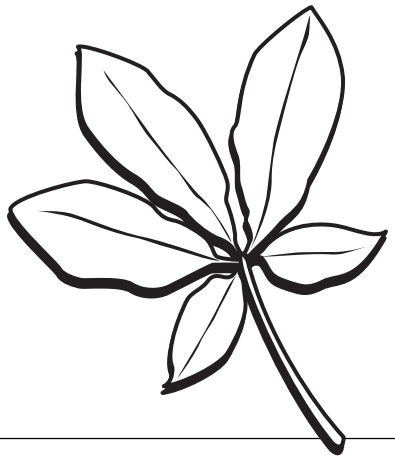
Grade 1



Parts of a Tree

Objectives

Students will:

- identify the main parts of trees and the function of each;
- describe some of the ways trees and wood are used;
- tell why it is important to protect and respect trees.

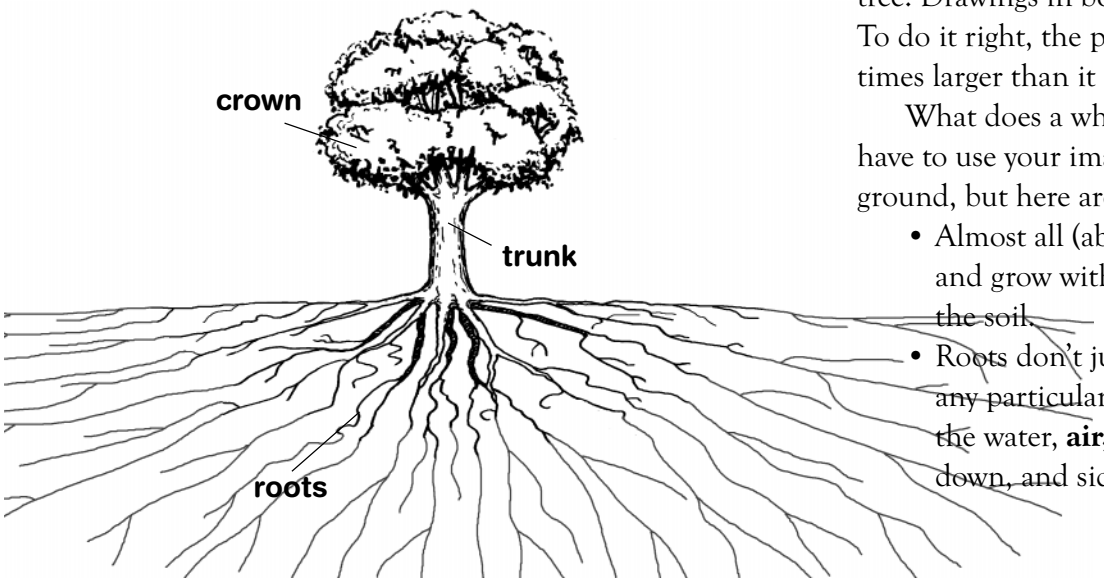
Vocabulary Words

roots	broadleaf
trunks	inner wood
crowns	xylem
air	cambium
minerals	phloem
absorb	sap
evergreen	outer bark
needleleaf	photosynthesis

Background Information

Everywhere we go in our communities, we see trees. Do you ever stop to really think about trees and how they grow so big and tall? Trees have different parts, all with important jobs to do to keep the tree healthy and growing. This unit will help you learn about parts of trees and some of the amazing things they do.

Trees have three main parts—**roots, trunks,** and **crowns.** Each part has a special job to do.



Roots

Explore roots and you'll discover a fascinating underground world. People who study trees are learning more each year about tree roots. They tell us the root system is probably the least understood part of a tree.

We've all seen sturdy trunks and leafy crowns of trees. Maybe you've tripped over the above-ground roots. But no human has ever seen a whole adult tree. Drawings in books are only part of the picture. To do it right, the page would have to be over 300 times larger than it is now.

