trunk, and limbs, most plants have flowers, a stem or stems, leaves, and roots.



The majority of plants — more than half — are flowering plants. Flowering plants all have roots, stems, leaves, and flowers. They reproduce by way of seeds that form inside a fruit, which develops from part of the flower. Flowering plants are divided into three major groups: trees (woody plants), shrubs (woody plants), and herbs (soft-stemmed plants). Other kinds of plants are mainly **conifers** ("evergreen" trees with needle-shaped leaves and seeds held in cones instead of flowers), and ferns and mosses (plants that produce spores instead of seeds and lack one or more of the basic flower parts). *Note: This book focuses on flowering plants and conifers.*

Presenting the concept:

Remind children that most kinds of living things fall into one of two groups: "Plants" or "Animals." Which group do people fit into? Place the *yes* and *no* word cards on a table. Then, place the title *people* in the top row. Place the title *plants* in the same row, to the right. Place the characteristic cards down the left side of the pocket chart. Read each characteristic, and ask children if it applies to people. Volunteers can place a *yes* or *no* card next to each characteristic. Last, place the picture card that identifies a person's anatomy and discuss it. Once the column is complete, reproduce it on the board. Do the same thing with the *plants* title. Finally, place and discuss the picture card that identifies a plant's structures. Discuss the table you have created on the board to compare plants to people.

Extending the activity:

Explain to children that plants and animals are further broken down into groups based on similar characteristics. Depending on your students' level of understanding, you can describe some major animal classes (mammals, birds, reptiles, amphibians, and insects). Or, you can talk about animals in the same family (dogs, cats, snakes, ducks, frogs, butterflies, and so on). Discuss differences between major plant groups, such as trees, shrubs, grasses, and herbs. Make a display that shows members of each group.



Name _____

Activity 1

What is a Plant?

Directions: Fill in the chart below. Answer yes or no for each question.

Plant Characteristic	Yes	No
Alive?		
Needs energy?		
Grows?		
Reproduces?		
Dies?		
Makes its own food?		
Made up of cells?		
Has bones, blood, muscles?		
Body divided into parts?		

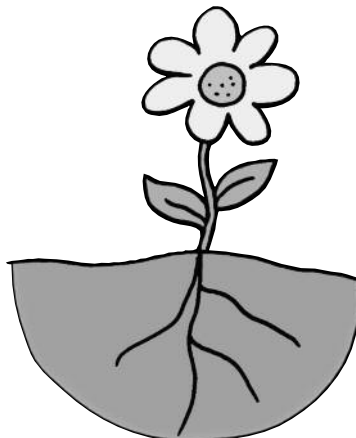
Draw an arrow from each word to its matching plant part.

stem

flower

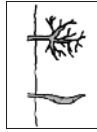
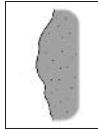
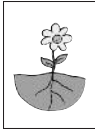
leaf

root



Teaching Notes: Roots

Cards needed: (red ☀️, plant identification card)



roots

take in food

take in water

grow
underground

store food

grown one
or many

hold in place

Background information:

- Plants develop two kinds of roots: **taproots** and **fibrous** roots.
- A taproot grows straight down. It forms a thick main root with smaller roots branching off its sides. Fibrous roots form a tangle that spreads outward instead of downward. There is no main root, and all roots have the same thickness and length.
- The roots of most plants grow underground. They may branch again and again until they have spread far from the stem.
- Roots have three jobs: to anchor the plant, to absorb water and minerals from the soil, and to store food.
- Roots are covered with a fuzz of tiny hairs. These hairs absorb water, along with minerals dissolved in the water, from the soil.

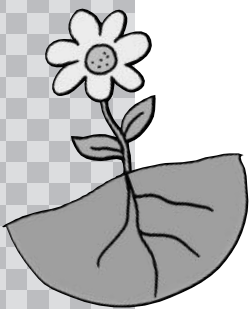
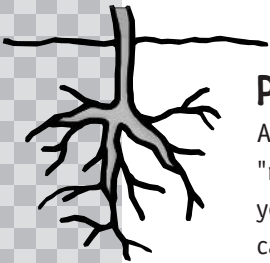
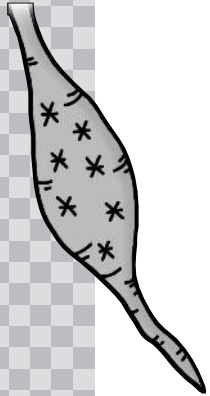
Presenting the concept:

Ask children to compare their own body parts to a plant's body parts. Have them imagine their toes as "roots" that might bury themselves in soil. Place the title *roots* at the top of the pocket chart. Place the yellow ID card next to it. Ask a volunteer to point out roots on the ID card. Place the remaining word cards in a separate row across the pocket chart. Arrange the remaining picture cards on the table. Read the root facts from the list below out loud. Ask students to listen for functions that are pictured on one of the cards. A volunteer can then place the correct card in the pocket chart, under the correct word. Discuss why each function might be important to a plant.

