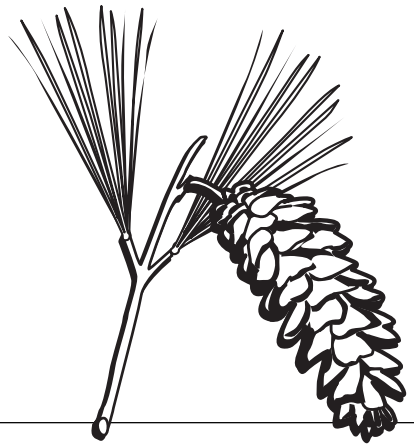
Grades 6–8



Minnesota's Forests

Objectives

Students will:

- name and locate the three biomes of Minnesota and forest cover associated with each;
- describe shelterbelts, windbreaks, and living snow fences and their purposes;
- describe urban forests and their special needs;
- describe the importance of the forest industry to the state's economy.

Vocabulary Words

biomes
deciduous
coniferous
prairie grassland
shelterbelt
wind erosion
topsoil
windbreaks
snow fences
soil erosion
urban forest
community forest

Background Information

The history of natural stands of forests in Minnesota is much like that of forests throughout the United States. American Indians lived in the forest for thousands of years. They got all the necessities of life from their immediate surroundings. While they sometimes intentionally burned sections of forest to make open space to grow crops and attract game animals, the overall impact of native peoples on forests was small. They respected their woodland environment, knowing their survival depended on it. They used only what they needed, and did not deliberately harm their natural world.

European settlers arriving on the eastern coasts in the mid 1700s often found the lushly wooded lands to be a hindrance to the things they wanted to do. Clearing away trees to make way for homes and villages, roads, and fields was slow, backbreaking work with only animal power and simple tools. It wasn't until the late 1700s and early 1800s that many saw the value and money to be earned by harvesting what looked like an endless supply of timber. In a movement across the treed regions of the nation that lasted into the early 1900s, millions of acres of forest fell to the logger's saw. Forests were exploited; there was not much thought to the future. That's different today. Most wooded lands are now managed, planned, and planted so both our generation and those coming after us can enjoy things that only forests can bring to our lives.

Minnesota has three distinct **biomes.** These are biological communities of similar plants and their related animals that occur over large areas. The three biomes in Minnesota are the **deciduous** forest biome, **coniferous** forest biome, and **prairie grassland** biome. To see a map of Minnesota's biomes, turn to Resources, page 108.

For more information about Minnesota's forest regions, the history and uses of the forest, and special Minnesota trees, see Resources, page 105.

Human-Made Mini Forests

Farmstead Shelterbelts

As you drive through rural Minnesota, trees are a familiar sight around farm buildings and livestock feedlots. Trees give protection from Minnesota's strong, cold, winter winds and driving snowstorms.

In winter, prevailing winds in Minnesota are from the northwest. The ideal farmstead planting is

an L-shaped belt of trees and shrubs on the north and west sides of the farmstead area. The design of the planting depends on the number and location of buildings and feedlots on the farmstead.

For best protection, plantings are about 100 feet from buildings or feedlots. Trees planted too close to buildings or feedlots cause snow to pile up in winter and create hot air pockets (no air movement) on hot summer days.

A **shelterbelt's** main purpose is to stop the wind. Evergreens are especially good for this because they keep most of their needles all year long. Their branches also extend all the way to the ground.

Shelterbelt trees are planted close together in rows, with the rows also close together. The trees should not crowd each other, however. When this happens, sunlight is limited and limbs begin to die.

Field Windbreaks

All America awoke to the seriousness of soil losses through **wind erosion** (soil being carried away by the wind) when the first big dust storm hit the Great Plains in May 1934. The storm started in western Kansas, Texas, Oklahoma, and eastern Colorado. It carried an estimated 200 million tons of soil at a height of almost two miles eastward and northward across the country and for hundreds of miles out over the Atlantic Ocean. Dust settled in Canada, blocked out the sun over the nation's capitol, and sifted through screens of homes and offices all across the country. Some farms lost **topsoil** (the upper layer of soil, usually darker and richer than the subsoil) as deep as their plows reached. The blowing soil particles cut off crops at the soil line as cleanly as you could cut them with a knife.

After the dust storms, field **windbreaks** began to appear throughout the Great Plains and Midwestern states. In Minnesota, you'll see them primarily in the flat prairie region. The two main purposes of a windbreak are:

- to hold valuable topsoil in place, keeping it from blowing off the land
- to keep the winter snowfall on the cropland, which keeps more moisture in the topsoil.

An effective windbreak slows the wind, but is not so dense that it completely stops it. Instead, it should be open enough to let wind move slowly through—much like a screen in a window lets air through. This allows snow to sift through and spread over the protected cropland. When the snow melts, moisture increases over the entire protected area. Since deciduous trees lose their leaves in winter, they are a better choice for field windbreaks than evergreens. A single row correctly spaced can do the job.

Along with holding topsoil and keeping snowfall on fields, windbreaks offer food, cover, and travel lanes for wildlife. They also add beauty to the landscape.

Living Snow Fences

Living **snow fences** are plantings of trees, shrubs, native grasses, and sometimes standing rows of corn that trap blowing and drifting snow. These barriers are carefully placed near highways to help keep roadways clear and prevent big drifts that lead to stranded motorists.