What does a whole tree really look like? You'll have to use your imagination for what's underground, but here are some of the facts:

- Almost all (about 99 percent) of the roots live and grow within three feet of the surface of the soil.
- Roots don't just grow downward or toward any particular thing, but wherever they can get the water, **air,** and **minerals** they need ... up, down, and sideways.

- There's a connection between the root system and the rest of the tree. If part of the roots die, a part of the crown may die, too.
- Tree roots come in many different sizes. Some are so tiny you can only see them with a microscope. Others may be up to 12 inches or more across.

Large, woody roots grow horizontally (side to side), mainly in the top 12 inches of the soil and usually no deeper than 3 to 7 feet. Smaller roots stretch out from the large roots to take up a space four to seven times larger than the crown! These roots spread across an area that can be twice the height of the tree.

Why are roots important? To grow, all parts of the tree need to be healthy. Roots hold the tree in the ground so it can stand straight. They help the tree make food for itself. Roots **absorb** (soak up) water and minerals that move up through the trunk and are used by the tree to make food. They store energy (food) too.

By understanding roots better and not damaging them, we can help keep trees safe and healthy.

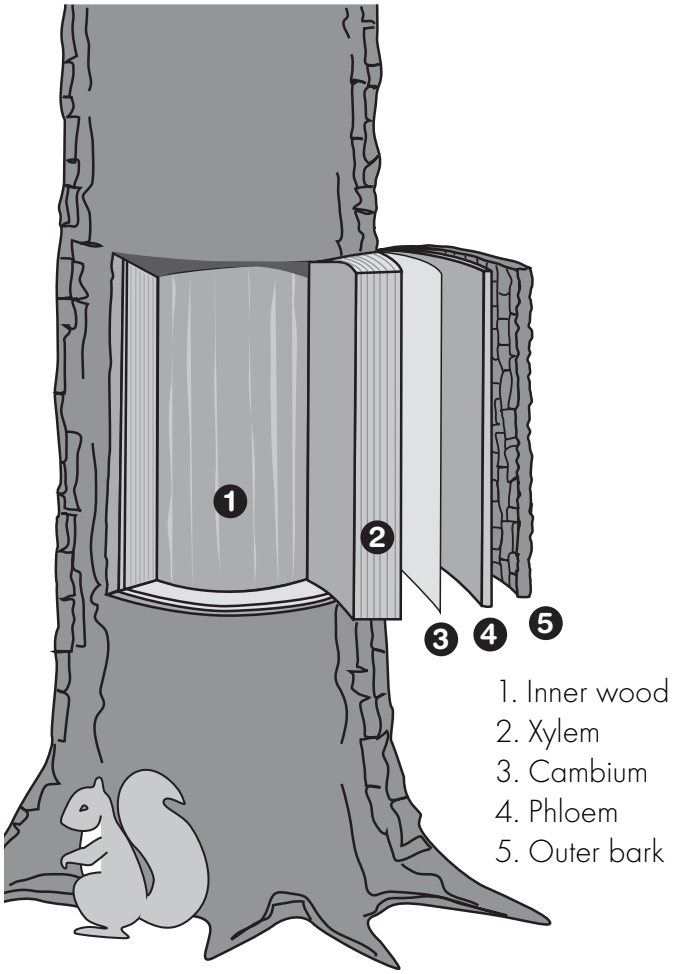
Trunks

Trunks and branches give a tree its shape. The trunks of most **evergreen (needleleaf)** trees grow straight up to the top of the tree. All the branches grow out from the trunk. The branches near the top are shorter than those farther down, giving the trees a shape of a triangle. The trunks of most **broadleaf** trees (such as an oak or maple tree) do not reach to the top of the tree. Instead, the trunk divides into spreading branches, giving the crown a rounded shape.