- Most roots grow underground, in soil.
- Roots hold a plant in place, like an anchor.
- Roots take in food from the soil.
- Roots take in water from the soil.
- Roots store food for a plant to use later.
- A plant may grow a single, thick root or many branching roots.

Extending the activity:

Bring in samples of plants with different kinds of roots, such as flowers and grasses. Gently clean the roots of dirt so children can easily examine them. Also include a carrot, radish, or beet, all of which are examples of edible roots. Discuss how the roots of grasses compare to those of a tree and ask children to guess why they might need to be different.



Name _____

Activity 2

Roots

Directions: Fill in each blank with a word from the Word List. You may use some words more than once. Below, draw a plant with one root. Draw a plant with many roots.

Word List

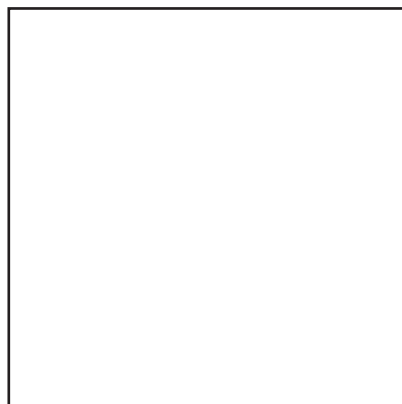
anchor
 food
 water
 underground

1. A plant's roots take in _____ and _____ the plant needs to live.

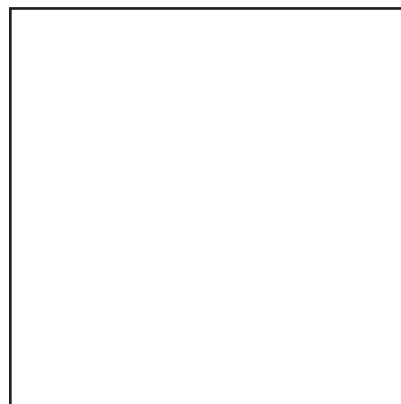
2. A plant's roots grow _____.

3. A plant's roots are also able to store _____.

4. A plant's roots help _____ a plant in place.



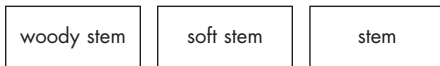
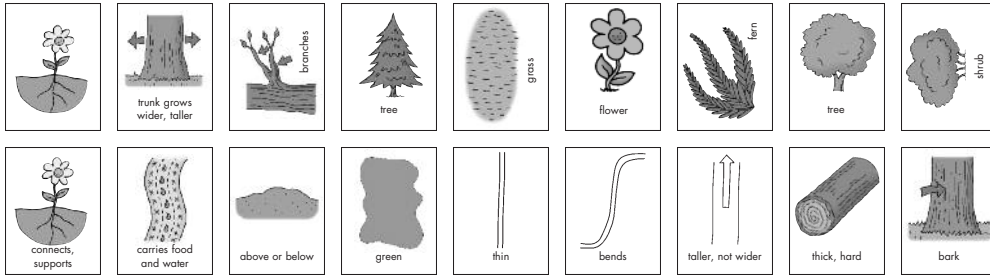
plant with one root



plant with many roots

Teaching Notes: Stems

Cards needed: (orange ☀️, plant identification card)



Presenting the concept:

Continue to compare the human body to a plant. What part/parts of the body are a bit like the stem of a plant? How might they act in similar ways? Place the title *stem* at the top of the pocket chart. Place the yellow ID card next to it. Ask a volunteer to point out the stem on the ID card. Arrange the picture cards that match the following facts on a table. Read stem facts out loud. Ask students to listen for words or functions that are pictured on one of the cards. A volunteer can then place the correct card in the pocket chart. Do this with all the cards to create a column below the title. Discuss why each function might be important to a plant.

- Stems may grow above or below the soil.
- The stem connects a plant's roots to its leaves, branches, flowers, and fruit, and holds aboveground parts upright.
- The stem carries food and water to all parts of a plant.

