Grade 2

Tree Life

Objectives

Students will:

- explain in simple terms how a tree grows from seed through maturity and finally decays and returns to the soil;
- identify and count annual rings;
- describe seasonal changes in wildlife and in broadleaf trees.

Vocabulary Words

seeds	root tips
roots	cambium
stems	outer bark
buds	sap
dormant	annual ring
life cycle	inner wood
chlorophyll	broadleaf
photosynthesis	needleleaf
seedling	decay
sapling	recycling

Background Information

Minnesota, like many parts of the world, has very cold winters. During this time, the ground is hard and seems lifeless under layers of snow and frost. But under all this cold lie the **seeds, roots,** and **stems** that will be next summer's plants. Each seed holds a tiny plant and some food that will feed the new plant. Roots and stems have tiny **buds** that will begin to grow when the weather warms. The cold earth is far from lifeless. Winter is simply a time of rest.

As spring arrives, the rays of the sun begin to warm the earth. Snow and frost melt. The moisture soaks the seeds and makes them swell. The tiny plants begin to grow. Buds and roots also begin to grow and soon we see new plants.

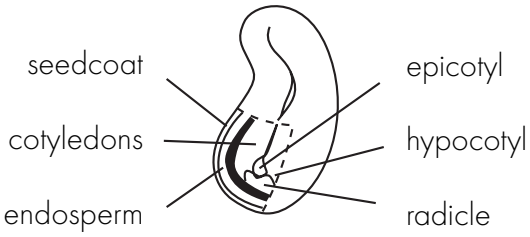
Through the hot summer months, plants grow strong and sturdy. But at the end of the season, a plant's work is usually done. For some plants, it's the end of their lives. For others, it means going into a long rest as the autumn ground freezes and there is no more water. They will "sleep" (lie **dormant**) again until spring, when the **life cycle** will start all over again.

It Starts With Seeds

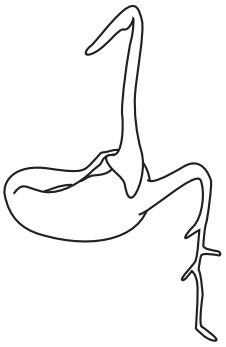
They can be as large as a baseball or as small as the head of a pin. Some are flat, some are round: others are long and thin. Most travel ... some by air, some by water, some by hitching a ride with a passing person or animal. Touch them with a bit of warmth and moisture, and the miracle of growth begins. What are they? Seeds, wonderful seeds!

Seeds look and feel very different from each other, but they're all alike in important ways. Each of them is a baby plant with its own food supply, all put together in one handy, self-sealed package. The cross section on page 24 shows the parts of a tree seed.

All seeds have the same needs for growth—moisture, warmth, sunlight, food, and air. And they all begin to grow in much the same way. Moisture soaks the outer shell of the seed until it becomes soft. The food inside expands as the water enters the seed. If warmth is also present, the shell breaks open and growth begins.



A small root pushes out of the seed and down into the earth to search for water. A tiny stem pushes up through the soil reaching toward the sunlight.



As the plant grows underground, it uses the food stored in the seed. As soon as it pushes out of the ground into the sunlight, it begins to make its own food. Food is made by the leaves and the stem. The green material in the leaves' tissues—**chlorophyll**—acts together with water, air, and sunlight through the process called **photosynthesis** to make a kind of sugar that is food for the plant. Some tree species have unusual seed "containers." Think about bananas, apples, and pine cones.

The young tree that grows from a seed is called a **seedling.** After a tree reaches a height of 6 feet or more and its trunk is 1 to 2 inches thick, it is called a **sapling.** The tree grows taller and its trunk grows thicker every year. The tree continues to grow as long as it lives.

Where Growth Takes Place

Trees have three different growing parts: the **root tips,** the **cambium,** and the buds. The root tips cause the roots to grow longer and spread out in search of more water and minerals. The cambium is inside the tree, under the **outer bark.** You'll find cambium in the trunk and limbs. The buds on the limbs grow longer, making the tree taller and wider. This also makes it possible for the limbs to spread out to receive more sunlight.

Teacher note: See Resources, page 115, for more detailed information on the structure of a tree.

Wood is not solid material. It is made up of a lot of tiny tubes that can be seen only under a microscope or very strong magnifying glass. These tiny tubes carry plant foods up and down the trunk of the tree and through the branches as liquid called **sap.** A piece of wood even as small as a pencil contains millions of tiny tubes.

By looking at the cross section of a tree trunk, you can see tree growth from the center toward the outside. Look closely at the top of a stump or the end of a log, and you can see rings in the wood. These rings are made by growing layers of wood; a new layer is added each year. Each layer is made up of a band of lighter-colored wood called spring wood and a band of darker wood called summer wood. The spring wood band is usually wider than the summer wood band. One spring wood band and one summer wood band together are called an **annual ring.**

The tree's age can be figured out by counting the annual rings on the stump. Remember, one light band and one dark band is one year's growth.