The trunks of most trees are made up of five layers. Most young children will not remember the names of these layers; the important concept is that there are different layers in the trunk. Information is provided here for teacher background in case questions arise. From inner to outer, trunk layers are:

1. **Inner wood:** This is the woody tissue in the center of the tree. Inner wood has two main jobs: to store growing compounds and sugars (tree food) and to help hold the tree up.
2. **Xylem:** This is a band of cells at the outside edge of the inner wood. It has tiny pipelines that carry water and small amounts of dissolved minerals from the roots to the leaves.
3. **Cambium:** This is a thin layer of growing tissue on the outside of the xylem. Its job is to make the trunk, branches, and roots grow thicker. The trunks and branches of most trees grow thicker as long as the tree lives. It uses the sugar manufactured by the leaves to make new plant tissue. On its outside, the cambium makes phloem. On its inside, it makes new xylem, which eventually becomes inner wood.
4. **Phloem:** This layer also has tiny pipelines. The food made by the leaves moves through the phloem to the other parts of the tree. This food is called **sap.**
5. **Outer bark:** This is the "skin" of hard, dead tissue that protects the living inner parts of the tree from injury. The outer bark stretches to let the trunk and branches grow thicker. The bark of a few kinds of trees, such as beeches and birches, is smooth because it stretches easily. But the bark of most other trees does not stretch so well. As the trunk and branches grow thicker, they push against the bark. It finally cracks, dries, and becomes rough with large ridges. Most trees lose old bark from time to time and replace it with new layers.

Remember: Bark needs our protection! A tree's outside bark protects it from insects, fungus, and disease. The phloem, which is on the inside of the outer bark and is often referred to as the tree's inner bark, moves food from the leaves to the roots. Peeling, carving, or damaging a tree's bark will injur the tree and may cause the tree to die.



Crown

The crown is the branches and leaves of the tree. It has the important job of making food for the tree. The leaves (the leaves of a pine tree are its needles) are tiny "factories" that make food, using water absorbed by the roots and carbon taken from the carbon dioxide in the air. These leaf "factories" get their energy, or fuel, for the work of making food from the sun. Putting the sun's energy to work to make food in this way is called **photosynthesis.**

Other important parts of a tree include the flowers and fruits. This is where seeds are found that will grow into new trees. Trees have many kinds of flowers. Some trees have very showy flowers and others have small, plain flowers that are hardly noticeable.

The fruits of some broadleaf trees, such as apples and cherries, have tasty outer coverings we can eat. The fruits of other broadleaf trees, like acorns and walnuts, are hard nuts. Ashes, elms, and maples have thin, winged fruits. Most needleleaf trees grow their seeds inside cones.

Language Arts

Literature and Folklore

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

Treelore. Literature is packed with fascinating folklore and legends about plants and trees. Your librarian will direct you to good sources.

It's Arbor Day!

See "Tree Poems" and "Tree Tunes" for Arbor Day Ceremonies, Resources, pages 130 and 131.

Fantasy Journey

If there's room, have the students lie down on the floor. (Alternate sites: If you have a woods or park available, go there for this project; beneath a large, old tree also works.)

Tell students: Close your eyes. Imagine you are resting on your back in a large forest. What are you feeling? What does it smell like? What sounds do you hear? How do the trees look from this angle? What words would you use to describe the sky?

Life of a Leaf

You'll need: Writing paper and pencils.

You are a leaf. What happens to you each season? When there is a big windstorm? When there is pollution in the air? When a hungry caterpillar decides you would make a tasty lunch? When you are chosen the most beautiful leaf in the school leaf collection? Write a story about yourself and your life as a leaf. Use plenty of details and describing words!

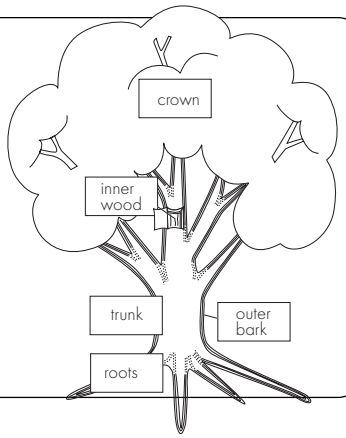
Parts of a Tree

Write the name of each tree part on the line that shows where it is. Use the words in the Word Bank.