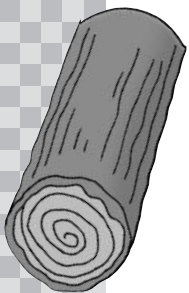
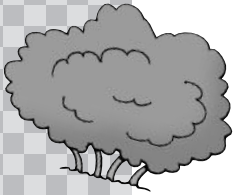
Tell children stems come in different shapes and sizes. Place the titles *soft stem* and *woody stem* at the top of the pocket chart. Use the same procedure described above to present the facts listed below and create two columns on the pocket chart.

- Soft stems are green.
- Soft stems are thin.
- Soft stems bend easily.
- Soft stems grow taller but do not grow wider.
- Woody stems are thick and hard.
- Woody stems have a tough skin called bark.
- Woody stems grow wider and taller, turning into trunks.
- Woody stems sprout branches.

Remove all the cards from the chart. Then, place the *soft stem* and *woody stem* titles next to each other in the top row of the pocket chart. Place the plant picture cards on a table. Invite children to place the cards in the correct column, based on their stem types.

Extending the activity:

Compare soft stems to woody stems, both from the outside and from the inside (look at cross-sections). Discuss tree rings and their use in calculating the life of a tree. Also, have students make posters about your state's official tree and flower.



Name _____

Activity 3

Stems

Directions: Use the Word List to describe soft stems and woody stems. Some words may be used more than once. Below, look at the plant pictures. Write S if the plant has a soft stem or W if the plant has a woody stem.

Word List

- thick
- hard
- thin
- bends easily
- green
- bark
- grows wider
- sprouts branches
- grows taller

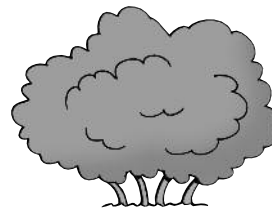
Soft Stems

Woody Stems



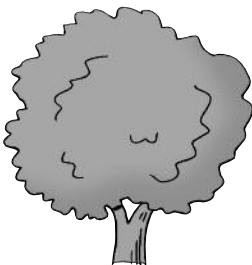
Fern

1. _____



Shrub

2. _____



Tree

3. _____



Flower

4. _____

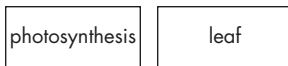
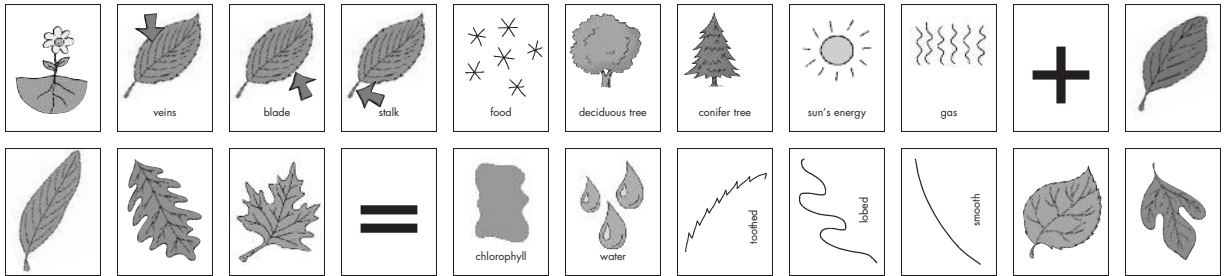


Grass

5. _____

Teaching Notes: Leaves and Photosynthesis

Teaching Notes: Cards needed: (pink ☀️, plant identification card)



Presenting the concept:

Continue to compare the human body to a plant. Tell children to imagine their arms as branches. What part of the body might be like a plant's leaves? Place the title *leaf* at the top of the pocket chart. Place the yellow ID card next to it. Ask a volunteer to point out a leaf on the ID card. Arrange the picture cards that match the following facts on a table. Read leaf facts out loud. Ask students to listen for words or functions that are pictured on one of the cards. A volunteer can then place the correct card in the pocket chart. Do this with all the cards to create a column below the title.

- Most leaves have a stalk that connects to a twig or stem.
- The main part of the leaf is called its blade.
- Wide, flat leaves usually grow on **deciduous** trees. These trees lose leaves each fall.
- Thin, needle-shaped leaves usually grow on evergreen or conifer trees. These trees hold leaves year-round.
- Leaves have pathways called **veins**. Veins run across the leaf and carry food and water.
- Leaves make food for a plant.

