Seedlings for Schools

Teacher Resource Guide

Pennsylvania Game Commission
2001 Elmerton Avenue
Harrisburg, PA 17110
www.pgc.state.pa.us

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A Sampling of Standard Correlations for Activities

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Can this Animal Live Here?	2-5	S4.A.3.1 S4.B.1.1 S4.B.2.1	4.6.4A 4.6.7A 4.7.7A 4.7.4A 3.1.4A2	4.1.1 4.1.2 4.4.5.C 4.1.4D	-Describe the basic needs of an organism -Investigate what animals/plants need to grow -Explain how adaptations help an animal survive in its habitat. Understand limiting factors and predict their effect on an organ-ism. Identify local animals and their habitats.
Habitat Evaluation	6-10	A8.A.1.1 S8.B.2.1 S8.B.3.2	4.6.7A 4.6.10A 4.7.7A	4.1.10A 4.5.7D	Describe and explain the adapta-tions of plants and animals to their habitats -Understand limiting factors and predict their effects on an organ-ism -Describe how the availability of resources affects organism in a an ecosystem
Identify Trees through a Dichotomous Key	3-8	S8.B.1.1		3.1.4A1 3.1.7A1	-Classify plants and animals based on characteristics -Compare and contrast major characteristics.
Planting and Caring for the Tree Seedlings	preK-8	S4.A.3.3S S4.B.1.18. S8.A.1.3 S8.B.3.2 S8.C.2.1	4.6.4A 4.4.4C 4.4.7C 4.6.7A 4.6.7A 4.6.10A 4.7.7A	4.1.1 4.1.2 4.1.10A 4.5.7D	-Describe the basic needs of an organism -Investigate what animals/plants need to grow -Understand limiting factors and predict their effects on an organ-ism -Describe how the availability of resources affects organism in a an ecosystem

Standards starting with "4" - Environment and Ecology Standards
Standards starting with "3" - Science, Technology, Engineering Education Standards.

Eastern Hemlock
(*Tsuga canadensis* (L.) Carr.)

Pennsylvania State Tree

Grows in sun and partial shade. Prefers moist, well drained soils. Will grow to 100 ft. tall . This tree can be planted close together and trimmed for use as a hedge. Eastern hemlock is native to Pennsylvania.

LEAVES: Evergreen needles occur singly, appearing 2-ranked on twigs, flattened, about 1/2" long, dark green and glossy, light green with 2 white lines below.

TWIGS: Slender, tough, yellowish brown to grayish brown. Buds eggshaped, 1/16" long, reddish brown.

FRUIT: Cones 3/4" long, egg-shaped, hanging singly from the tips of twigs. Under each scale are 2 small, winged seeds.

BARK: Flaky on young trees, gray brown to red brown, thick and roughly grooved when older.

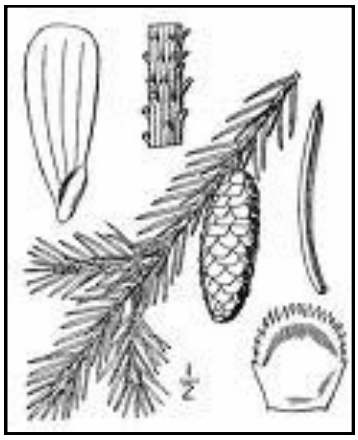
GENERAL: A large, long-lived tree, important for construction timber and as a source of tannic acid for tanning leather. Found in cool, moist woods throughout the Commonwealth, Eastern hemlock is the offical state tree of Pennsylvania. Ruffled grouse, wild turkey and songbirds find food (seeds) and shelter in this tree. Deer browse it heavily when deep snow makes other food scarce.

FYI: Hemlock is used for timbers and general construction, boxes and crates, railway ties and pulp. Historically it was used as a source of tannin for tanning leather. Native Americans used the moist inner bark to make a poultice for wounds and sores. Today hemlock oil, distilled from the needles and twigs, continues to be used in liniments.

