TREES + ME =

FORESTRY

18 U.S.C. 707

Adapted for use in Pennsylvania by
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Chapter 1

TREES + ME = FORESTRY
An Introduction to Forest Resources

VISITING A NEW WORLD

Imagine that you're an alien from another planet. You have just landed in the middle of a strange, yet beautiful, place. Giant living plants surround you. The air smells clean and fresh. Welcome to a forest!

A forest is an area of plants and animals made up mostly of trees. Every forest has layers of plants. These main layers are the **canopy,** the **understory,** and the **forest floor.**

The canopy is formed by the branches and leaves from the tallest trees. Beneath the canopy is the understory, where shorter trees and shrubs grow. The forest floor has seedlings, grasses, ferns, and crumbling plants and logs. Different kinds of plants and animals live in different layers of the forest.

Different kinds of plants and animals live in different kinds of forests, too. Why? Because forests have different soils, climates, and amounts of water. For example, a hemlock tree grows best in a wet, moist, cool, forest. A chestnut oak grows better where it is dry and warm.

Forest ecology is the study of how soils, sunlight, water, and other parts of nature work together to make a unique forest.

Any product or benefit that comes from the forest is a **forest resource.**

On page 5 you'll find a crossword puzzle of forest resources.

Fill in the blanks to learn what the forest has to offer!

Forests are important because they:

— feed and shelter wildlife

— protect soil from blowing or washing away

— make the world beautiful

— provide a place for recreation

— help keep rivers and streams clean

— provide timber for wood products

Forests help all of us in many ways.

Each person in the United States uses enough wood products in one year to make up a tree 100 feet tall and 16 inches in diameter!

RESOURCES FOR EVERYONE

Forestry is the study and practice of managing wooded lands. Forestry is a science. It also is a business and an art. Forestry is part of the field of **conservation**—the practice of caring for natural resources. **Foresters** are people who are trained to oversee the woods. They make sure that the forest makes the resources we need. They also make sure we will be able to enjoy these same things in the future.

Forests are **renewable resources**. For example, even though millions of Christmas trees are cut every year, there will be more in the future because they are renewable. If forests are taken care of, they will regrow.

Managing a forest for more than one benefit or product is **multiple resource management**. Foresters take care of forests not just for wood but also for wildlife. They plan for hikers. They make sure the forest stays healthy. They protect the soil and water. Foresters try to find the best balance among all products and benefits.

In Pennsylvania, the wood products industry is a very important user of forest resources. The industry employs thousands of people. These people make billions of dollars worth of wood products each year.

Place an **R** *by the items below that are renewable resources. Plane an* **N** *by the items that are nonrenewable (cannot be replaced once used).*

___ black cherry ___ sunfish

___ natural gas ___ white ash

___ raccoons ___ diamonds

___ garter snakes ___ zinc

___ copper ___ coal

Re-Tree-Ve the resource!

ACROSS

1. This sweet, sticky substance comes from the sap of a sugar maple tree.
2. This involves lunches, fun, and ants.
3. This needs a worm, hook, and lots of luck.
4. These come from maple and like to be "knocked out" when you bowl.
5. Made from the pulp of trees, this can be found "rolling around" in bathrooms.
6. These are made from tree pulp and hold lots of lemonade.

DOWN

1. This requires a tent, cookstove, and lantern.
2. When trees breathe, they make this.
3. These come from white ash trees and turn kids into real sluggers!
4. Made from wood, these help you do your homework.
5. Trees protect this by keeping soil and pollution from entering streams.
6. This requires healthy minds, strong feet, and a walking stick.
7. This comes from logs and is used to build houses.

FORESTS PROVIDE MANY JOBS.

Can you match each drawing with a career?

CAREER CONSIDERATIONS

A forester manages woodlands. A forester looks at all of the things a forest provides—timber, recreation, water, wildlife, and beauty—to make decisions. A forester's goal is to provide many benefits from the forest. To become a forester, you should start by entering a college or university that has a forest resources program.