Remove all the cards. Place the title *photosynthesis* in the pocket chart and define the word. Place the photosynthesis symbol and picture cards on a table. As you explain the steps involved in photosynthesis, have volunteers place the corresponding cards in the chart to complete an equation.

- Leaves have green **chlorophyll** inside their cells.
- Chlorophyll traps energy from **sunlight**.
- Leaves take in a **gas** called **carbon dioxide** from the air around them.
- Carbon dioxide mixes with the sun's energy and **water** in the leaves.
- These materials make sugar, which the plant uses for **food**.

Remove all the cards. Explain that plants have different leaf shapes. Pass out the leaf picture cards. Place the titles *toothed*, *lobed*, and *smooth* in a row across the top of the pocket chart. Invite children to place their cards in the pocket chart. Some leaves will have more than one feature.

Extending the activity:

Make a classroom collection of leaves. Organize them based on features such as which kind of tree (deciduous or conifer) they come from, their shape, or their color (this works especially well in fall and can include a discussion of why leaves turn color).j1

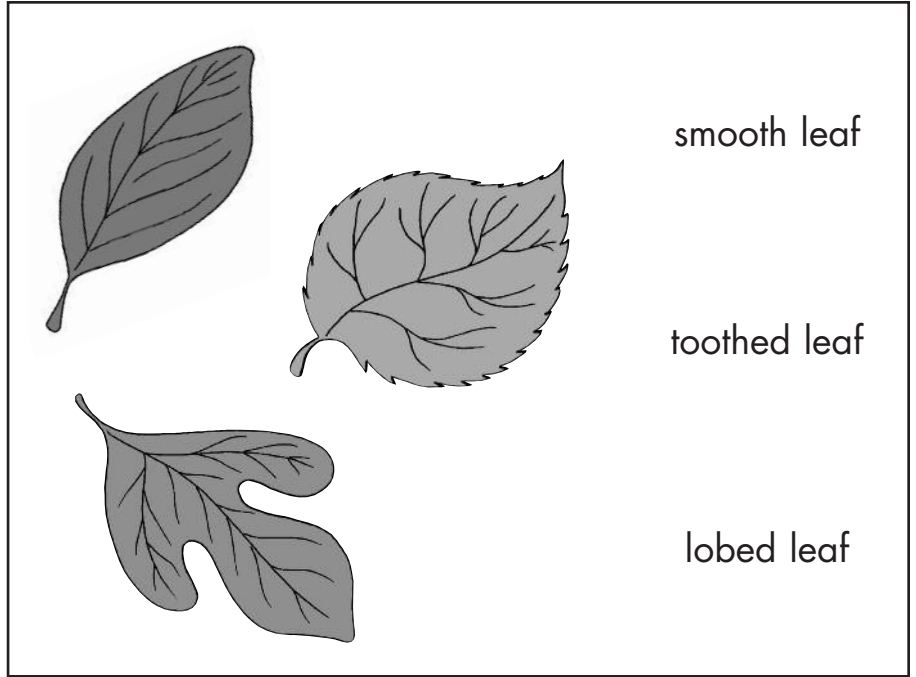
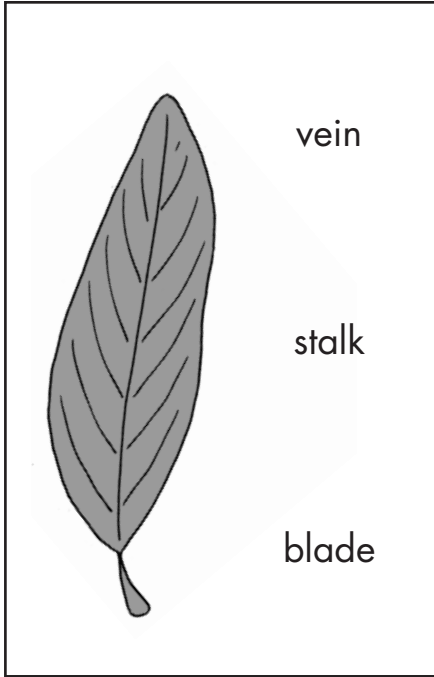
Name _____

Activity 4

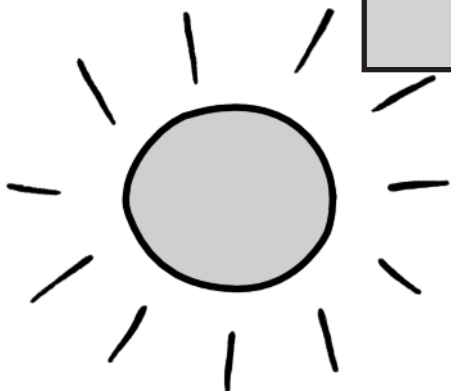
Leaves and Photosynthesis

Directions: Draw an arrow from each word to its matching part in these pictures.