The hemlock woolly adelgid, *Adelges tsugae* ,was introduced from Asia into the Pacific Northwest of the United States around 1924. Since then, it has spread across the country. It was first discovered in Pennsylvania in 1967. This insects feeds on hemlock trees, sucking fluids from the needles. Some trees will die within 4 years of being infested while other will continue to live, but in a much weakened state. The egg sacs of these insects look like the tips of cotton swabs clinging to the undersides of hemlock branches. For more information: www.dcnr.state.pa.us Forestry.

Featured Tree for Seedlings for you Class

White Spruce
Picea glauca



The white spruce is an attractive conifer tree which grows to 60-70 feet in height. This tree has been and continues to be a valuable tool in reforestation projects in Pennsylvania because deer tend to shy away from eating it. This tree can be planted in a stand of other white spruce, mixed with other trees or by itself. When planted in the open the white spruce will develop a conical shape from crown to the ground.

Leaves: blue-green needles, 4– sided and approximately 1/3-3/4 inches long

Bark: thin, flaky, grayish-brown .

Cones: 1 1/2"to 2 1/2" long, narrow and oblong; light brown; scales on cones thin and flexible**.**

Twigs: orange brown to gray

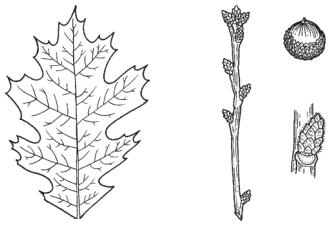
General: The white spruce is often found in the wild in pure stands or in a mixture with quaking aspen, paper birch, balsam fir and black and red spruces. It is one of the most important and widely distributed conifers in Canada and can also be found in our Northern states. White spruce prefers moist loam soils. While it can be found in many different types of sites, white spruce is often found on stream banks, along lakes and adjacent slopes.

Uses: White spruce provides seeds and valuable cover for wildlife. Deer do not like to eat white spruce which makes it very useful to plant in areas where forests need to regenerate. It is used extensively in regeneration projects throughout the state. In the past the flexible roots of white spruce were used by Native Americans to lace birch bark canoes and to make woven baskets.

Tree summaries taken from *Common Trees of Pennsylvania:* Bureau of Forestry, DCNR
www.dcnr.state.pa.us Go to Forestry, go to Information and Education, go to Common Trees.

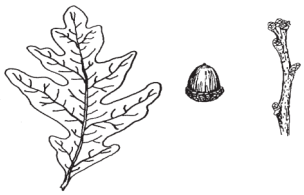
Featured Tree for Seedlings for you Class

Mixed Oaks
(Quercus spp.

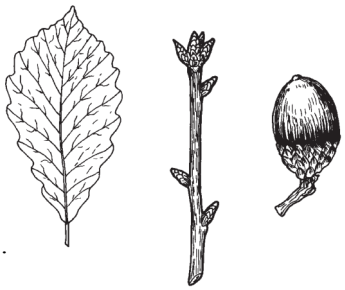


A

B



C



D.

Grows in sun and partial shade. Will grow in moist or dry soils. Grows up to 100 ft. in height. The oaks found in these bundles are native to Pennsylvania and are an important source of food and shelter for a variety of wildlife.

LEAVES: Alternate, simple. Exact shape is dependent upon species.

TWIGS: Greenish brown to reddish brown depending on species.

FRUIT: Acorns of different shapes and sizes dependent on the species.

BARK: Young trunks relatively smooth, older trunks have ridges. The depth of ridges depends on the species. However, white oak has pale gray bark that looks scaly and does not have ridges.

GENERAL: Oak trees are large native trees found throughout Pennsylvania. The trees found in this mix grow to a height of 80 to 100 feet. Acorns are produced by all species and are a valuable wildlife food for chipmunks, squirrels, deer, turkey, bear, grouse and many songbirds.