According to the Federal Emergency Management Administration (FEMA), the natural disaster that claims the most lives in Minnesota is winter weather. Between 1990 and 2000, in the Mankato–Windom area alone, there were 1,411 vehicle crashes due to snow, 917 crashes due to blowing snow, and 86 crashes resulting from cross winds. With living snow fences, driver visibility is improved and these vehicle accidents are reduced.

Living snow fences have many other advantages. They save money when they help keep winter roads open. They absorb carbon dioxide, give off oxygen, and help reduce **soil erosion** (loss of soil) from wind and water. They add beauty to the landscape and provide wildlife habitat.

Urban and Community Forests

When many of us hear the word "forest," we think of the Boundary Waters Canoe Area Wilderness (BWCAW), the towering trees along the highways in northern Minnesota, or perhaps the wood lot on a farm. City dwellers tend to think forests are somewhere out in the country, perhaps a place where they hunt or hike or camp.

Trees and Careers

Students participate by preparing the background and drawing or painting a large map of the biomes of Minnesota. (If you need help with this, check out the biomes map in Resources, page 108.) They research forest-related jobs in the 1860s and today, and add job information cards (and illustrations or pictures, if possible) to the bulletin board display.

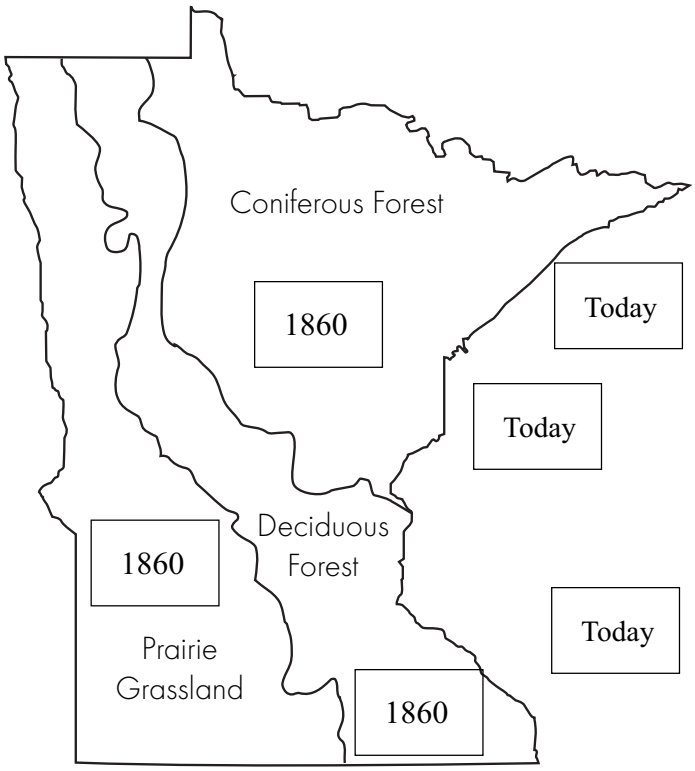
Job market of 1860. Illustrate cards showing past forest-related jobs. These go right on the map. For instance, horses and humans did much of the work with simple tools. There were loggers (lumberjacks), skidders, horse handlers and drivers, cooks and cook shanty helpers, saw sharpeners, and more in the forest itself. "River pigs" helped float logs down rivers to sawmills. From the mills, lumber traveled by horse-drawn wagons and sleds to meet local needs. Train cars and riverboats moved lumber longer distances.

A great collection of information on the history of logging in Minnesota can be found in "Early Loggers in Minnesota, Volumes I-IV" by J.C. Ryan. These four booklets can be ordered from the Minnesota Timber Producers Association, 903 Medical Arts Building, 324 West Superior Street, Duluth, MN 55802; 218-722-5013. Each booklet is $8.50.

The Forest History Center in Grand Rapids can also help with this project. If possible, try visiting the site and see how some of these forestry jobs were done in the past. Contact the Forest History Center at 2609 County Road 76, Grand Rapids, MN 55744; 218-327-4482; http://www.mnhs.org/foresthistory.

Job market today. Illustrate cards that show and tell about a forester, tree inspector, logger, large crane operator, trucker, etc. "Today's" cards go on the outside of the map, but on a parallel with the biomes they might apply to.

Forest products manufacturing is Minnesota's third largest industry surpassed only by machinery and computer services and electronic equipment and instruments. Many forest product-manufacturing jobs are located in the Twin cities metro area.



The truth is that cities and towns have forests, too. The trees in city parks and open spaces, the plantings along boulevards, the bushes on golf courses and in back yards, birds in the trees and the wildflowers at the edge of the schoolyard are all part of an ecosystem that is often called an **urban** or **community forest.**

The trees in urban forests are usually a combination of species that have sprouted naturally and plantings done by humans. Some of the trees grow in public places like parks, and belong to everyone in the community. Others grow on private property.

Trees that grow in areas where there is a lot of human activity have special challenges. Air pollution; damage from vehicles, weed whips, and human actions; root damage from construction and utility work; and soil compaction over the roots can all be hard on tree health. Many communities have city foresters or park employees who look out for the health and welfare of the trees, advise property owners how to care for their trees, and help plan and plant trees for now and for future generations.

Forests for Special Uses

Sometimes, trees are planted for very specific purposes. Examples of these forests are Christmas tree lots and fields of fast-growing aspen to be used for paper or construction fiberboards. Several acres are planted with the same species of trees, and the trees are cut when they reach the right size for their purpose.