LEAVE THE ANSWER TO ME

Imagine that you are a chef. You are in charge of writing a recipe for a forest. What ingredients would you include?

TREE-VIAL PURSUIT

Did you know that the forest industry ranks among the top 10 employers in 40 of the 50 states?

YEARNING TO LEARN

Additional Activities

In the following activities, remember the basic rules of conservation. Do not damage or destroy the plants and animals you are studying. Leave all animal homes unchanged. Have a positive impact on the forest.

Take a walk in a park, nature area, forest, or wooded backyard. Look at the trees, plants, and animals and decide in which area each lives—the canopy, understory, or forest floor. Collect an item from each layer. Answer the questions on the next page under "Points to Ponder on Your Nature Walk" after you have completed your nature walk.

QUIZ FOR THE REAL WHIZZES

Fill in the blanks below using the words at the end. Whiz through this!

1. The _____ is the top of the forest and is made up of branches and leaves from the tallest trees.
2. _____ is the study of how soil, sunlight, water, and living things work together, blending to make a unique forest.
3. Proper care of our natural resources is called _____.
4. _____ is a science, a business, and an art that includes conservation and management of forests.
5. Management of the forest for more than one resource is called _____ management.
6. Forests are a _____ because they can regrow and renew themselves.
7. The layer of shorter trees and shrubs directly below the canopy is called the _____.
8. The _____ is the bottom layer in a forest ecosystem, where seedlings, grasses, and wildflowers grow.

renewable resource	forest ecology
forest floor	multiple resource
conservation	understory
forestry	canopy

COUNTY 4-H ROUNDUP REQUIREMENTS

1. The exhibit should not exceed 12 inches deep by 18 inches wide by 22 inches high.
2. Exhibits should include a project title and your name.

TIPS FOR MAKING A THREE-SIDED DISPLAY

- It's a good idea to get your leader, parent, or other adult to help you.
- Use a material such as hardboard, particleboard, or plywood. Sturdy poster board can be used.
- Open displayed dimensions should not exceed 12 inches deep by 18 inches wide by 22 inches high.
- Use hinges to attach the sections to each other.
- Paint or cover the background with adhesive paper, if you like.

POINTS TO PONDER ON YOUR NATURE WALK

1. Which trees and plants are sun-loving?
2. What animals did you see on your walk?
3. Which layers of the forest did they use?
4. What insects did you see on the forest floor? In the understory? In the canopy?
5. Which layer of trees or plants gets the most rain? Which layer gets the least?

Plan a family outing to a park or forest. Look at the types of resources that are provided for visitors and answer the following questions.

1. What evidence of timber harvesting do you see in the woods? Describe any hiking trails, snowmobile trails, docks on lakes, or other signs of recreation.
2. What things were done to keep the woods beautiful? Were trees left standing along the major roads?
3. What signs of wildlife did you see?
4. What information did you see posted about bears or other animals:
5. Did the air smell clean, and did the water look clear?

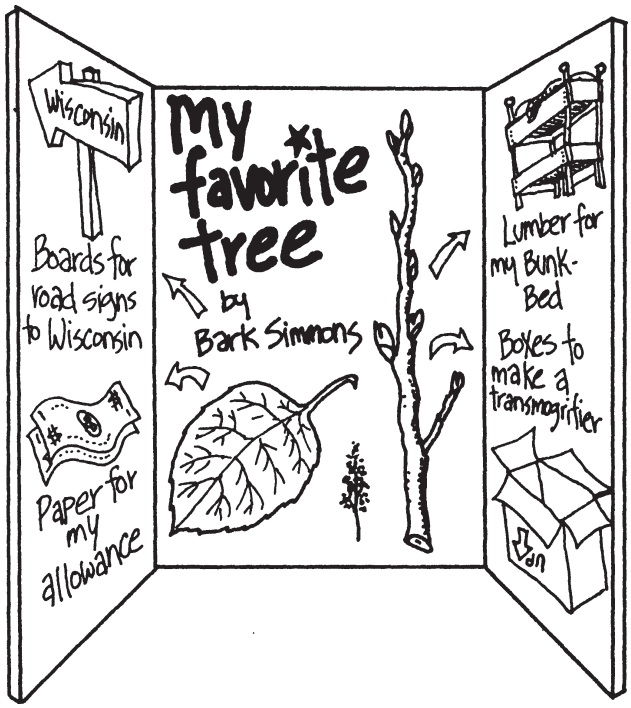
Take this chance to tell your family what you know about multiple-resource management.