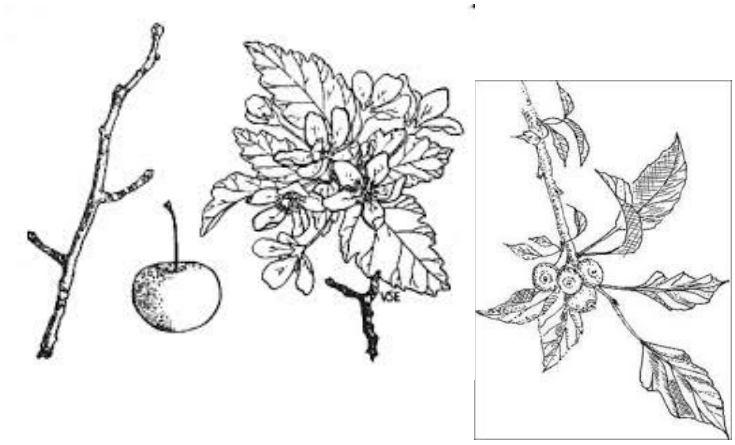
A. Black oak; B. Red oak; C. White Oak; D Chestnut oak.

From Common Trees of Pennsylvania: Bureau of Forestry, DCNR
www.dcnr.state.pa.us Go to Forestry, go to Information and Education .go to Common Trees.

Featured Tree for Seedlings for you Class

Assorted Flowering Crabapple

Malus spp.



Grows in sun and partial shade. Plant along woodland edges, small hedge-rows, in parks and backyards. These attractive small trees can be planted individually or in small groups. Some crabapples retain their fruit but others drop their fruit when ripe, so consideration should be given as to placement of the trees.

FRUIT: Small red fruits eaten by a variety of wildlife from deer and turkeys to songbirds.

BARK: Twigs and bark range in color from green and yellow to reddish born. Some trees develop a mottled bark as they get older.

GENERAL: These flowering crabapples are small non-native trees that grow in height from 8 to 20 feet. They have white to pink flowers in the spring and produce small red fruit in about 5 years. Although related to the apple tree, the fruit is berry -sized. There are crabapple species native to Pennsylvania, however crabapple trees cross-breed readily. This flowering crabapple mixed species, while not native, grow well in Pennsylvania and will not become invasive.

Seedling Care and Planting Directions

Once seedlings arrive, open the bundle and keep roots moist. Wear gloves when handling seedlings. Hand out seedlings with roots in half gallon baggies with moist shredded newspaper or plant in juice/milk carton for transplanting at home. For "How to plant" please see instructions with seedlings and in this guide

We recommend that you and your students wear gloves when handling plants, seedlings, and other organic materials. *Organic materials may carry a fungus that can infect a cut , etc. This is a rare occurrence but can easily be avoided by wearing gloves. For more information, please see the icaution not at back of this guide.*

Properly caring for seedlings during transportation, storage and planting is extremely important. The primary considerations are: (1) to keep the seedlings from drying out, and (2) prevent heating.

Transport seedlings in a covered vehicle or cover them with a tarp (preferably light colored) to prevent the wind from drying the seedlings. Do not park loaded vehicles in the sun because excessive heat can kill the seedlings. Also, large loads should be unloaded as you arrive at your destination or storage area because tightly packed trees may generate heat which can build up to lethal temperatures.

Seedlings should be planted as soon as possible. However, should storage be necessary, the following is recommended:

1. Open bundle and insure roots are moist. Roots and packing should be cool and damp to the touch, but need not be soaking wet. Add water, if necessary, to roots only (do not wet tops).
2. Cold storage at 35-40 degrees F for up to two weeks.
3. Basement or other cool enclosed area at 40-55 degrees F for up to one week.
4. Heeled into ground in shaded, moist location. Bundles should be broken open for proper heeling in and all air pockets around roots eliminated.

Preparing the planting site properly is very important. Existing vegetation on the planting site may require site preparation to eliminate sod, weeds, brush, or undesirable trees in order to reduce competition for moisture and sunlight. Where heavy sod or dense weed growth exists plowing down sod, scalping sod with a mattock or spade, or killing vegetation with herbicides before planting is recommended. Use of herbicides should only be in accordance with the label. If the area to be planted has established young trees and shrubs that could crowd or overtop the seedlings-mechanical or chemical controls should be employed. Successful seedling survival and growth is dependent upon controlling competition from other vegetation for 1-2 years.