Language Arts

Literature and Folklore

A Sand County Almanac. Introduce students to naturalist Aldo Leopold through selections from this classic journal of a family's experience on a southern Wisconsin farm.

Lumber-Camp Lore

You'll need: Library or media center access.

Have students research life in the lumber camps during the heavy logging periods of the 1800s and early 1900s. Along with getting a fascinating glimpse of history in their work and lives, enjoy lumber lore. Lumberjacks often invented fantastic stories and characters to entertain themselves during the long, cold winter months.

Forest Facts Crossword

You'll need: "Forest Facts Crossword" Activity Sheet, page 76 and Forest Facts Crossword Clues Sheet, page 77.

Have students do the crossword puzzle.

Answers to Forest Facts Puzzle: **Across**—3. acid rain, 8. redbacked, 11. erosion, 12. trees, 14. understory, 16. forest, 18. humus, 19. golden mouse, 21. fern, 22. porcupine, 24. recycle, 26. growth, 28. slug, 29. multiple use, 31. bark, 32. log, 34. needle, 35. canopy, 37. tropical, 38. cypress swamps, 40. broad, 41. polluted, 42. stork. **Down**—1. fir, 2. hiking, 4. deforestation, 5. nest, 6. water, 7. northern spotted owl, 9. mushroom, 10. wood, 13. pines, 15. resource, 16. fur, 17. ruffed grouse, 19. ground beetle, 20. earthworms, 23. climate, 25. conifers, 27. salmon eggs, 28. snag, 30. decomposers, 31. boreal, 33. deciduous, 36. paper, 39. mixed.

Spread the Word

You'll need: Writing supplies.

Three weeks before Arbor Day, have students write "press release" announcements to local newspapers, community leaders, business owners, and residents reminding them that Arbor Day is coming. In the announcements, encourage participation in this year's Arbor Day by planting trees and other plants. Invite readers to share their plans with students, telling how they will support Arbor Day and how students, in turn, might be involved in making it happen. (See "Arbor Day, Celebrate Trees!" on page 1 for activity ideas.)

Vocabulary Boosters

You'll need: Reference materials and a dictionary.

Have students research to define silviculture, bottle biology, arborist, botanist, landscape engineer, forester, hydrologist, horticulture.

People and Cultures

Trees in Any Language

Take a walk outdoors and have students sit quietly beside a tree, simply being with the tree in silence for five minutes. During this time, ask them to really focus on the tree, the look of its branches against the sky, the pattern on the bark, the spread of the canopy, the shadows on the ground. When we really spend time with a tree, what messages might we imagine it can say to us?

Ask students: What do trees "say" to people all around the world? Have them research what trees mean in cultures throughout the world. Why do the feelings and messages about trees move so easily from one culture to another?

Invite students to share times trees have been meaningful to them, or how a tree is important in their culture or community.

Think and Discuss

Discuss Minnesota's biomes (see Resources, page 108). How does the natural environment influence the way people live?

Research: The Hinckley Fire of 1894. If you need more information, write to the Fire Museum Curator, 106 Old Highway 61, Hinckley, MN 55037. What precautions do we have today that would help avoid a fire of such size in Minnesota today?

Guest speaker: Ask someone from the Minnesota Historical Society to speak to the class about the Forest History Center in Grand Rapids.

Home Forests

Have students research and discover the forests in their own community. Before beginning, ask: How can you find out this information?

For town and city dwellers, what does urban forest mean? Where is it? Who takes care of it?

Find out what portion of your county is forested, the kinds of trees that are generally cut, if any, and why, and the kinds of wood products made in your county. Learn how people use the forests in the local community.

Field Trip

Visit a lumberyard, sawmill, pulp mill, or other wood-processing industry. Call beforehand to arrange a tour. Here are some questions you can ask to help learn about this business:

How does this business get the raw materials to make its product?

How does it help ensure the raw product will be there for its use in the future?

Who buys the product? How and where does it get shipped?

How many employees are there? What are their jobs?

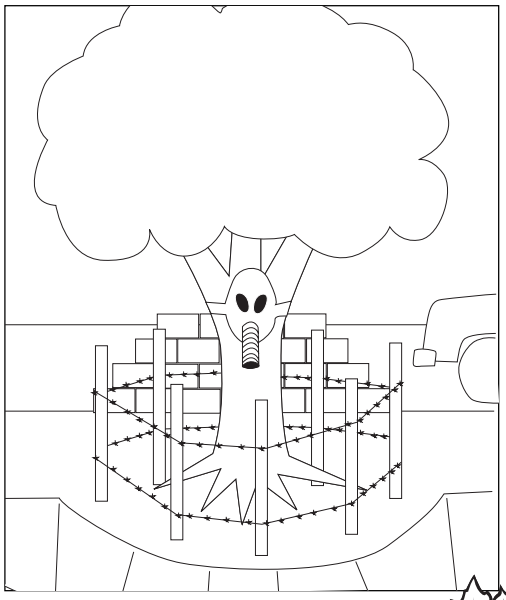
Option: If there are no businesses like this locally, contact companies by phone or letter in another area and ask the same questions.

Science and the Environment

Perfect Urban Trees

You'll need: Drawing materials and paper.

Let student's imaginations soar. Design a perfect urban tree. How would it deal with polluted air ... wear a thick gas mask perhaps? How would it protect itself against climbers? Would built-in ladders or an elevator work? Think about the challenges that affect urban trees, then draw the solutions.