Notice the darker wood in the center of a stump or log. It is called **inner wood.** It gives support and strength to the tree, and stores food the tree can use later. For more information about annual rings, see Resources, page 113.

Seasons Come, Seasons Go

Seasons bring a lot of changes to a forest. During spring, forest life is renewed. The flowering plants, including many trees and shrubs, display their showy flowers. The **broadleaf** trees and shrubs bud out, then begin to cover themselves with new leaves. The **needleleaf** trees develop new shoots that later flare out into the new stems and needles.

While all the forest plants are springing to life, fur-bearing mammals are giving birth to their young. Songbirds (cardinals, robins), game birds (ruffed

grouse, wild turkeys), predatory birds (hawks, owls), and scavengers (vultures, gulls, crows) are hatching their offspring. Along nearby ponds and lakes, waterfowl hatch their young. All this new plant and animal life is a wonderful form of beauty for people to enjoy.

During late spring and summer, the new life that began in the spring is "growing up." Many flowers turn into showy fruits; young birds grow feathers and begin flight training; ducklings start to swim; young fur-bearing animals romp around and learn the serious business of hunting for food and hiding from their predators. While all this activity is going on, the trees in the forest have full sets of leaves. They are adding a new layer of wood around their trunks and spreading their branches wider and higher.

In the autumn, the forest changes into a new kind of beauty. The leaves of broadleaf trees, shrubs, and other plants change to brilliant colors of red, yellow, and orange. Many people think frost causes this change. Actually, frost can reduce the brightness of autumn colors. The green color in leaves comes from a green material called chlorophyll. In the fall, when temperatures begin to lower (not yet freezing) and the hours of daylight shorten, the production of the green chlorophyll stops. The chlorophyll that is already in the leaves gradually breaks down until it is completely gone. Other colors in the leaves that have been there all along then show through. These colors are now seen in various shades of reds and yellow. After showing their beauty for several days or weeks, the colorful leaves fall to the ground.

During the autumn, some birds and waterfowl migrate to warmer climates. Squirrels and chipmunks finish storing acorns, pine cones, and seeds of other plants to feed on through the long winter months. Hibernating animals prepare to "hole up" for much of the winter. Most of the trees and other plant life shed their seeds before the snow flies so the seeds will be ready to sprout into new plants when the snow melts the next spring.

Once the cold of winter sets in, some animals hibernate until spring. Many birds have flown south to warmer climates. Those that don't spend many hours each day looking for food. Fur-bearing animals such as rabbits, squirrels, fox, wolves, and deer snuggle up in sheltered spots to stay warm, but also spend time each day searching for food. Trees move into their dormant (resting) time.

Decay of a Tree

You already know trees start out as seeds. Over many years—sometimes hundreds of years—trees grow up and stand as strong, healthy "adults." Over time, though, trees get old. They may be attacked by insects or diseases. They may be weakened by years with little rain. Finally, they begin to die and **decay.** Their places, in turn, are taken by other plants and trees. As each tree decays and returns to the soil, it affects the area around it and it changes the environment. New space is opened up for other plants. More sunlight can reach the forest floor, and plants that need the sunlight to grow sprout up. Downed trunks and branches make great homes for rabbits, skunks, and other forest animals. Decaying bits of the old tree add nutrients and organic matter to soil, making it a richer food for other plants.

In most forests, old, weak, and sick trees are dying and decaying all the time. It is a normal part of nature's plan.