Below, use the Word List to write the steps involved in photosynthesis.



Word List
 gas
 sun's energy
 chlorophyll
 water
 sugar

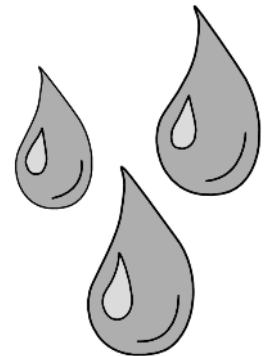


+ _____

+ _____

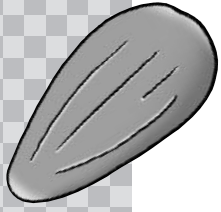
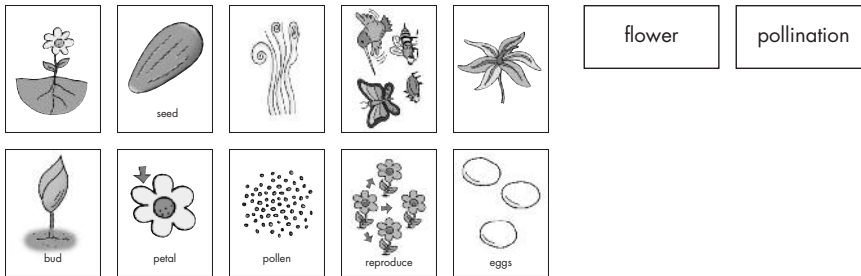
+ _____

= _____



Teaching Notes: Flowers

Cards needed: (green ☀️, plant identification card)



Presenting the concept:

Continue to compare the human body to a plant. Which part of the human body is the easiest to recognize? Explain to children that, just like a human face, a plant's flower is usually showy so that it's easy to recognize and remember. This is because the flower is the part of the plant that helps it **reproduce**, or make more copies of itself. Most flowers need "outside" help to reproduce (an idea you will explain more in a moment).

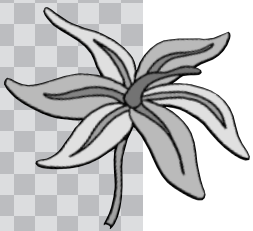
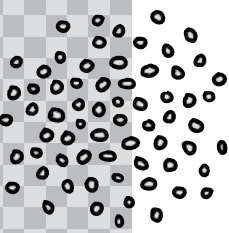
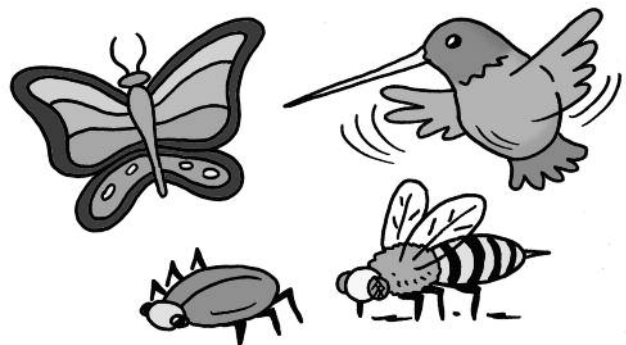
Place the title *flower* at the top of the pocket chart. Place the yellow ID card next to it. Ask a volunteer to point out a flower on the ID card. Arrange the picture cards that match the following facts on a table. Read the flower facts out loud. Ask students to listen for words or functions that are pictured on one of the cards. A volunteer can then place the correct card in the pocket chart. Do this with all the cards to create a column below the title.

- A flower is the part of a plant that helps it reproduce, or make more copies of itself.
- A flower starts out as a closed **bud**.
- When a flower blooms, its leaf-like parts, called **petals**, open up.
- Flowers have special parts that make eggs. They also have special parts that make a dust-like material called **pollen**. When pollen mixes with eggs, they turn into seeds. Seeds grow into new plants.

Remove all the cards from the pocket chart. Place the title *pollination* at the top of the pocket chart, and define this term. Explain that, in most cases, a flower cannot grow seeds unless its eggs mix with pollen from another plant. Ask children how they think pollen might be spread from plant to plant. (Remind them of "outside" help.) Place the picture cards in the pocket chart. Discuss how wind and plant-eating animals might play a role in pollination. Explain that flowers often make a sweet liquid called **nectar** that animals like to eat. These flowers are brightly colored to catch animals' attention. Have volunteers use the flower, pollen, wind, and animal picture cards to act out pollination.