Original Field Charts

You'll need: Cameras, poster board, pens or markers, ruler or measuring tape, staplers, treats such as cookies, and younger students (first to third graders).

This project may take several days. You might want to pair or group students to work with different trees.

Students will create large, single-tree charts that function as a field guide to many of the trees in the area. Students take photos of various trees and perhaps attach a leaf, pine cone, etc., from each tree to a chart. The chart also contains locations of the tree, species, approximate size, and any unusual characteristics. Each pair or group takes its completed chart and a group of younger students outside. The younger children are challenged to locate the tree that is featured on the chart. The chart makers then lead the younger children to that tree, invite children to explore it close up to really get to know the tree, and share the information on the chart. The group sits beneath the tree and enjoys a treat together.

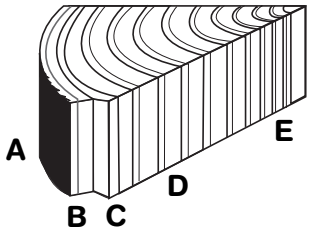
Discover How Trees Grow

You'll need: Materials students decide they need to complete the project.

Provide information about the cambium cells and how a tree grows (see the following information and Resources, page 115). Also, use references such as youth-friendly encyclopedias, most of which have good illustrations. Ask students: How could we make a model, drawing, or other demonstration to show how trees grow? What needs to be included?

Divide students into groups of three or four. Each group develops a way to visually show someone who does not understand the way the cambium cells divide—forming wood cells toward the center of the tree and bark cells toward the outside and causing the tree to grow. Students might produce a video, drawings that move, transparencies, and models to teach this fascinating concept.

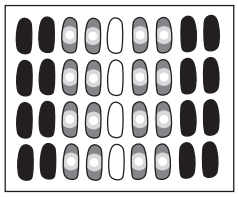
The trunks of most trees are made up of five layers. From outer to inner, these layers are:



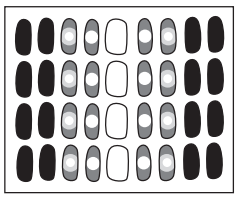
A. Outer Bark
B. Phloem
C. Cambium
D. Xylem
E. Inner Wood

Every layer performs a vital function in growth.

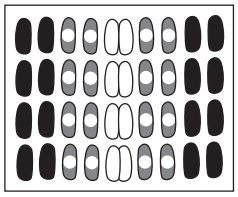
Trees grow from the inside out. Beginning in spring, the cells in the cambium layer divide to form new cells. The new cells toward the outside of the tree form the phloem that carries sugar-rich sap from the leaves throughout the tree. Phloem eventually becomes bark. New cells toward the inside of the tree form xylem, which carries water and minerals up the tree from the root system. Xylem eventually becomes wood. Growth that makes a tree larger in width takes place at the cambium layer. Growth that makes the limbs and roots longer and trees taller takes place at the branch tips (buds) and root tips.



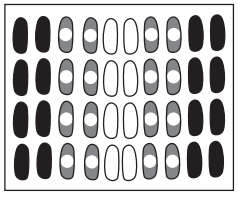
1. Cambium cells are found between the inner wood and xylem, and the phloem and outer bark (moving from inside the tree out). The cambium is visible with a magnifying glass.



2. Growth widens tree trunks, limbs, and roots.



3. Then cambium cells divide, forming xylem cells toward the center of the tree and phloem toward the outside.



4. The new cambium cells begin the growth process again.

Tree Growth

You'll need: Models, photos, or actual parts of a tree.

Show how a tree grows from seed to maturity. Use models or actual parts of trees that students have collected.

Show the relationship of various parts of the growing tree to its environment including cooperation and competition with other plants (flora) or animals (fauna).

Observe the differences in growth and form between a deciduous tree and a conifer or between different deciduous trees and conifers. Show how these occur in nature, and with the aid of books on trees, describe these differences in your project.

Design a Shelterbelt

You'll need: Construction paper, large paper or poster board, markers, and glue. This can be a group or an individual project.