Language Arts

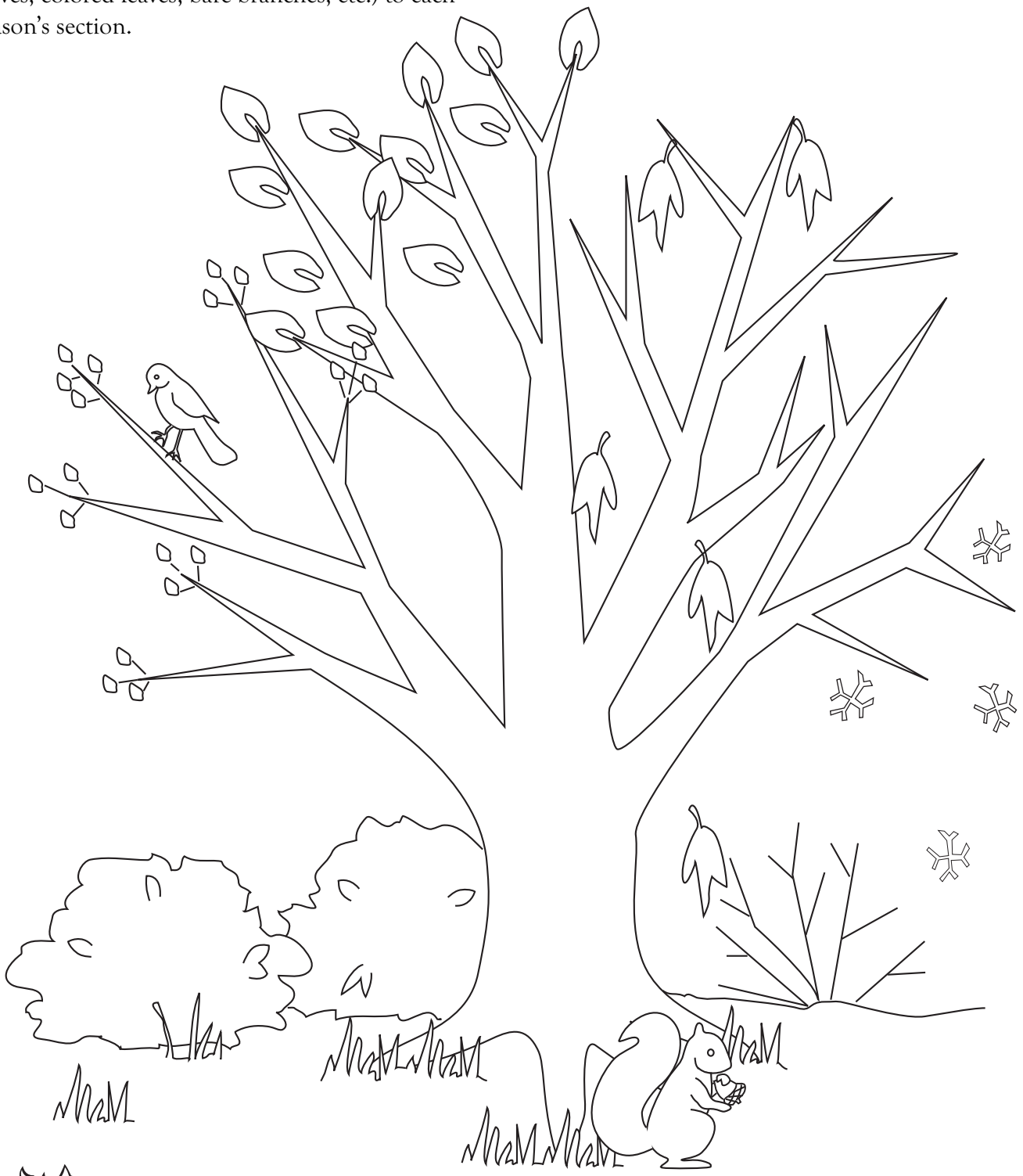
Literature and Folklore

Book Nook. See "Book Nook," Resources, page 135, for tree-related books to enjoy.

Treelore. Literature is packed with fascinating folklore and legends about plants and trees. Ask your media specialist or librarian to help you find good sources. For example: It's said that Ojibwe Indians seldom took down a living tree because they believed a tree could feel pain. Their medicine men told of trees wailing as they were being chopped down. Many other tribes around the world have also been especially respectful of trees. Stories of Scandinavian elves and trolls living in and around trees have been told for years.

A Tree for All Seasons

Make a basic tree trunk with branches. Divide the crown according to the four seasons. Students participate by adding appropriate parts (buds, green leaves, colored leaves, bare branches, etc.) to each season's section.

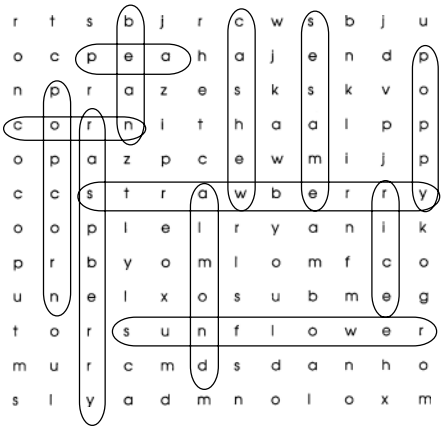


Seed Search (Vocabulary)

You'll need: "Rodney the Root's Seed Search" Activity Sheet, page 32.

Discuss the activity sheet and do the word search.

Answers:



Be a Poet

You'll need: Writing paper and pencils.

Write a poem about why trees are so special in our lives. As a group, brainstorm words that can be used. Then let the creative juices flow! Write about what trees and forests do for you ... how they make you feel. Or imagine you are a tree. Talk about how things look from your point of view, or how you feel about things that happen to you as a tree. What are some other ideas?

People and Cultures

Trees Then and Now

Have students interview older members of the community to learn what the area looked like 25 or more years ago. Borrow or copy old photographs from your county Historical Society to help. How have the trees changed? Are there more trees or less trees than there were then? How have people's needs affected the trees in the community? Have the senior citizens relate a favorite memory or story about a tree from their youth. Is the tree still alive? If not, why not? Talk about planting trees as a legacy to future generations.

Treat a Tree Like a Best Friend

You'll need: Writing paper and pencils.