ROUNDUP AND FAIR PROJECTS

Draw your favorite tree. Mount the drawing on poster board. Draw some products and benefits we enjoy from this tree (for example, furniture or a place to hang a swing). Do a little research (try an encyclopedia or a book on trees) to list the right products. Different kinds of trees give us different items.

Prepare a display of renewable and nonrenewable resources, using samples (a small piece of wood or a rock, for example) or drawings and photographs. Mount the items on a three-sided display board. Label which items are renewable and which are nonrenewable.

Prepare a display on a job related to the forest (for example, wildlife biologist or forester). Include photos or drawings of different job duties, such as checking survival in tree plantations or managing a timber sale. Mount these drawings on a three-sided display board.



ANSWERS

Re-Tree-Ve the Resource

Across	Down
1. maple syrup	1. camping
2. picnicking	2. clean air
3. fishing	3. baseball bats
4. bowling pins	4. pencils
5. toilet paper	5. clean water
6. paper cups	6. hiking
	7. lumber

Renewable/Nonrenewable Quiz

Renewable resources
black cherry, raccoons, sunfish, white ash, and garter snakes.

Nonrenewable resources
natural gas, copper, zinc, diamonds, and coal

Job Match

A. soil scientist	E. hydrologist
B. truck driver	F. logger
C. mill technician	G. wildlife manager
D. forester	H. park ranger

Quiz for the Real Whizzes

1. canopy	5. multiple resource
2. forest ecology	6. renewable resource
3. conservation	7. understory
4. forestry	8. forest floor

Below is a puzzle that has the common names of 14 trees hidden within the letters. Circle the tree names when you find them. The letters can be used more than once and the names can run across, up, down, or diagonally.

H C T A M C A K L O P L O

I S S W A L N U T R I W K

C E B U R O A K A K T H L

K L B I G D E D C L C I Y

O U F I R A E A N E H T S

R C S L I C R U C C P E H

Y R A T G A H M E U I P O

I E M O M Q E V A R N I Z

L H H A Z L L A S P E N T

R E T A R P M O H S L E L

T N U P F R E D P I N E E

B L P N R E H T U O S F A

Answers: sugar maple, oak, white pine, elm, pitch pine, spruce, birch, hickory, red pine, fir, cedar, ash, walnut, aspen

Chapter 2

NAME THAT TREE!
An Introduction to Dendrology

DENDROLOGY FOR YOU AND ME

Have you ever wondered what to call a tree? Each kind of tree has its own name. You need to know how to identify trees if you want to explore each tree's individual traits and uses. The science of tree identification is called **dendrology.**

Trees, just like all other living things, have both a common name and a scientific name. Most people use the common name of a tree. White pine, red maple, and American elm are common names for three trees.

A NAMING PRACTICE

Scientists and technicians use the scientific name for a tree. A tree has only one scientific name but might have more than one common name and may even have the same common name as another tree.

For example, red pine also is called Norway pine, but it has only one scientific name, *Pinus resinosa*.

The scientific system of classifying and naming plants, called **taxonomy,** helps foresters and others communicate clearly about trees. Taxonomy organizes living things into groups according to whether they have similar traits.

All living things are divided into two big groups called **kingdoms.** Every living thing belongs to either the plant or the animal kingdom. Each kingdom is then divided into smaller groups, and then those groups are divided into still smaller groups. The last, and smallest, group is called **species.**

Below is an example of the classification of eastern hemlock.