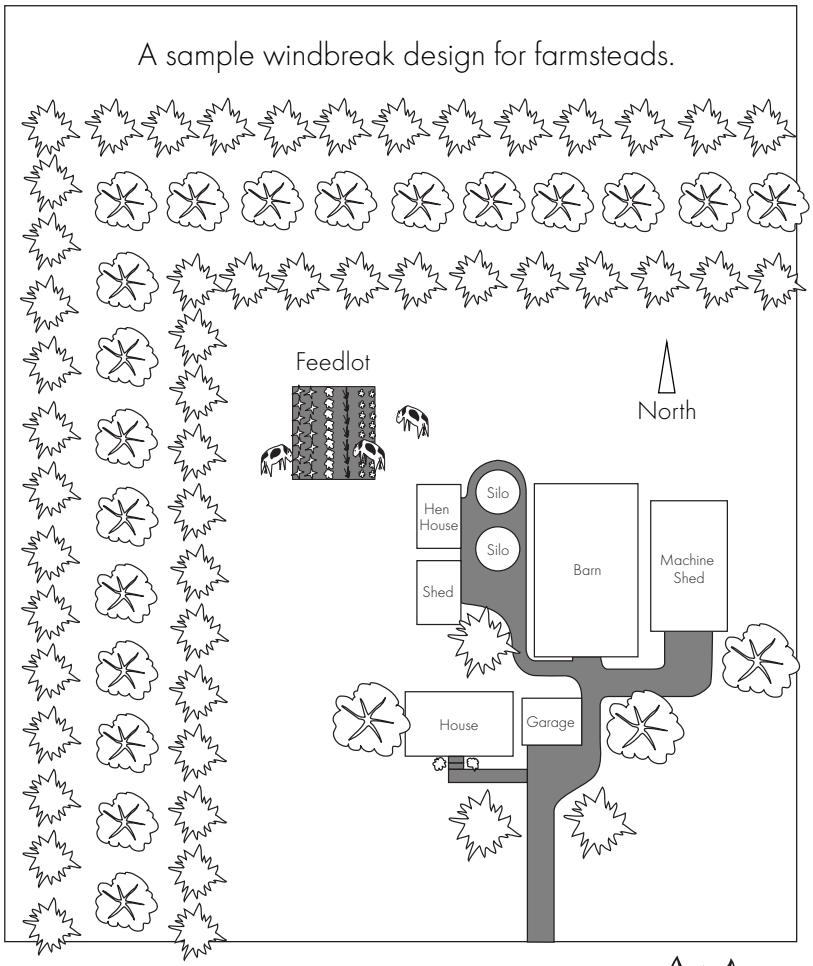
Review with students: Forests are sparse in the prairie grassland biome of Minnesota. Most natural stands occur along river banks and wetland areas. Trees were planted around homes or as windbreaks or shelterbelts in the countryside. On farms, plantings are planned to help protect people and animals from the cold northern and western winter winds. In this project, you design a shelterbelt to protect a farmstead.

1. From the construction paper, design symbols to represent the farm buildings: house, barn, shed, silo, etc. Add a feedlot for animals, too. Lay the farm buildings and feedlot in place. Leave enough room around the outside of the paper for shelterbelt plantings on the poster board.
2. Make symbols or draw figures to represent shrubs or trees that are planted around the buildings for landscape reasons.
3. Make symbols or draw figures to represent the evergreen trees to be used in the windbreak.
4. You won't be able to show scale on small worksheets, but distance is given in the following directions so you can estimate spaces needed.

Guidelines for planting:

1. Plant the windbreak on the north and west sides of farmstead buildings.
2. Plant the first row of plantings about 100 feet from buildings and feedlots and 50 feet beyond them.
3. Plant at least three rows for good protection.
4. Leave space between rows. (In real life, it's about 16 feet depending on type of trees.)

Some farmers use mostly evergreens in their windbreaks. Others mix the trees, using slower growing trees like pine and spruces on outside rows and faster growing trees like maple and ash in inside rows. This helps "fill in" spaces in the new shelterbelt quickly.



Enhancements

Math

Word Problems

Glance through the information in this *Teachers' Guide* and create word problems and situational math exercises using the forest as a base. The skills of your group will determine specifics. Some basic examples:

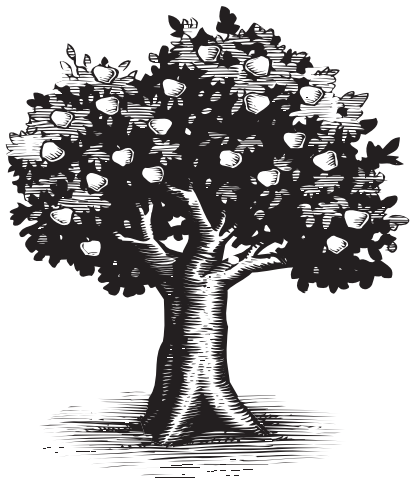
1. Fireplace wood is often measured in cords. A standard cord of wood is a stack that is 8 feet long, 4 feet wide, and 4 feet high. How many cubic feet is that?
2. Minnesota has 16.7 million acres of forested land, owned in the following percentages. What is the total number of acres owned by each group?
   Private owners - 32 percent
   State - 23 percent
   Federal - 21 percent
   Counties - 16 percent
   Industry - 8 percent
3. Vermont was about 35 percent forested a century ago. Today it is about 76 percent forested. What is the percentage of increase?
4. In 1990, Minnesota forest growth was 5.7 million cords and harvest 3.5 million cords. What was the difference? What is the percentage by which growth exceeds harvest?
5. Land in the U.S. is frequently measured in acres. An acre is 43,560 square feet (about the size of a football field). What is the metric unit of measurement most comparable to an acre? If one acre of land is equivalent to about 2.47 of that metric unit, what would be the size of a 1,000-acre forest in metric terms?
6. In wood terms, a "2x4x12" describes what?
7. A board foot is a lumber measurement for a board 1 foot long, 1 foot wide, and 1 inch thick. Imagine that you are going to build a bookcase that has five shelves, each 36 inches long, 12 inches wide, and 1 inch thick. How many board feet of lumber will you need for shelving alone? Next, suppose that the top and bottom shelves form the top and bottom of the bookcase. If the bookshelf is 5 feet tall, how many more board feet will you need to complete the back and sides of your bookcase? How many total board feet are needed for your bookcase?

Answers:

1. 128 cubic feet.
2. Rounded off: Private - 5.34 million acres; State - 3.84 acres; Federal - 3.51 million acres; Counties - 2.67 million acres; Industry - 1.34 million acres.
3. 202 percent increase.
4. Growth is greater; 2.2 million cords; growth exceeds harvest by 63 percent.
5. Hectare; 404.9 hectares.
6. A piece of wood 2 inches thick by 4 inches wide by 12 feet long; "2 x 4" is a common term for lumber 2 inches thick by 4 inches wide.
7. Shelving: 15 board feet; 25 more board feet for back and sides; 40 board feet in all.