Extending the activity:

Bring in examples of different kinds of flowers. Help students press flowers to preserve them. They can lay flowers flat between two sheets of newspaper, then place the newspapers between the pages of a large book. Stack other heavy objects on the book to press the pages together as tightly as possible. After several days, children can remove the flowers and glue entire specimens or parts of each on white paper to make homemade cards as gifts.



Name _____

Activity 5

Flowers

Directions: Use the Word List to correctly complete each sentence. Below, draw a picture to show how plants are pollinated.

Word List

animals
reproduce
bud
wind
colors
nectar
pollination
petals

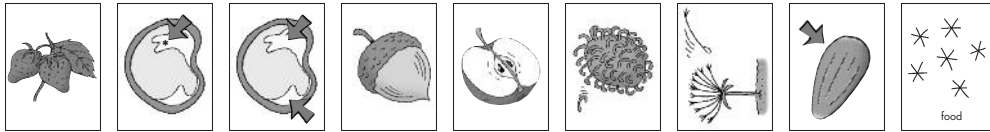
1. A flower starts out as a closed _____.
2. A flower's leaf-like parts are called _____.
3. A flower's job is to help a plant _____.
4. When pollen and eggs mix, _____ takes place.
5. Seeds may be blown around by _____.
6. Seeds may be spread by _____.
7. Flowers often make sweet liquid _____.
8. Flowers often have bright _____.



Pollination of a Flower

Teaching Notes: Seeds

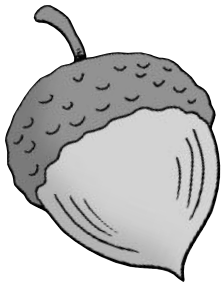
Cards needed: (purple ☀)



Background information:

Seeds develop inside a flower after pollination. A single plant may produce thousands of seeds in one growing season. A seed has a tough shell or **seedcoat** that surrounds a tiny plant called an **embryo** and the food it needs to start growing.

For the best chance of survival, seeds must "travel" from their parent plants and land in a new place to grow. This process is called seed **dispersal**. Seeds have different designs based on their method of dispersal. Some seeds have feathery or wing-like parts that catch the wind so they can float. Some seeds are covered with hooks or spines that catch on animals' fur or people's clothing. They get a free ride to a new home. Some seeds are held inside fruits that are soft and sweet, like a peach. Others are held inside fruits that are hard and meaty, like a nut. Animals eat the fruits, and the seeds pass through them without being harmed. They're dropped in a new place.



Presenting the concept:

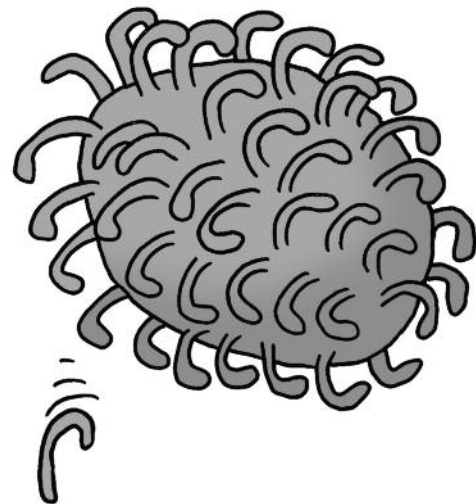
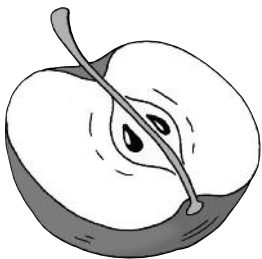
Place the title *seed* at the top of the pocket chart. Place the strawberry picture card next to it. Ask a volunteer to point out a seed on the card. Ask children what they think might be inside a seed. Ask them to share examples of seeds they are familiar with.

Discuss the parts of a seed, starting with the outermost layer (seedcoat, embryo, food). To do this, place each picture card in the pocket chart. Ask children to identify what is shown in the picture. Then, place the matching word card next to the picture. Discuss how each part of a seed is important.

Remove all the cards. Explain that, to have the best chance of survival, seeds must "travel" from the parent plant to find a place of their own to grow. They have different ways of doing this. Lay the picture cards on a table. Place the remaining word cards in a vertical row down the left side of the pocket chart. Challenge children to match the picture cards to each method of travel (some methods will have more than one matching picture card).