Kingdom.....Plant

Division.....Spermatophyta

Subdivision.....Gymnospermae

Order.....Coniferales

Family.....Pinaceae

Genus.....Tsuga

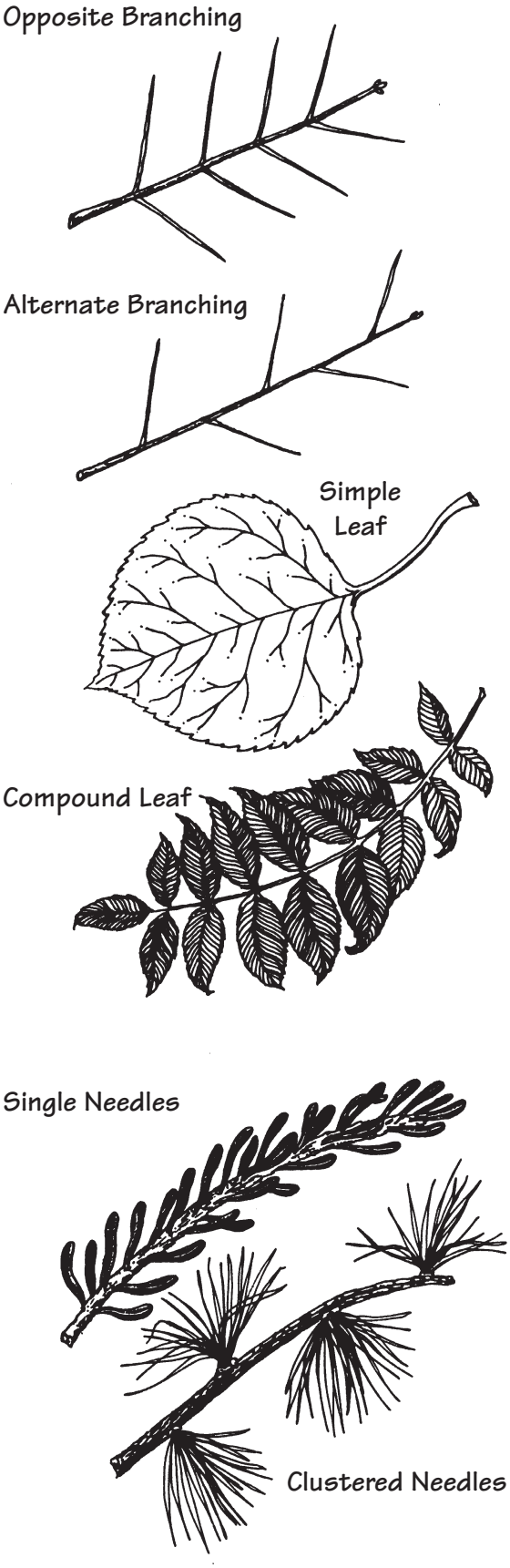
Species.....canadensis

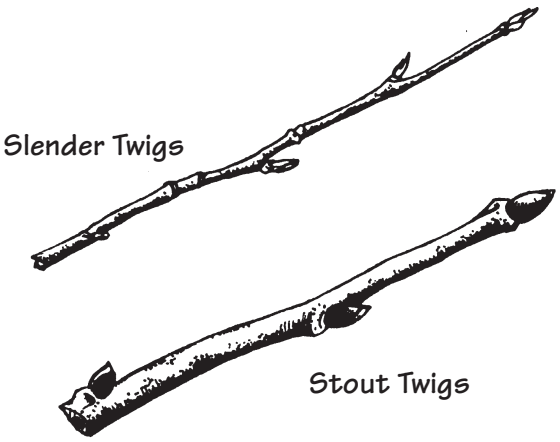
The scientific naming system is based upon the Latin language. Although the Latin names are important for foresters, you will not have to learn them here. Instead, we will focus on common names and tree identification.