Color your tree. Draw bugs, birds, and animals that might live in or by your tree.

Teacher's note:

Photocopy the page below for each student. Make a forest on the bulletin board with all the trees. (Cover this "Teacher's note" with paper before copying so it will not appear on students' copies.)



Word Bank

inner wood
outer bark
crown
trunk
roots

People and Cultures

Pollution Patrol

You'll need: Large drawing paper (12" x 18") and markers or crayons.

Do you know trees help clean the air, making it safer for humans and animals to breathe? When we breathe in, our lungs use oxygen from the air. We breathe out carbon dioxide. Tree leaves do just the opposite. They absorb (take in) carbon dioxide in the air around them and give off the oxygen we need. As they take in air, they also absorb some of the pollution in the air.

Take a walk around the school neighborhood and notice things that are polluting the air. Ask students: Are there factories with large smokestacks? How about cars, motorcycles, lawn mowers, and highway construction machines? What else do you see? What can you smell? Draw things you find on a problems/solutions chart. This chart can easily be made by having children fold their paper lengthwise and drawing the problems on the left side of the fold, solutions on the right.

Who can you tell about the problems you see? Are there any ways trees might be used to solve a pollution problem in your community? Who might be able to help do something about the problems you've listed?

Thanks, Wood!

People can do many different things with wood. What have people done with wood because:

It floats? (Made boats, pontoons, docks, rafts, diving platforms.)

It is super strong? (Made houses and buildings, bridges, ships and ship masts, posts and poles.)

It burns? (Used it for cooking food, heating buildings, making campfires.)

It can be cut to different sizes? (Made buildings, furniture, fences, poles.)

It can be bent? (Made rocking chairs, bows, boat hulls, rounded doors and windows, American Indian dwellings.)

It can be carved? (Made sculptures, spoons, bowls, totem poles, carved art.)

It can glide on snow? (Made sleds, toboggans, skis, sleigh runners.)

Which part of the tree is used for boards and building materials, log homes, and large posts? (The trunk.)

Which part of the tree is used for firewood? (The trunk can be split for firewood, but branches are more easily handled and often used.)

Forests Then and Now

For the Dakota and Ojibwe American Indians who lived in Minnesota before the first European settlers arrived, the forest was much more than just trees. The forest gave them shelter from the snow, wind, and rain. It gave building materials for tepees and lodges. It produced materials for making transportation easier as they made papoose carriers, canoes, rafts, sleds, and snowshoes. The forest was a steady source of food, with meat, berries, nuts, maple sugar, and green plants. Skins from forest animals were used for clothing, sleeping mats, blankets, and tent coverings. Some medicines even came from the forest. The American Indians showed great respect for the forest and tried to live in cooperation with the land.

Today, Minnesota's forests are used for many different things: camping, hiking, growing lumber, snowmobiling, cross-country skiing, snowshoeing, birdwatching, fishing, hunting, growing Christmas trees, and much more. Ask students: How can today's visitors to wooded areas show their respect for trees and forests? (They can protect every part of trees against damage from fire, carving, chopping, damage from machines like cars, snowmobiles, and all-terrain vehicles; pick up and carry out litter; control and thoroughly put out campfires; stay on trails and roads; leave forest plants and animals alone, etc.) What else can students suggest? How should the respect we show forests also be shown to trees that live in towns and cities? (Protect trees against damage from carving, weed whips, and lawn mowers; water and mulch trees; plant more trees, etc.)

Science and the Environment

Root Power

You'll need: A package of small seeds, two eggshells broken in half, an egg carton, and potting soil.

Put some potting soil in each of the four eggshells; sprinkle seeds in two of them. Cover according to the directions on the seed package. Set the four half-shells in the carton so they will stay upright. Water very lightly and place in the sunlight. After a few weeks, watch what happens. The shells with the seeds will start to crack from the roots. Discuss how roots cause damage to sidewalks or basements.

The Role of Root Hairs

You'll need: Two seedlings, potting soil, two jars, and paper and markers for graphing.