FUN FACT

Big Drinkers



Trees require enormous quantities of water. A large apple tree in full leaf may absorb as much as 95 gallons of water from the soil every day. Most of the water goes to the leaves. On a sunny summer day, some trees move water up through their trunks at the rate of three feet per minute. A tree's wood is about half water.

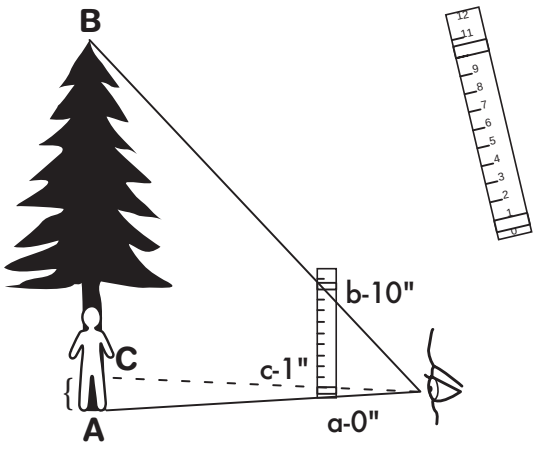
Measure That Tree

You'll need: For each pair of students, a 12-inch ruler, masking tape, a flexible tape measure, stakes, notepaper, and a pencil.

Tree Height Measurement. Students pair with a partner and select a tree. Each pair takes their 12-inch ruler and marks the 1-inch and 10-inch lines on the ruler with tape. One person then stands at the base of the tree. The other holds the ruler up in front of his or her own eyes at arm length and moves back until he or she can see the whole tree from top to bottom between the 0-inch and the 10-inch mark on the ruler. He or she then moves the ruler until the base of the tree (A) is exactly at 0 inches (a) and the top of the tree (B) is sighted exactly at 10 inches (b). (See diagram.) Then he or she sights out from the 1-inch mark (c) to a point on the trunk above the base (C). The partner marks this spot on the trunk with tape.

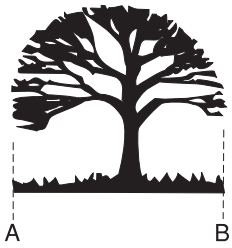
Measure the distance from the base of the tree to the 1-inch mark (A to C). Multiply by 10 to get an approximate idea of the height of the tree (A to B).

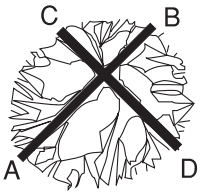
Ask students: Why might an urban forester be concerned about the height of a tree? (So it doesn't grow into overhead power lines.) Do trees grow to various heights? (Yes. For example, a red pine can grow to a height of 60 feet to 80 feet, sometimes 100 feet; a sugar maple can grow to a height of 80 feet; a paper birch can grow to a height of 65 feet to 70 feet; a red mulberry can grow to a height of 18 feet to 30 feet, sometimes 50 feet.)



Crown Spread Measurement. Set a stake directly under the outside edge of the crown farthest from the trunk (A) and another directly opposite it at the outer edge of the crown (B) on a line passing through the center of the tree. Next, set stakes marking the shortest diameter of the crown passing through the center of the tree (C and D). Measure both distances to the nearest foot with a tape measure. Add the two measurements together and divide the sum by two to find the average crown spread.

Ask students: Why is a larger crown spread better for the health of a tree? (A larger crown means more leaf area to produce food for the tree.)





Circumference Measurement. Measure, to the nearest inch, the distance around the tree at a point 4½ feet up from the ground. If the tree is on a slope, measure from the ground at the mid-point of the tree base. A flexible tape measure is a good tool to use.

Ask students: Is the tree with the smallest circumference the youngest? (Not always. The tree could be an old one that has been growing slowly due to poor or stressful conditions. See Resources, page 114 to get more information on things that affect tree growth.)

Use "Measure That Tree" Activity Sheet on page 78 to help with these tasks.

Ask a Pro

Interview a forester or arborist to learn how he or she measures, counts, and inventories trees. When and why is it necessary?

The Arts

Nature Photography

You'll need: Cameras and film.

Have students take a camera tour of a nearby forest. Try for creative shots. Share results!

Still Life Art

You'll need: Leaves, seeds, pine cones, and camera and film or drawing materials.

Artistically arrange leaves, seeds, pine cones, and other forest-related items to create a still life display. Photograph or illustrate the display.

Nature's Palette Dyes

You'll need: Raw materials for making dyes (see activity), white vinegar, stove or hot plate, screen or cheesecloth, and T-shirts or fabrics to dye.

Making dyes, inks, and art materials from natural materials is easy and fun. At the same time, you can learn a lot about conservation and safety. A nature hike is an opportunity to collect some of the things. Others can be found in the kitchen, grocery store, and greenhouse. In nature, don't take any materials whose removal would harm the environment in which it was found, and be sure not to collect plants that are protected by the law. Check with an adult to be certain no poisonous plants are collected. And play it safe; tasting wild plants and berries is off limits!

Late summer and fall are usually the best times to gather dyes from nature. In spring, you may have to rely on the kitchen or grocery store for materials.