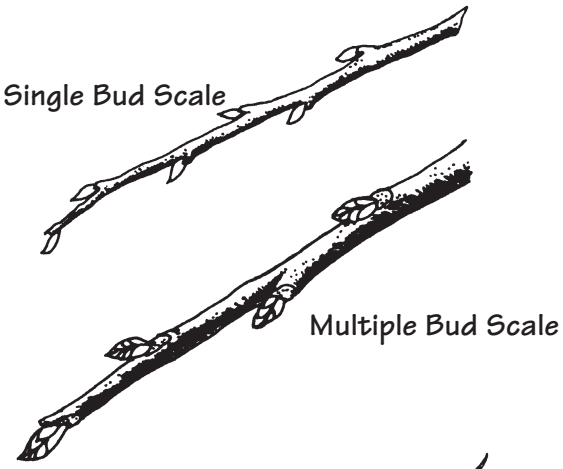
Did you know that leaves are the most common identifying trait of a tree? But what happens when you try to use leaves to identify a tree when it is winter? You'll find some trees no longer have their leaves! Most **coniferous** (remember "cone") trees retain their needles or leaves all winter. Deciduous trees drop their leaves in the fall. That's why it is smart to learn other special features of a tree, too, including:

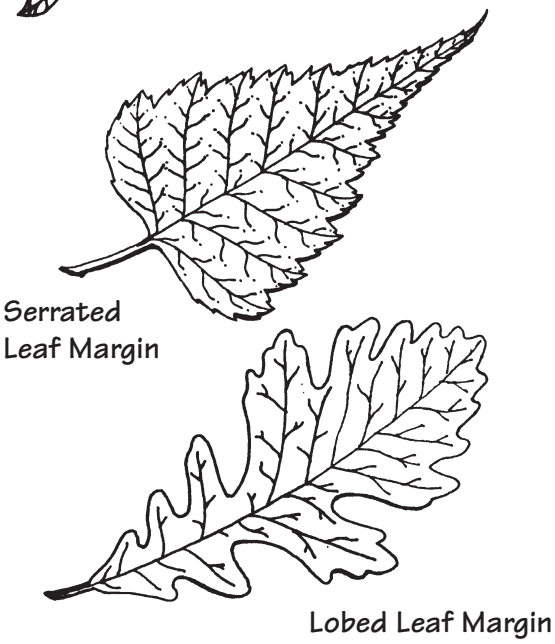
bark	**cones**
fruit	**growth form**
twigs	**buds**
flowers	**peculiar odor**

Some specific identifying traits of trees are illustrated on this page and the next. Outside in your backyard or in a neighborhood park, collect as many leaves and twigs with these traits as you can find. To help people identify unfamiliar trees, foresters and taxonomists have developed special identification charts called keys. Keys help you unlock the identity of a tree species by giving you choices based on traits of the tree.







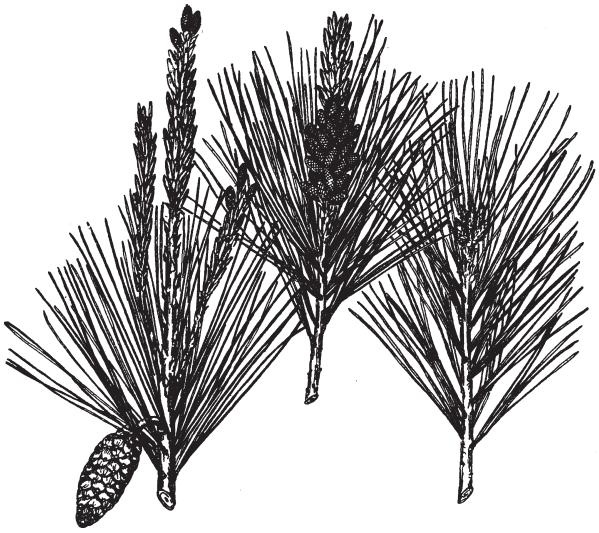


Each time you make a choice, you advance one step closer to learning a tree's name.

You can try your hand at a key by discovering which terrific tree is described below! Start at trait #1 and follow the instructions until you reach the right answer!

WHO AM I ?