Someone once said, "We should treat a tree like it is our best friend." Ask students: Why do you think someone might say this? Is it a good idea? Why or why not? What are some things you could do to show trees you are their friend? What could your whole city or neighborhood do to show friendship and respect for trees? Pair up with a partner and make a list. Share your lists with the whole class, and make it a habit to do at least two of your best ideas.

Become Recycling Sleuths

You'll need: Wastebaskets filled as they normally are at the end of a school day and a custodian or person who empties the baskets to visit the classroom.

What do school wastebaskets have to do with trees? Have students make hands-on connections.

Arrange a day for a custodian or maintenance person to visit the room for the purpose of telling about his or her job and talking with students about ways they can help care for the school. Tell students about the visit ahead of time and have them prepare questions to ask of the guest. Then, more specifically, ask the visitor to discuss what happens to things that are thrown in school wastebaskets.

What does the word **recycling** mean to students? Why do they think people do it? Do they know how recycling can help save trees? (Because paper is made from wood pulp, recycling and using less paper is one way to reduce the number of trees being cut down. Recycling also reduces the amount of waste hauled to landfills.)

Ask students: What things does your family recycle? What do we recycle at school? Schools and homes use a lot of paper. Think about the things that are thrown away in garbage cans and wastebaskets. How much of it is paper? Look in the classroom wastebaskets at the end of the day for several days. What do you see? How many wastebaskets full of paper does your class throw away in one week? In one month? Keep a count! Where does the paper go? What can you do to use less paper?

Tips: Recycle paper products, save newspapers for recycling, use both sides of drawing and writing paper, use discarded mail for scrap paper, cut out magazine pictures and make your own greeting cards, use gift wrap more than once, use a regular cup instead of a paper drinking cup, use rags made from old clothing instead of paper towels, etc. Try for one day to use no new sheets of paper! You'll discover all sorts of other paper to write on.

Where is the nearest recycling center? What things do they recycle? What do they do with the things they collect? What new things are made from the recycled products they handle? Why might some people choose not to recycle? If we don't know about the recycling in our community, how can we find out? Can wood be recycled? Are there any wood recycling centers in your city?

For more information on recycling, check out this site: http://www.moea.state.mn.us/reduce

Science and the Environment

Growing Buds

You'll need: 12-inch (approximately) twigs from several kinds of trees, a jar, and water.

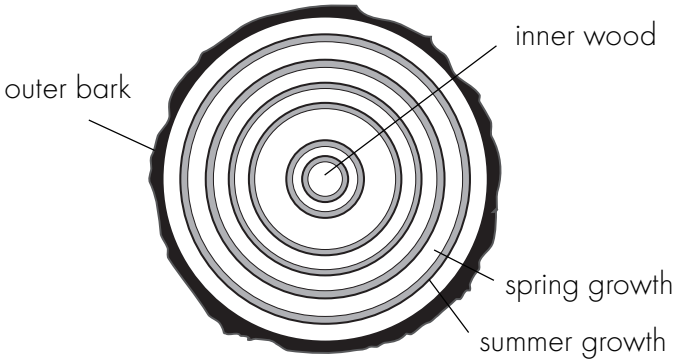
In early spring, when the buds are still tightly closed, have an adult cut about a 12-inch twig from several kinds of trees (cut at an angle). Take only what you need. Put the twigs in a jar filled with water and set in a warm, sunny place. Change the water once a week. Notice the changes that take place. In May, can your group find the kinds of trees that match the twigs?

Learn Those Layers

You'll need: "Learn Those Layers" Activity Sheet, page 33.

One spring growth ring (light-colored wood) and one summer growth ring (dark-colored wood) together are called an annual ring. To find out the age of a tree through counting its rings, start at the outer (newest) ring just inside the bark and count in toward the center of the tree. This tree is in its sixth year of growth.

Answers:



Reading the Rings

You'll need: Cross section of a branch, small trunk, or freshly cut stump.

Use actual tree parts to study and count the rings. Are there differences in the width of the annual rings? In good growing conditions (warm spring weather, plenty of moisture and sunlight) trees grow more rapidly and have wider rings. In chilly, cloudy conditions and not enough moisture, they grow more slowly and have narrower rings.

Rotting Treasures

You'll need: A rotten log or decaying stump and magnifying glasses.

One of the best ways to learn about the ecology of an area is to study a rotten log or decaying stump. Here's a community life cycle at work. What forms of new life can you see around the log or stump? What larger growing things are there? What is happening to the log or stump as it decays? Are there clues about what is helping the wood decay (moisture, insects, etc.)? What new discoveries do you make when you study the rotting wood with a magnifying glass?

Leaf Skeletons

You'll need: Partially decomposed leaves.