Colors and Sources. **Yellow:** brown onion skins, marigold and goldenrod blossoms, sunflower petals; **orange:** roots, bark, leaves from sassafras; **bluish purple:** grapes or grape juice, blueberries, blackberries, raspberries; **green:** plantain leaves and roots, spinach leaves; **brown:** tea bags, bark, instant coffee, black walnut husks.

Preparation. Chop all materials into small pieces. Prepare each color separately—one part plant material to one part water. Add one tablespoon white vinegar to each pint of dye to help keep colors from fading. Bring to a boil, then simmer for about an hour. Add more water if needed. Cool and let sit overnight for brighter colors. Strain the dye through a strainer or cheesecloth.

Dip fabrics into the dyes and watch the color changes. More tips:

- Tie-dye T-shirts.
- Dye pillowcases and run sturdy cord through the hems for handy drawstring sacks.
- Dye sections of old sheets to make your own table covers, curtains, and more.

Hint: Carefully choose your drying spot for dyed fabrics as the dye may "seep" from your fabric into the drying surface.

Through the Mist

You'll need: Tissue paper (several colors), drawing paper, and liquid paste.

Cut the same tree silhouette from various colors of tissue paper. Overlay on drawing paper using liquid paste to hold them in place. They'll have a "misty," multi-colored appearance.

Games and Physical Activities

Forest Fitness

Explore recreational and fitness uses of forests and natural spaces, and do some of them if possible. Discuss:

a. How do trees and forests contribute to overall human recreation or exercise and lifetime sports?
b. How can people get good outdoor exercise if they have little equipment, time, or support from others (for example, teams)?
c. Discuss the physical and emotional value of trees and forests in helping people deal with the effects of stress. What could this mean to society in terms of medical expenses, work productivity, and social activities?

Performance Assessment

Task Statement

Students create and play a new Tree Bingo game using questions and answers on the following: Minnesota biomes, history of Minnesota forests, the importance of trees to our economy, careers in forest industry, urban forests, and windbreaks and shelterbelts. (See samples in Resources, pages 92-95.)

Grades 6-8 Standards

Identify the three Minnesota biomes, their general locations, and their types of forests.

Evaluate the values of windbreaks and shelterbelts.

Research local community forests and how they are used.