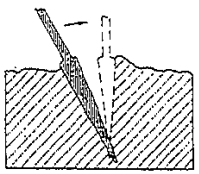
The planting method is another important variable. The hand tools primarily used for planting seedlings are the mattock and the planting bar. Many experienced planters due to speed and efficiency favor the planting bar. An experienced two-man crew can plant between 600-1000 seedlings per day. Planting bars are easily made in a machine or welding shop. Care must be exercised when using the planting bar. The hole must be deep enough to plant the seedling to proper depth and wide enough to receive roots without crowding. Be especially careful not to leave air pockets around the roots by insuring that the closing stroke of the bar is close to the seedling and by using sufficient pressure to insure good soil compaction. (See Illustration opposite side).

In sandy or loose soil, portable posthole diggers provide a planting method that prevents potentially crowded roots. With proper size auger, suitable holes can be dug for even large rooted hardwood seedlings. This method should not be used in heavy or clay soils because of the tendency to get a "pot bound" effect.

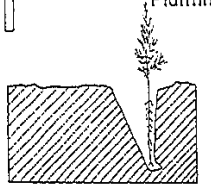
Shovels or spades are useful tree planting tools available to most people. While not as fast as a planting bar it is easier to assure proper planting depth.

The planter must be careful not to expose the roots of the seedlings to the sun, wind or air because the resultant drying may be fatal to the seedlings. Keep roots moist in a bucket or planting bag with water or moist medium during the planting process. (See illustrations on opposite side for helpful planting tips).

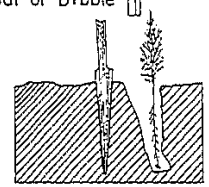
BAR PLANTING



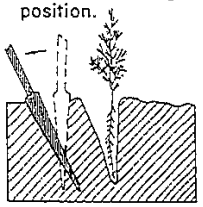
1. Insert bar at angle shown and push forward to upright position.



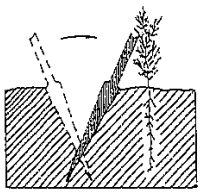
2. Remove bar and place seedling at correct depth.



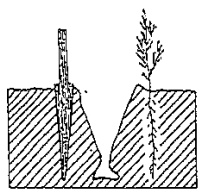
3. Insert bar 2 inches toward planter from seedling.



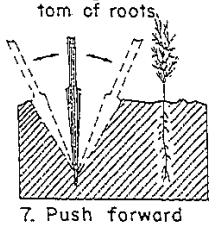
4. Pull handle of bar toward planter firming soil at bottom of roots.



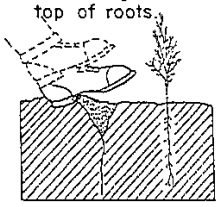
5. Push handle of bar forward from planter firming soil at top of roots.



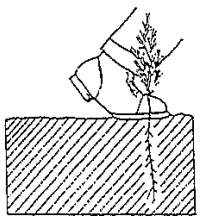
6. Insert bar 2 inches from last hole.



7. Push forward then pull backward filling hole.

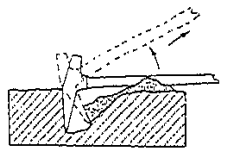


8. Fill in last hole by stamping with heel.

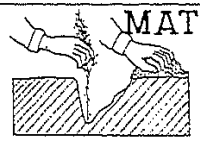


9. Firm soil around seedling with the feet.

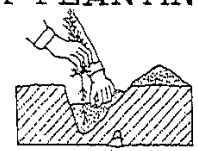
MATTOCK PLANTING



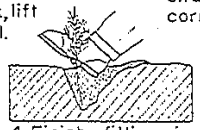
1. Insert mattock, lift handle & pull.



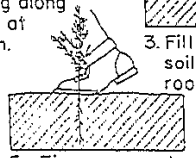
2. Place seedling along straight side at correct depth.



3. Fill in and pack soil to bottom of root.



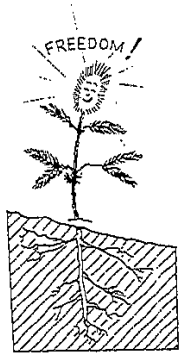
4. Finish filling in soil and firm with heel.