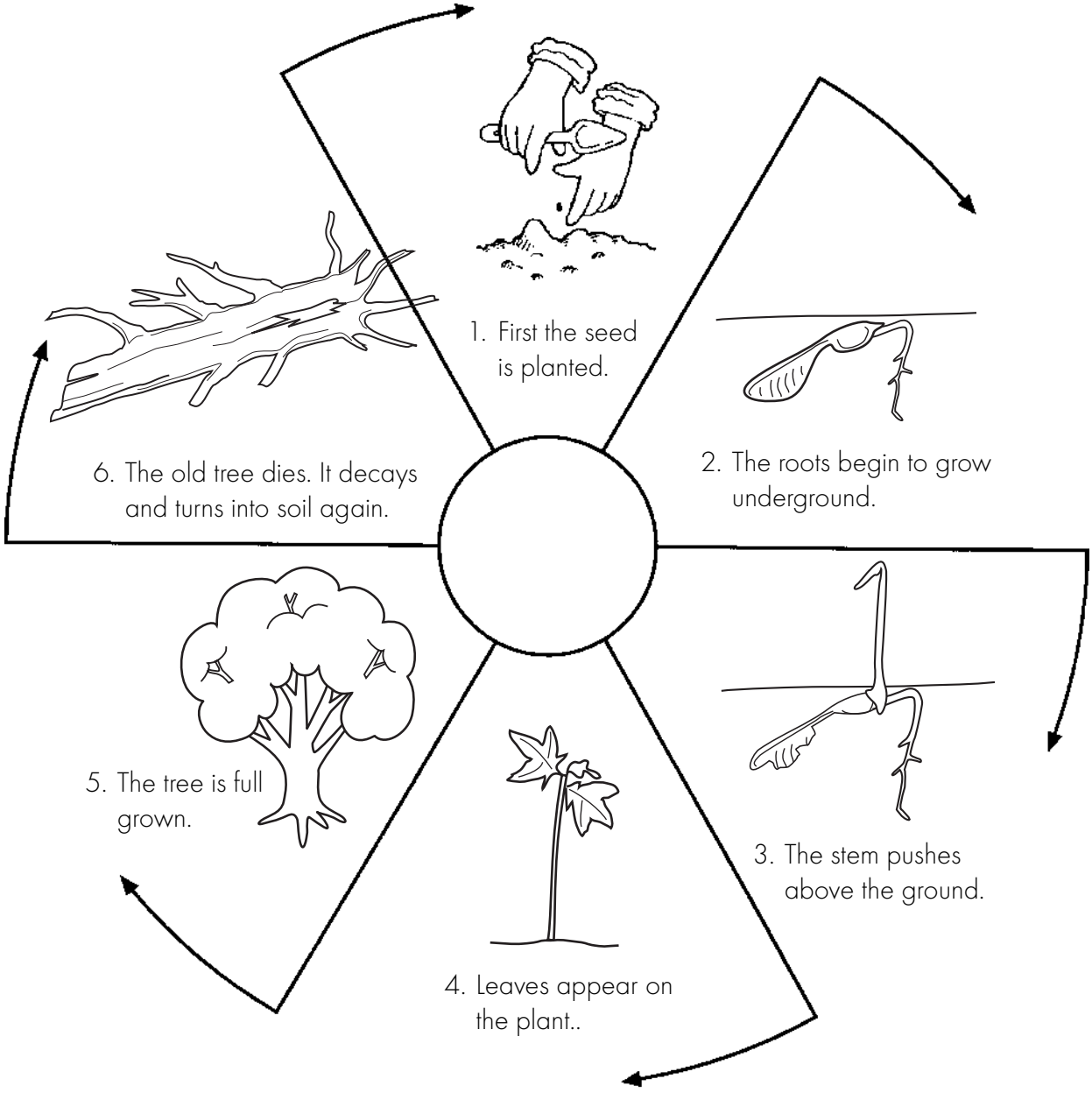
You can find leaves late in the winter or early in the spring that have not fully rotted into rich soil. Look under bushes, in tall grass, or all over the ground in the woods. Search through the layers of rotting leaves. You might find a leaf "skeleton" with just the harder veins left. Dig down and look for leaves on the bottom that have almost turned to soil and you may find insects hiding from the cold. Your leaf skeletons show the first steps in how leaves decay.

Cycles of Life

You'll need: "Cycles of Life" Activity Sheet, page 34.

Discuss the cycle of life of a tree and then have students complete the activity sheet. Their work will be easier to check if you guide them to paste their first picture (planting the seed) at the top of their circle.

Answers:



Enhancements

Math

Tree Shadows

You'll need: String, sticks, or tape measures.

Use string, sticks, or tape measures to show and measure how the shadow of a tree changes at several different times of the day. Why does it change? At what time of day is it shortest? Longest? When is your own shadow longest and shortest?

Stump Rubbings

You'll need: Stumps, light-weight paper, and soft-lead pencils or dark crayons.