Extending the activity:

Have a picnic that features seeds, nuts, and fruits. The menu might include sunflower seeds, peanuts, strawberries, apples, peaches, popcorn, and other foods. Give children the chance to examine seeds from each item on the menu.



Name _____

Activity 6

Seeds

Directions: Use the Word List to label the parts of a seed. Below, draw a line from each seed to its trick for traveling, and explain why seeds must do this.

Word List

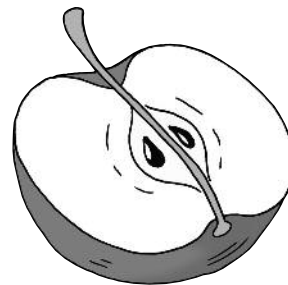
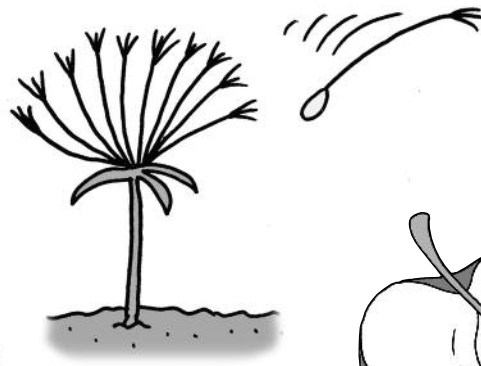
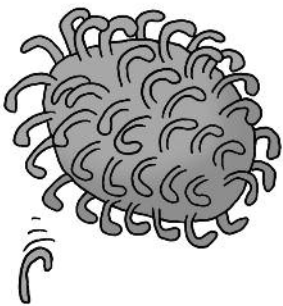
- seedcoat
- embryo
- food

1. _____



2. _____

3. _____



float on air

sticky or hooked

inside fruit

Seeds travel because:

Teaching Notes: Growing Plants, Good for People

Teaching Notes: Cards needed: (yellow ☀)

Background information:

Germination is the process by which a plant begins to grow from a seed. Typically, seeds don't germinate until temperature, water conditions, and soil conditions are all favorable. Once a seed germinates, it sends a shoot up through the soil toward the surface. During this initial growth, the shoot uses food stored in the seed for energy. Once the shoot breaks through the soil, it can start performing photosynthesis and make its own food. Germination is the first step in a plant's life cycle. Plants grow, mature, reproduce, and die. Plants have many uses for people, at all stages of their life cycle. Seeds, flowers, roots, stems, and leaves all are used for many manufactured goods, as well as medicine, food and drink, building materials, fuel, and recreation.

Presenting the concept:

Place the title *germination* at the top of the pocket chart, and define this term. Ask children what they think a seed might need to grow (warmth, soil, food, water). As they supply the correct answers, place the matching picture cards in the pocket chart, under the title. Remind students seeds store food.

Remove all the cards from the chart. Place the title *life cycle* at the top of the chart, and define this term. Arrange the word cards for each life cycle step in a circle on the chart. Place an arrow between each step, leaving spaces for matching picture cards. Note: The pocket chart is not circular, so the "circle" you form will not be perfect. Ask volunteers to match the picture cards to the life cycle steps.

Remove the cards from the chart. Begin to discuss how people depend on and use plants. After sharing a few ideas, place the titles *recreation*, *health*, *building materials*, *food and drink*, *manufactured products*, and *fuel* in a row at the top of the chart. Arrange the matching picture cards on the table. Ask students to place them correctly under each title. Use the pictures to generate further discussion.

Extending the activity:

Germinate some quick-growing seeds, such as radish or bean seeds. Line the inside of a clear cup with a folded paper towel. Stuff more towels in the middle of the cup to press the towel liner snug against the cup. Insert seeds and beans between the liner and the cup. Moisten the paper toweling with water, and keep it moist. The seeds and beans will germinate within several days. They will be ready for viewing at about 4 or 5 days. You may wish to plant them and allow them to keep growing.

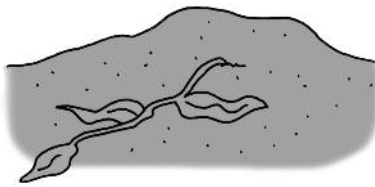
Name _____

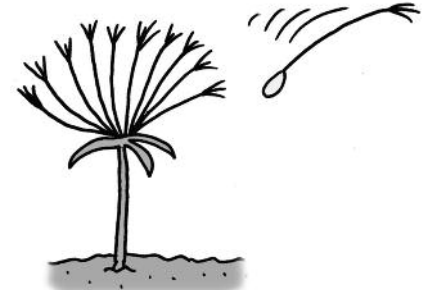
Activity 7

Germination and Plant Life Cycles

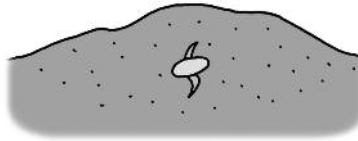
Directions: Order the steps of a plant's life cycle from 1 to 5. Use the Word List to label each step. Below, draw a picture to match each use that people have for plants.