5. Firm around seedling with the feet.

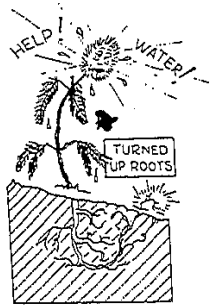
CORRECTLY PLANTED

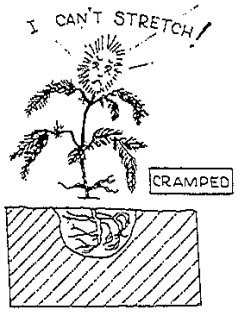
Set the tree in the ground to the same depth at which it grew in the nursery.

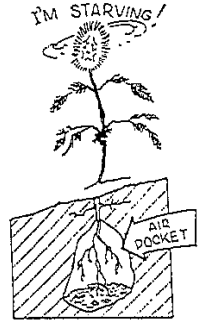


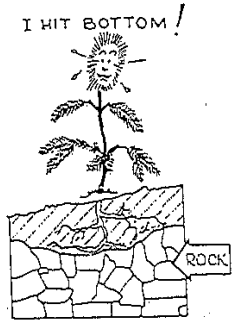
This depth can be determined by the change to a lighter colored bark where the stem was below the ground.

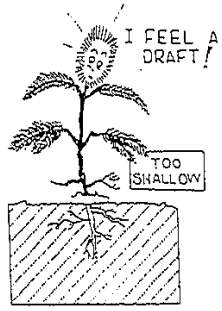
AVOID THESE ERRORS IN PLANTING

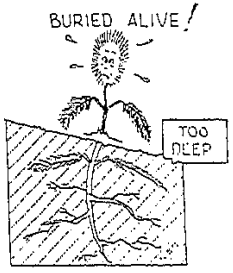












Name_____ Date_____

Seedlings for Schools

Part 1: Please answer the following questions.

1. What species (kind) of tree is your seedling?_____

2. Is your seedling probably a deciduous tree or an evergreen tree? _____

Part 2: Draw your seedling here.

Part 3: Together Makes a Tree

A. Use the word bank to identify the parts of the tree. Write the name in the space provided.

B. Draw an arrow from the name of the tree part to its location on your seedling drawing.

1. These can be narrow, wide or long. Most of the time, trees have lots of them. When they are green they soak up energy from the sun and make food for the tree in a process called photosynthesis.

_____

2. This supports the tree and holds the tree up. It also holds the tubes (xylem and phloem) that transport minerals, water and food for the tree.

_____

3. These help form the top or crown of the tree. Trees have lots of them. They spread out and help hold the leaves.

_____

4. This protects the tree from injury and disease.

_____

5. This part of the tree "anchors" or holds the tree in the soil and takes in water and nutrients from the soil. There are many of them.

_____

Word Bank: Bark, Trunk, Leaves, Roots, Branches

Tree Tidbits! There are more than 20,000 species of trees in the world and Pennsylvania has 108 native species

Name_____ Date_____

Did You Ever Eat A Tree?

Part 4. Trees provide oxygen, shade, shelter and FOOD! Many animals eat tree eaves, bark, fruits and seeds. Deer, blue jays, squirrels and chipmunks eat acorns that come from oak trees. Porcupines love to eat the twigs and leaves of evergreens. Beavers like to eat the bark, twigs and buds of maple, cherry and other trees! Did you know people eat foods that come from trees, too? **Directions:** Look at the list of foods below.:

1. Place a ✔ check mark next to all the foods that you have eaten.
2. Then, Circle the foods that you think come from trees!

1.___Corn	6.___Peaches	11.___ Apples	16.___Green Beans
2.___Figs	7.___Almonds	12.___Cinnamon	17.___Walnuts
3.___Peanuts	8.___Oranges	13.___Apricots	18.___Lemons
4.___Mangos	9.___Bananas	14.___Cabbage	19.___Peas
5.___Spinach	10.__Pistaschios	15.___Coconuts	20.___Cherries

Trees Produce!

Hint! Most can be found at a school

Part 5. People make lots of useful and fun things from trees.