Show how root hairs have a vital role in absorbing water and minerals from the soil by using two nearly identical seedlings. (Be sure the root systems of seedlings are kept moist; seedlings can die in as little as 20 minutes if allowed to dry out!) From one seedling, remove all of the tiny hairlike roots, leaving the main roots intact. Plant both seedlings in identical soil in two jars, and water daily.

Compare growth and vigor of the two seedlings. Graph heights.

Is growth good or poor? Is foliage wilted or healthy? What color are the leaves? The seedling without root hairs may survive, but growth will be poor and foliage will likely be wilted from the first day on.

After the root lesson above, care for your healthy seedling until it becomes well established. Then students can plant it in an area they decide is well suited to the tree's survival needs.

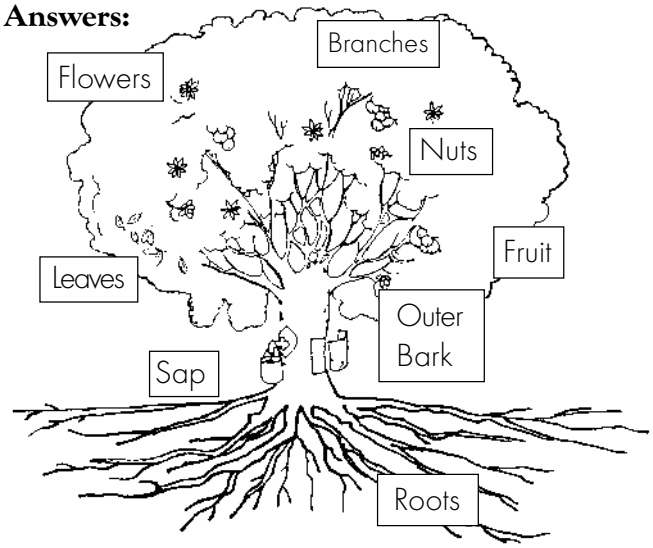
New or Old?

Look for partially opened leaves, twigs, etc., and partially decayed ones. What season of the year do we see the most new leaves? The most decayed leaves? Why?

Rodney the Root Says …

Label the parts of a tree. See "Rodney the Root Says" Activity Sheet, page 21. For science or evaluation have students complete the activity.

Answers:



Enhancements

Math

How Many Kinds?

You'll need: A large sheet of drawing paper or one-inch-squared graph paper, crayons or markers, and leaves.

Have students count all the trees in the schoolyard and make a graph showing how many there are of each kind. If they don't know the species, group by type of leaf (needleleaf or broadleaf).

Ask students: How can we find out what kinds of trees we have? (Guidebooks, encyclopedia, ask a city forester or someone who knows, etc.) Post a labeled leaf from each tree where all can see them and begin to learn the names of the trees.

Measure Up

You'll need: "Measure Up!" Activity Sheet, page 22.

Tell students: We are going to do some measuring today. On the bottom of your sheet is a ruler. Cut it off the sheet. Then use it to measure the parts of trees on the rest of the paper. (Depending on your group, you may need to do this activity together or have extra aides available to help students who have difficulty.)

Where Are the Roots?

Choose two or three trees of different sizes. Estimate their heights. Have students stand in a circle around each tree and take one big step back from the trunk for each foot of height. Stop and look at the size of your circle. Now make the circle twice as big by taking the same number of big steps back again. This new circle (twice the height of the tree) begins to show how far roots spread out from the tree. Amazing!

Ask: What does this big space mean when we try to protect tree roots?

The Arts

Forest Sounds

You'll need: Rhythm band instruments and a cassette recorder.

Gather rhythm band and other instruments and create your own forest music. Ask students: How do you think a forest sounds? Have you ever really heard one? Which instrument(s) would you use to make the sounds of soft breezes through the leaves? Strong wind through the needles or leaves? How about squirrels leaping from branch to branch, birds calling, a tree being chopped down or falling? How about feet shuffling through the fall leaves, a deer running through the bushes, a woodpecker pecking, a sleepy owl hooting? Would a forest sound different at night than during the day? (Owls hooting, bats swooping, coyotes crying, etc., are usually night sounds. Birds are usually quiet at night.)