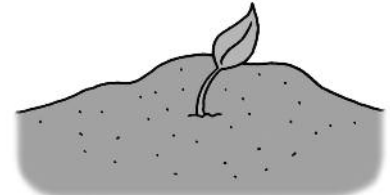
Word List
 germinate
 grow
 mature
 reproduce
 die

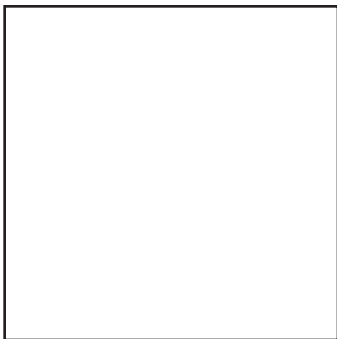




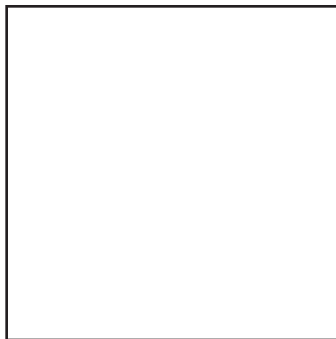




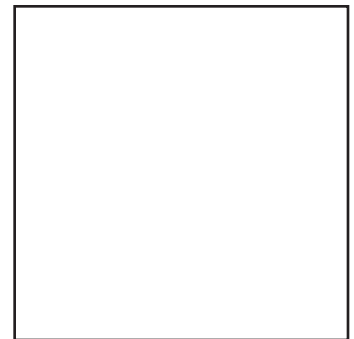




food



manufactured goods



recreation

Reading List

The Apple Pie Tree
Zoe Hall
Scholastic, Inc., NY: 1996

From Seed to Plant
Gail Gibbons
Holiday House NY: 1993

How a Plant Grows
Bobbie Kalman
Crabtree Publishing, NY: 1996

The Magic School Bus Plants Seeds:
A Book About How Living Things Grow
Joanna Cole
Scholastic, Inc., NY: 1995

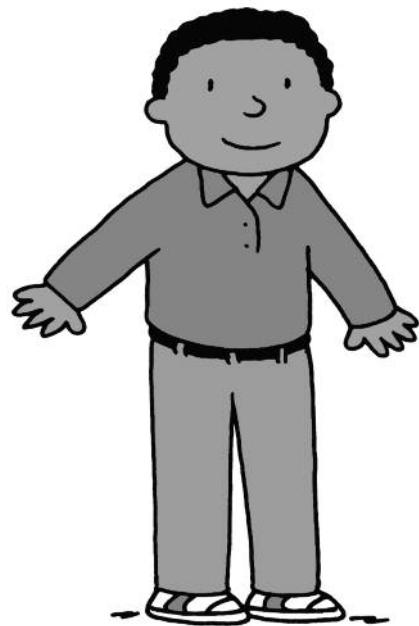
Nobody's Mother Is in Second Grade
Robin Pulver
Dial Books for Young Readers, NY: 1992

One Bean
Anne F. Rockwell
Walker & Co., NY: 1999

Plants
Ray Boudreau
Kids Can Press, Canada: 2000

The Tiny Seed
Eric Carle
Simon & Schuster, NY: 1987

Weslandia
Paul Fleischman
Candlewick Press, Cambridge, MA: 1999



Cards-At-A-Glance

Cards are shown as front-to-back pairs.

			yes	photosynthesis
			yes	soft stem
			yes	flower
			yes	leaf
			yes	seed
			yes	pollination
			yes	fruit (soft or hard)
			people	seedcoat
			float on air	life cycle
			roots	germination
			no	recreation
			no	health
			no	food and drink
			no	building materials
			no	fuel
			no	manufactured goods
			no	sticky or hooked
			no	embryo (new plant)
			plants	take in water
			grow (mature into adults)	take in food
			reproduce	store food
			die	grow underground
			energy	hold in place
			alive	grow one or many
			produce food	→
			cells	→
			muscles, bones, blood	→
			body divided into parts	→
			yes	woody stem
			yes	stem