Find the stump of a large tree. (Dutch elm and oak wilt diseases have affected many trees. Diseased trees have been removed, and their stumps are a good learning source.) Do a stump rubbing, using a strip of paper and a soft-lead pencil or dark crayon. Figure out how old the tree was when it was cut. (See "Nature's Timeline: Read the Rings!" in Resources, page 113.) It might be fun to see who in the class can find the oldest tree stump.

The Arts

Leaf Prints

You'll need: Leaves, tempera paint, and paper.

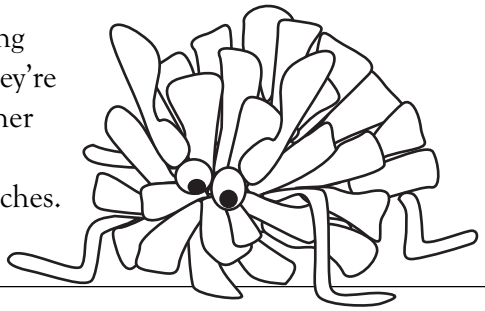
Make a leaf print by covering a pressed leaf with tempera paint. Place leaf, paint side down, on a piece of paper. Carefully rub the leaf and then peel it off. You're left with a nice leaf impression.

Make prints of many different kinds of leaves and post on a bulletin board for a colorful and interesting display.

Pine Cone Critters

You'll need: Pine cones, glue, pipe cleaners, construction paper, and scissors.

Have students collect pine cones and bring them to class. Look for a variety of sizes ... they're out there somewhere! Glue pine cones together to make animal critters. Use pipe cleaners, construction paper, etc., to add finishing touches.



Health

Nutrition—Who Needs It?

Is good nutrition important only for humans? No way! All living things need some kind of nutrition in order to survive and that includes trees. Brainstorm a list of the things you need for good nutrition and healthy living (vitamins, minerals, proteins, carbohydrates, water, fresh air). Now list the things trees need: rich soil (minerals and other nutrients), fresh air, sunshine/light, water, etc. Most of our nutrition comes through our mouths, although Vitamin D can be absorbed through our skins from the sun. Research how a tree gets its nutrients. (Moisture and nutrients are absorbed from the soil through the roots. Energy—food for growth— is created through photosynthesis, the leaves, and the sun.) Tree leaves absorb carbon dioxide from the air; but roots absorb oxygen from air pockets in the soil.

Games and Physical Activities

Run and Seek

You'll need: Bags and a list of, and access to, tree-related items.

Give students bags and a list of things to find. Go outdoors to a safe and specific area in which to hunt. Space "contrived" tree-related items far apart so there's plenty of space for active movement. Set a time limit, and they're off! The list of items to find might include pine cones, acorns, maple tree seeds, a feather, fallen twigs, etc. You may want to do a "dry run" in the hunt area first to find things to add to the list. Make sure the list contains only nonliving or on-the-ground items.

Tree Tag

Players are divided into two teams—"squirrels" and "rabbits." Squirrels are on one end of the playing area, rabbits on the other. For plenty of exercise, teams should be 40 or more feet apart and have side boundary limits. One player, the fox, stands in the center. The fox calls either "squirrels" or "rabbits." When their team is named, those players try to run to the opposite end of the playing area to visit their forest friends (the other team). If the "fox" tags them before they reach the other end, they immediately stop in place, become trees, and are rooted in place. They can move their arms, though, and now help the fox by tagging other players as they run past. The fox continues to call out teams and tag players until everyone has become a tree. The fox then chooses one of the trees to become the new fox and play continues.

Growing Up

Show how a seedling grows by having students form their bodies into "a ball" on the floor. Have them lift an arm above their heads to represent the stem breaking from the seed and reaching upward toward the light. Next, each student stretches a leg straight down to represent roots growing from the seed. Students stand up to become a sapling. They show by stretching arms and hands how they grow taller and wider until they're mature trees. Then they act out growing old, falling down, and decaying.

Try a relay: Divide students into four groups. Beginning at the same time, have one student in each group act out the life cycle of a tree as previously described. When the first student is done, the second one in each group "sprouts" up from the decaying tree to begin the life cycle again. Each student in the group takes a turn acting out the life of a tree until everyone has had a turn. The first group to "grow" all its trees, wins.

Performance Assessment

Task Statement

Go on a walk and have students differentiate between the different stages of a tree's growth. After returning to the classroom, have students diagram and label these stages (seed, seedling, sapling, mature tree, dead tree, decaying tree).

Alternate: If a walking tour won't yield these differences, use photographs or the "Cycle of Life" pictures on page 34.

Grade 2 Standard

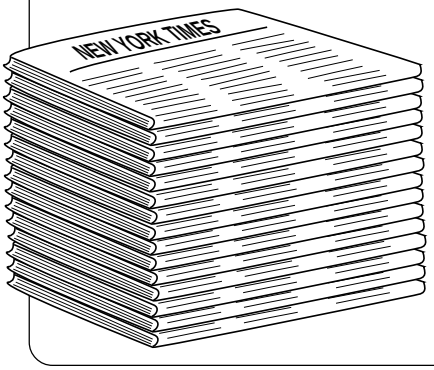
Differentiate between the different stages of a tree's growth.