I have certain traits that make me different from all the other tree species in the forest. I am special! My needles are borne in groups of five, called a fascicle. They are short and soft.



1. Are the leaves needle-like? ..... Yes! Go to 2a.

2a. Are the needles single on the twig? ..... No! Try 2b.
2b. Are the needles in bundles, tufts, or rosettes? ..... Yes! Go to 3a.

3a. Are the needles in tufts or rosettes? ..... No! Go to 3b.
3b. Are the needles in bundles with sheaths? ..... Yes! Go to 4a.

4a. Are the needles in bundles of 2 or 3? ..... No! Try 4b.
4b. Are the needles in bundles of 5? ..... Yes! Who am I?

Hi! My *name is white pine.*

A Key Practice

Let's classify the tree species in the opposite-branching drawing below. Use the summer key included at the end of this unit.

— First, decide whether the tree has needles or broad and flat leaves. The leaves are broad and flat, so go to 12.

— Next, determine if the leaves are opposite or whorled or alternate. These leaves are opposite or whorled, so advance to 13. Next determine if the leaves are opposite or whorled. These are opposite so go to 14.

— Are these leaves simple, or compound? The leaves are simple, so the next step is 15.

— Compare the leaf with the two choices. Choose the lobed margins. You have identified this tree as a maple.

Here's the Score

Using your yard or a nearby wooded lot, "key out" (identify) the tree species present. For each tree species you identify, write down its common name and the characteristics that helped you identify it.

Species	Identifiers

How many deciduous trees did you identify?

How many conifers did you find?

How many trees did you identify using the leaves only?

How many trees did you identify using other characteristics?

What trait helped you the most in identifying the trees?

Practice using the keys on other trees. First practice on trees you can already name. After you have successfully keyed out trees you know, try to identify unknown trees. The more you practice, the more expert a dendrologist you'll become!

QUIZ FOR THE REAL WHIZZES

Fill in the blanks below using the words at the end. Whiz through this!

1. The smallest taxonomic group is the

   _____.

2. The study of tree identification is called

   _____.

3. _____ is the scientific naming system.

4. The largest taxonomic group is the

   _____.

5. _____ help unlock the identity of different tree types.

Keys

Species

Kingdom

Dendrology

Taxonomy

CAREER CONSIDERATIONS

A **silviculturist** (silviculture means growing trees) decides which tree species will grow best in a certain area. The silviculturist also helps trees reproduce and grow quickly by making sure they have enough sunlight, shade, water, and nutrients. To become a silviculturist, you really have to know your trees and the places they grow best! If you want to be a silviculturist, you can learn about trees at a university or college.

LEAVE THE ANSWER TO ME

Choose several tree species you have identified. Pretend that you are in charge of naming them. What names would you give them? Why?

TREE-VIAL PURSUIT

Mothers have Mothers Day, and ghosts and goblins have Halloween. But do trees have a special day? Yes! Arbor Day is a day set aside each year to honor trees. The first Arbor Day was celebrated in Nebraska on April 10, 1872. Today, Nebraska and all the other states, as well as some parts of Canada, celebrate Arbor Day. In Pennsylvania, Arbor Day is the last Friday in April.

***How do you celebrate* Arbor Day?**
Plant a tree!

YEARNING TO LEARN

Additional Activities

In the following activities, remember some basic rules of conservation. Do not damage or destroy the plants and animals you are studying. Leave all animal homes unchanged. Have a positive impact on the forest.

Make some Forest Flash Cards.

You will need:

stiff cardboard, cut into 5-by-8-inch pieces, or index cards

leaves from different tree species

a heavy telephone book or catalog

a glue stick or rubber cement

clear adhesive paper

Collect and identify leaves from at least eight different tree species Press the leaves between the pages of a heavy telephone book or catalog for at least two days (this will help them dry out). Glue the pressed leaves onto the cards.

On the back of each, in bold letters, write the name of the species and some identifying characteristics. Cover the front and back with clear adhesive paper, trimming the edges close to the card. Use these cards with your friends to test each other's tree identification skills.