Create your forest sounds with the instruments, tape recording your best efforts. Invite others to listen to the tape. Do they "hear" the forest the same way you do?

Look and listen for songs about trees and sing or play your favorites. For possible songs and recording artists, see Resources, page 131.

Bark Rubbings

You'll need: Light-weight drawing or copy paper and crayons.

Take a tour of a woods or neighborhood (get permission if going on private property) and make rubbings of various tree barks. Enjoy the different textures and patterns you find. Are your rubbings from old trees or young trees? What are some clues? (Older trees are usually larger and generally have rougher, thicker bark with deeper grooves. Younger trees are usually smoother with smaller and shallower breaks. Species of tree makes a difference, too, however, so bark isn't a foolproof clue to age.)

Seasonal Life of a Leaf

You'll need: Classical tape, record, or CD.

Put on a soothing classical recording and act out or dance a leaf's life during different seasons.

Spring—small, then budding and unfurling.

Summer—growing, turning, rustling in the wind.

Fall—changing colors, falling to the ground, being raked into a pile and hauled away.

Winter—resting in a compost pile.

FUN FACT

From the Top Down

Most trees grow from the ground up, but not the banyan tree of Southeast Asia. The banyan usually sprouts above the ground and grows down. Banyans are planted when birds, bats, or squirrels drop seeds into cracks in the branches of other trees, called hosts. When a banyan sprouts, its roots grow down from the host branches and into the ground, forming trunks. The banyan kills the host tree by preventing its trunk from growing. After the host dies, the banyan continues to grow and eventually, one tree appears to be an entire forest. Try to find and share a picture of a banyan tree.

X-ray Vision

You'll need: Drawing paper and crayons or markers.

Think about roots after sharing the information from this lesson. Review what students know about them. Then, using fine lines and "x-ray" vision, they each sketch their idea of what an entire tree looks like, tree top to root tips. Which part of the tree will take up the most drawing space?

3-D Trees!

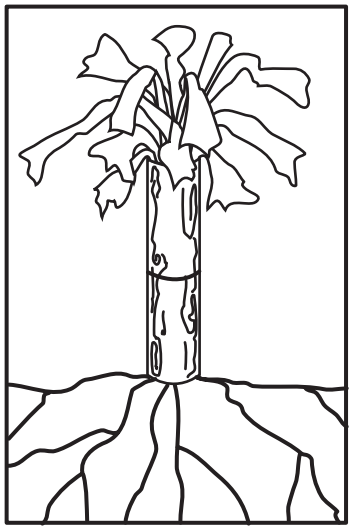
You'll need: A large piece of construction paper, toilet paper tubes, scissors, markers or crayons, yarn, glue, and tape.

Your trunk: Cut your tube in half. Make both halves the same size.

Use markers or crayons to make bark and knot holes. Tape your halves end-to-end on your paper. Leave room for your crowns and roots!

Make paper leaves and yarn roots. Glue in place. Add grass, flowers, and animals that might live in or near your tree.

Sample Tree



Adapted from *Ranger Rick's Naturescope "Trees are Terrific."* Used with permission.

Watercolor Magic

You'll need: Watercolor paints, brushes, and a large piece of paper.

Use watercolors and large paper divided into fourths to show seasonal changes in a favorite broadleaf tree.

Games and Physical Activities

Invent-A-Game

Gather some stones, a stick, or other natural objects. How might American Indians or early settler children have used these objects? What games can your group invent to play with them? After you have made some suggestions—complete with rules for playing—go to a park, playground, or wooded area to play the games you have invented.

Performance Assessment

Task Statement

Students will demonstrate their understanding of the main parts of a tree by illustrating and labeling eight of these parts. (See "Rodney the Root Says" Activity Sheet, page 21.)

Grade 1 Standard

Demonstrate an understanding of the main parts of a tree: crown, trunk, roots, branches, bark, leaves, sap, fruit, flowers, nuts.