Rubric—Quality of Performance

4 Exceeds performance standard
3 Meets performance standard
2 Developing toward performance standard
1 Attempt made but many serious errors

FUN FACT

Paper, Paper Everywhere!



An average of over 600 pounds of paper is used each year by every man, woman, and child in the United States!

Rodney the Root Says…

KID'S COPY

NAME: _____

Help me in a seed search!

How many plants can you name whose seeds are often eaten by humans? Check out the puzzle below. Names are up and down and across. Did you find all 12?

r	t	s	b	j	r	c	w	s	b	j	u
o	c	p	e	a	h	a	j	e	n	d	p
n	p	r	a	z	e	s	k	s	k	v	o
c	o	r	n	i	t	h	a	a	l	p	p
o	p	a	z	p	c	e	w	m	i	j	p
c	c	s	t	r	a	w	b	e	r	r	y
o	o	p	l	e	l	r	y	a	n	i	k
p	r	b	y	o	m	l	o	m	f	c	o
u	n	e	l	x	o	s	u	b	m	e	g
t	o	r	s	u	n	f	l	o	w	e	r
m	u	r	c	m	d	s	d	a	n	h	o
s	l	y	a	d	m	n	o	l	o	x	m

Look for these seeds:

corn	cashew	popcorn	sesame	raspberry	poppy
bean	sunflower	pea	almond	strawberry	rice

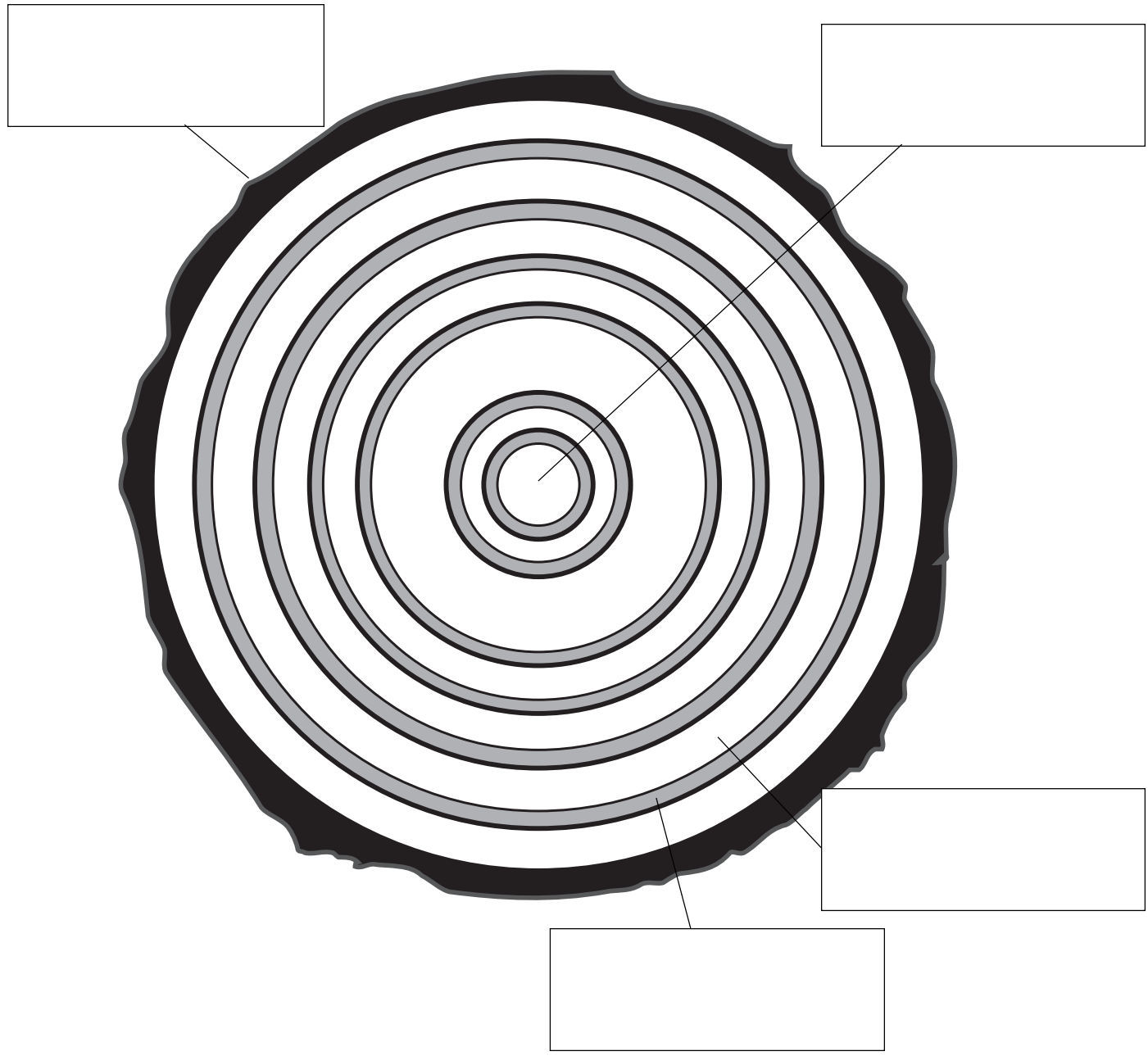
Answers on page 27.