Photograph the leaves, twigs, seeds, and trees of at least ten species.
Mount these together by species on a poster board, or make a "Family Album" in a regular photo album. Group pictures by tree species (for example, "A Linden Leaf by the Lake" and "A Linden Seed Lying on Loose Soil"). Preserve autumn leaves. Gather some bright colored leaves and small, leafy branches. Spread them on newspapers. Carefully smash the ends of the branches with a hammer to allow them to absorb water. Put them in a jar containing one part glycerine (available from drugstores) and three parts hot water. Set the jar someplace where you can watch the leaves for about a week as they change color and texture. Then you can remove them and use them for decorations. They will stay soft for a long time!

Shape twigs into wreaths

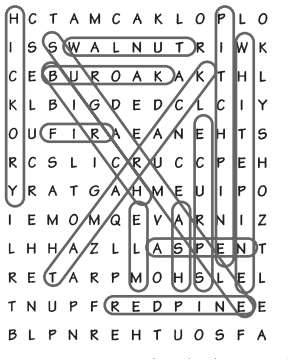
First, identify a tree, such as paper birch, willow, or grape vines, that has slender, pliable twigs. Get permission from the tree's owner to remove twigs from the tree. Cut some twigs and bend them into a wreath or circle. You may need several layers of twigs to form a complete circle. You can use the bottom of a bucket for a form. Lash the twigs together using twine or natural string. Decorate the wreath by gluing on moss, berries, feathers, or other natural material.

ANSWERS

Quiz for the Real Whizzes

1. species
2. dendrology
3. taxonomy
4. kingdom
5. keys

Tree Puzzle



ROUNDUP AND FAIR PROJECTS

Collect and display leaves, twigs, seeds, or stem/branch cross sections from six or more tree species. The cross section must be at least one inch in diameter, with bark. Label each species. Mount the collection on a three-sided display board or other backing. Your tree samples also can be arranged into a book. If you choose this option, use a leaf collection so the book will close flat.

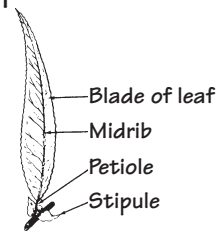
Make a road map or key to identify six tree species from a collection of leaves. Use just one main group (coniferous or deciduous). Construct the road map to identify these leaves, and attach it to the leaf collection. Point out characteristics used to distinguish each leaf. Draw your road map on poster board, and mount your leaves at points along the way. Use your imagination!

Draw a yard map showing the location of your home and the trees around it. Name the tree species. Collect a leaf, twig, or seed from each tree, and glue it next to the drawing of the tree. Draw the map directly on white or art paper and mount it onto a three-sided display board or other backing.