Rubric—Quality of Performance

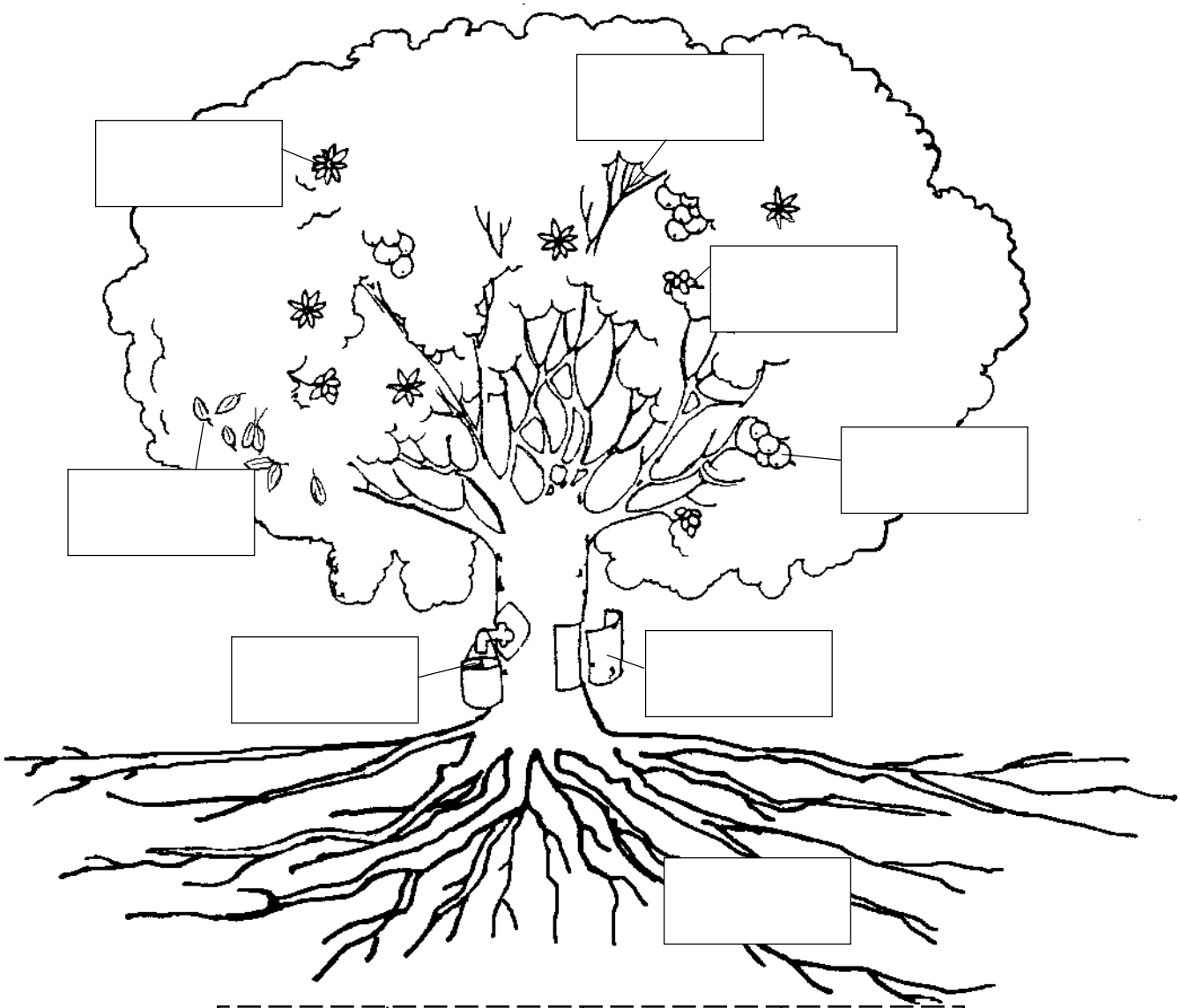
4 Exceeds performance standard
3 Meets performance standard
2 Developing toward performance standard
1 Attempt made but many serious errors

Rodney the Root Says …

KID'S COPY

NAME: _____

Label the parts of a tree.



branches	outer bark	flowers	nuts
roots	leaves	fruit	sap

Answers on page 18.