Learn Those Layers

NAME: _____

Can you label each layer? The layers you're looking for are:

inner wood	summer growth
spring growth	outer bark



One spring growth ring and summer growth ring together are called_____.

This tree is in its_____year of growth.

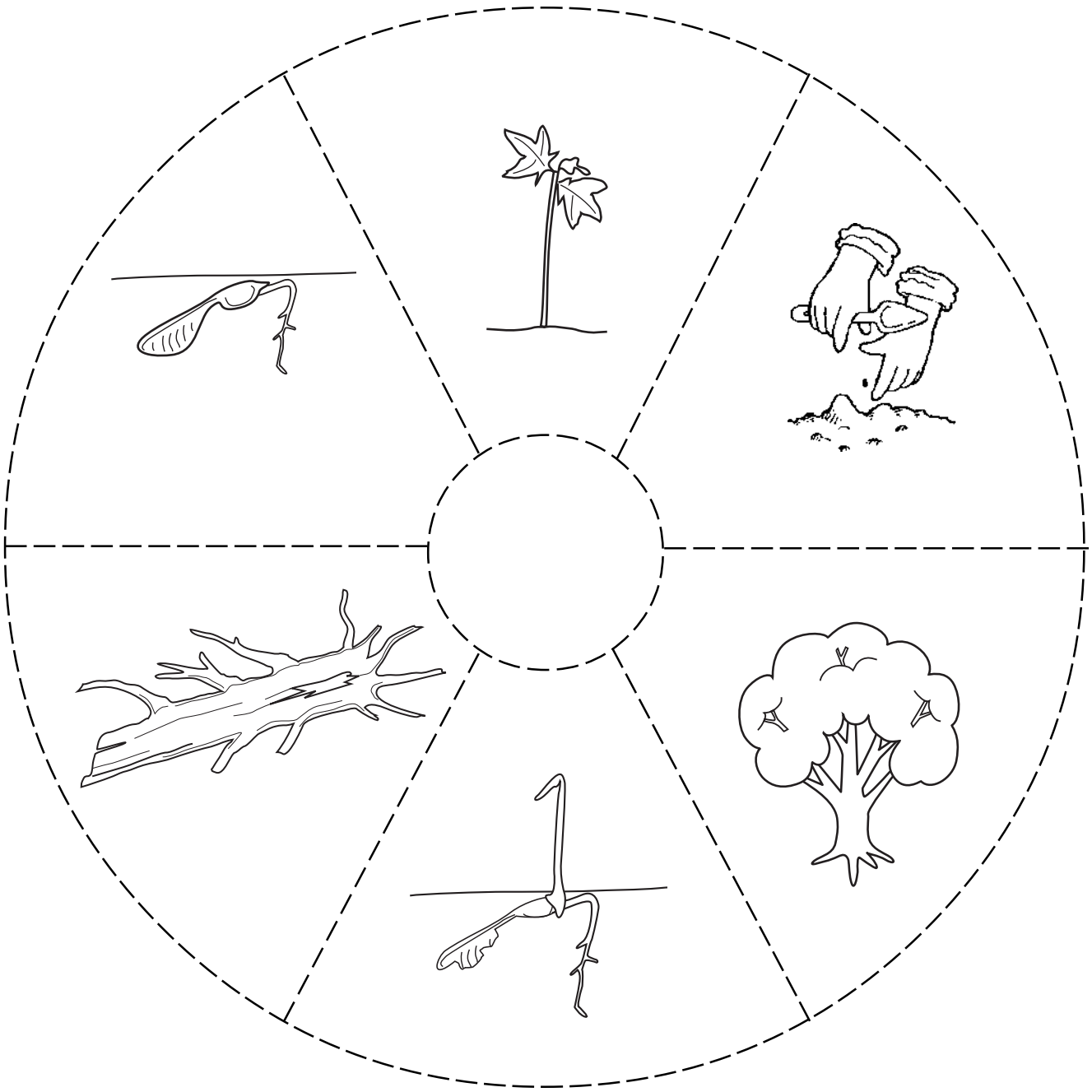
Answers on page 28.

Cycles of Life

KID'S COPY

The pictures show stages of a tree's life. Cut out the pictures by cutting along the broken lines. On another piece of paper, paste the pictures in the order in which the plant grows. Below each picture, write a sentence telling about it.

NAME: _____



Answers on page 29.