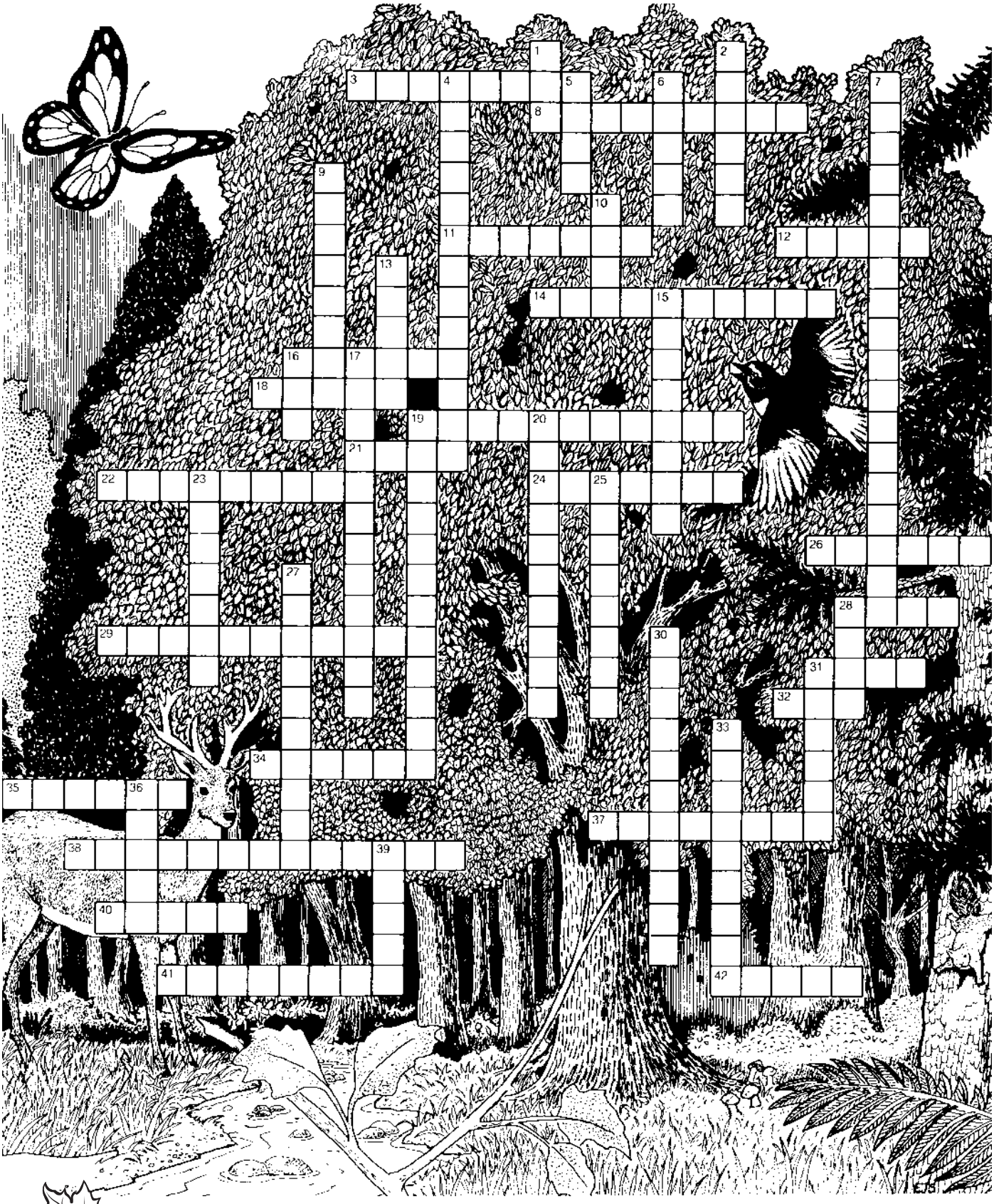
Rubric—Quality of Performance

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

Forest Facts Crossword

KID'S COPY

NAME: _____



Forest Facts Crossword Clues

This crossword puzzle reviews the information presented throughout this guide plus some things that may need to be researched. To make it easier for your students, list the crossword answers in random order on the board or on a reproduced "Word Bank" sheet for each student. The answers are on page 68.

Across

3. A form of air pollution called _____ is a serious threat to forests.
8. The _____ salamander lives in northern mixed forests. It gets its name from the stripe on its back.
11. Because the roots of trees hold soil in place, forests help prevent _____.
12. Both the oldest and largest plants in the world are _____.
14. The middle layer of the forest is called the _____.
16. A _____ is a community of trees and other plants, and of animals.
18. Decaying plant and animal matter in the soil is called _____.
19. A long tail helps the _____ balance as it scampers along branches and vines in the forest.
21. _____s, mosses, and lichens are plants that often grow on the forest floor.
22. The _____ is a prickly mammal that feeds on bark and other tree parts.
24. When you _____ your old newspapers, you're helping to conserve forest resources.
26. An old-_____ forest has many old, large trees. This type of forest also contains many snags and fallen logs.
28. A slimy, yellow invertebrate called the banana _____ lives in Pacific Coastal forests.
29. When people manage forests for more than one use at a time, they are practicing _____-_____ management.
31. A tree's _____ helps protect it from insects and disease.
32. A fallen tree, or _____, provides nutrients for insects, fungi, and other forest organisms.
34. Pines and spruces are types of _____-leaved trees.
35. The leaves and branches of a forest's tallest trees form its _____ layer.
37. _____ rain forests grow near the equator, where it is warm and where there is plenty of rain year round.
38. Many southern _____ _____ have been drained to provide land for crops and homes.
40. Maples and elms are types of _____-leaved trees.
41. Forests can help clean _____ air and water.
42. The wood _____, which nests in cypress swamps, is an endangered bird.

Down

1. A type of conifer called the subalpine _____ grows near icy mountain peaks.
2. Camping, birdwatching, and _____ are all recreational activities that you can enjoy in a forest.
4. _____, or the process of clearing away trees, is occurring in many of the world's tropical forests.
5. Western tanagers _____ in conifers or oaks.
6. The _____ moccasin lives in cypress swamps and feeds on fish, frogs, and other swamp creatures.
7. The _____ _____ _____, a bird of prey, lives in old-growth forests.
9. Many large, brightly colored _____s grow on the damp boreal forest floor.
10. _____ is a forest product we use to build homes and make paper.
13. Loblolly and shortleaf _____, which grow in the southern United States, furnish about one-third of the timber produced in this country.
15. Forests are a renewable _____, which means they won't "run out" if they are properly managed.
16. Its thick _____ coat helps the pine marten withstand the cold winter temperatures of the northern mixed forest.
17. The male _____ _____ jumps up on forest logs and drums to attract females.
19. With its strong jaws, the _____ can crush insects and other prey easily.
20. Many _____ live in the forest soil. If it rains, you may see them wiggle their way to the surface.
23. A region's _____, elevation, and soil affect what type of forest grows there.
25. Trees that bear their seeds in cones are called _____.
27. _____ _____ are found in many streams in the Pacific Northwest. If too much silt and debris get into the water, these tiny fish embryos may be damaged.
28. A standing, dead tree, called a _____, can be a home to many animals.
30. Animals and plants that break down dead matter into smaller parts are called _____.
31. _____ forests grow in cold, northern regions.
33. Each year at a certain time, _____ trees lose all their leaves.
36. This page is made of _____, a forest product.
39. Growing between the deciduous and boreal forests, the northern _____ forest contains both conifers and deciduous trees.

Adapted from the National Wildlife Federation's *"Forests are More Than Trees."*

Measure That Tree

NAME: _____

Pair up with a partner and try it for yourself. Take two copies of this page and measure and compare two different trees.

Height Measurement

1. Choose a tree.

2. Follow the directions on page 73. You may want to take a copy of them with you. With 0" at the base of the tree, 10" at the top, have your partner mark the tree at your 1" spot with a piece of masking tape.

3. Record the distance between the base of the tree and the masking tape marker here (round off to the nearest foot). _____ feet.

4. Multiply your answer in #3 by 10.

How tall is your tree? _____ feet.

Crown Spread Measurement

1. Follow the directions on page 73.

2. Record the distance (to the nearest foot) A to B here. _____ feet.

3. Record the distance (to the nearest foot) C to D here. _____ feet.

4. Add the distances together. _____ feet.

5. Divide your answer in #4 by 2.

What is the average crown spread? _____ feet.

Circumference Measurement

1. Follow the directions on page 73.

2. Write the tree's circumference here. _____ inches.

Extra Challenge: Sketch your tree to scale on graph paper!