Measure Up!

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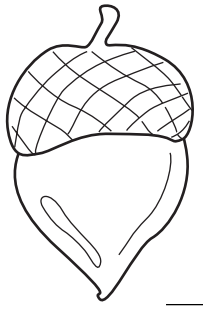

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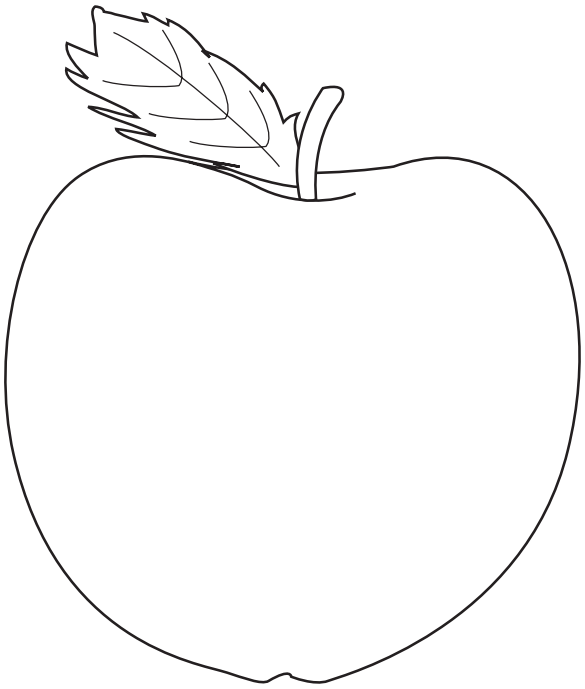

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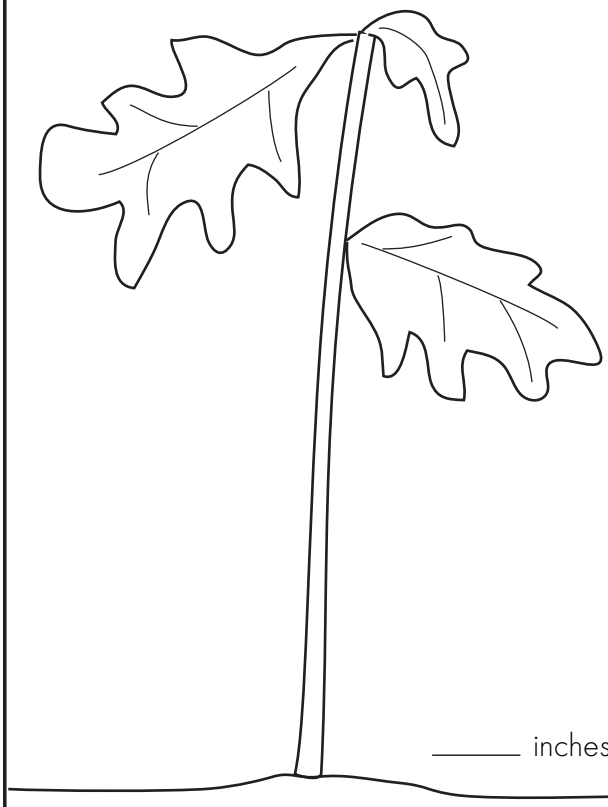

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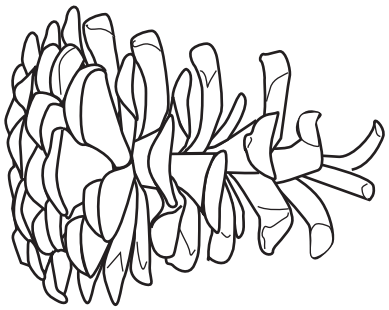

_____ inches long

_____ inches long

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