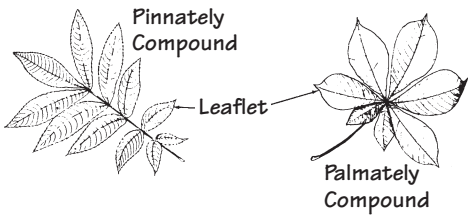
SUMMER KEY FOR PENNSYLVANIA TREES

If the tree has		go to
1a.	Leaves needle or scale-like	2
1b.	Leaves broad and flat	12
2a.	Leaves scale-like	3
2b.	Leaves needles	4
3a.	Scales pointed, twigs not flat	red cedar
3b.	Scales blunt, twigs flat	white cedar
4a.	Needles (leaves) single on twigs	5
4b.	Needles (leaves) in bundles, tufts, or rosettes	7
5a.	Needles flat, blunt	6
5b.	Needles four-sided and sharp-pointed	spruce
6a.	Needles with small stalks (attaches needle to twig)	hemlock
6b.	Needles without stalks	balsam fir
7a.	Needles in bundles with sheaths at base	8
7b.	Needles in tufts or rosettes	larch
8a.	Needles in bundles of 5	white pine
8b.	Needles not in bundles of 5	9
9a.	Needles in bundles of 3	pitch pine
9b.	Needles in bundles of 2	10
10a.	Needles about 4 inches long	11
10b.	Needles 1.5 to 3 inches long	Virginia pine
11a.	Needles stiff and sharp-pointed	Austrian pine
11b.	Needles flexible	red pine
12a.	Leaves opposite or whorled on stem	13
12b.	Leaves alternate on stem	18
13a.	Leaves opposite on stem	14
13b.	Leaves whorled on stem	catalpa
14a.	Leaves simple	15
14b.	Leaves compound (leaf made up of leaflets)	16
15a.	Margins entire	dogwood
15b.	Margins lobed	maples
16a.	Pinnately compound	17
16b.	Palmately compound	horse chestnut buckeye
17a.	Leaf divided into 3 to 5 leaflets	boxelder
17b.	Leaf divided into 7 leaflets	ash

Simple Leaf

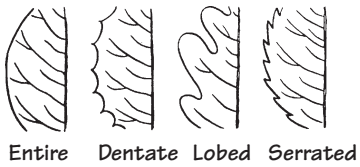


Compound Leaves



Leaf Arrangement

Leaf Margins



If the tree has	go to
18a. Leaves simple	19
18b. Leaves compound (leaf made up of leaflets)	39
19a. Margins entire	20
19b. Margins deeply cut, lobed, or toothed	22
20a. Leaf base heart-shaped	redbud
20b. Leaf base tapering	21
21a. Leaves 2 to 4 inches long	black gum
21b. Leaves 5 to 8 inches long	cucumber
22a. Margins deeply cut or lobed	23
22b. Margins toothed	28
23a. Veins palmate, five deeply cut lobes, star-shaped leaf	sweet gum
23b. Veins pinnate	24
24a. Square or notched at top	tulip-poplar
24b. Leaves not square or notched	25
25a. Leaves from one tree may be entire or with one or two lobes	sassafras
25b. Leaves with more than two lobes	26
26a. Lobes regular	27
26b. Lobes irregular	mulberry
27a. Lobes rounded	white oak group
27b. Lobes sharp-pointed with a hair-like bristle on end of each lobe	red oak group
28a. Teeth coarse, one at end of each lateral vein	29
28b. Teeth fine, several for each main lateral vein	30
29a. Leaves slender, 3 times as long as broad	chestnut
29b. Leaves not more than 2 times as long as wide	beech
30a. Leaves very narrow, 4 or 5 times as long as wide	willow
30b. Leaves broad	31
31a. Leaves not over 1.5 times as long as broad	32

If the tree has	go to
31b. Leaves about twice as long as broad	33
32a. Unequal heart-shaped leaf base, round stem	basswood
32b. Leaf base not heart-shaped, sides equal at base, stem tends to be flattened	aspen
33a. Leaves smooth	34
33b. Leaves rough and hairy	35
34a. Leaf stalk with one or two glands, has a sour odor when twig is broken	cherry
34b. Leaf stalk without glands	juneberry
35a. Rough leaves	36
35b. Soft, hairy leaves	37
36a. Leaf margins double-serrate from base	elm
36b. Leaf margins single-serrate from above base	hackberry
37a. Leaf margins double-serrate	birch
37b. Leaf margins single-serrate	38
38a. Leaf margins with rounded or blunt teeth	red mulberry
38b. Leaf margins with sharp teeth	hophornbeam
39a. Sap milky	sumac
39b. Sap not milky	40
40a. Terminal leaflet much larger than other leaflets	hickories
40b. Terminal lealet as large or smaller than other leaflets or it may be lacking	41
41a. Leaflet round-tipped	locust
41b. Leaflet pointed	42
42a. Leaves smooth	43
42b. Leaves hairy	44
43a. Leaves not over 7 inches long	mountain-ash
43b. Leaves over 12 inches long	ailanthus
44a. Terminal leaflet as large as other leaflets	butternut
44b. Terminal leaflet small or lacking	black walnut