Directions: 1. Unscramble the words to discover some products made from trees.

2. Can you think of *any* other products made from trees. List as many as you can in the space provided.

1. OOKBS___ ___ ___ ___ ___

2. RACIH ___ ___ ___ ___ ___

3. ECLNPI ___ ___ ___ ___ ___ ___

4. APEPR___ ___ ___ ___ ___

5. RODO ___ ___ ___ ___

6. BALET ___ ___ ___ ___ ___

7. MYG OROFL___ ___ ___ ___ ___ ___ ___ ___

8. LODFER ___ ___ ___ ___ ___ ___

What other things are made from trees? List as many as you can!

_____ _____

_____ _____

_____ _____

_____ _____

Name_____ Date_____

In Search of a Home!

See next page for hints

Help these animals find a home! Color the trees.
Then, draw a line from each animal
to a place in a tree where the animal could live.









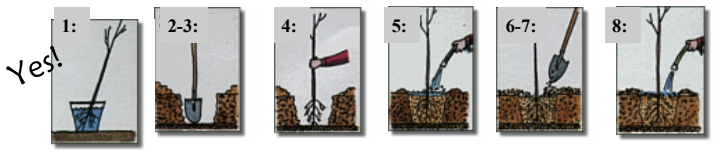


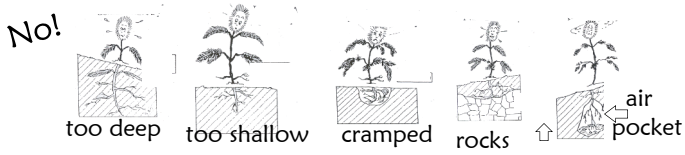

Write a short story or a poem. Include at least 3 of these animals and at least 1 of the trees.

How and Where To Plant Your Seedlings

***When handling and planting any plants, protect hands and arms by wearing gloves and long sleeves, wash hands after planting, clean and disinfect any cuts, scrapes or puncture wounds. See a doctor if cuts, etc. get infected. Seedlings, soil, bark, hay, cacti, leaf litter and other plant materials may contain a fungus called *Sporotrix shenkii* which causes an infection.**

1. Wear protective gloves when handling and planting. Keep your seedling's roots moist (in a baggy with moist shredded newspaper or plant in a small carton) until ready to plant in your yard. Plant as soon as possible.
2. Plant your seedling. *You may want to plant your seedling in a flower bed or other protected area until the seedling is larger. When ready to transplant in its final location, make sure there is enough room for the tree to grow. Oaks and spruce will grow up to 100 feet in height; crabapples are a smaller tree, and will produce small red fruit. This should be considered when selecting a location to plant. All will grow in sun to partial shade.*
3. Dig a hole. Hole should be deep enough for roots but not be too deep. Root collar (where trunk meets roots and darker bark meets lighter-colored bark) should be at ground level. *Do not plant too deep.*
4. Carefully place the roots *downward* into the hole. All roots should be in the hole. Roots should not be crowded. Be careful roots do not bend upward. Make sure tree is straight.
5. Partially fill in hole with soil. Pack soil *firmly* around the roots. *Do not leave air spaces around the roots.*
6. Make sure tree is straight. Place remaining soil in the hole and pack soil down firmly around the tree.
7. Water tree. Place mulch around the base of tree, forming about a 1 ft. circle around the tree. Mulch should not actually touch the trunk. Create a shallow basin in the mulch to help retain water.
8. Water generously every week to 10 days.





Hints for ***In Search of a Home!***

Cardinals perch on tree branches and sing. They often nest in evergreen trees where there is enough cover to protect them from predators. Cardinals eat seeds, berries and some insects.

The white-spotted sawyer is a beetle that often rests on the bark, branches and needles of evergreens. Adult beetles chew on the needles and small twigs of white pines. Adults have very long antennae and a white spot.

Mourning doves fly south for the winter. In the spring, they return to Pennsylvania to breed, lay eggs and raise their young. Mourning doves often make their nests high up in evergreen trees.

Raccoons are nocturnal, which means they are active at night. During the day, raccoons sleep in trees. Large cavities (holes) in trees make good places for raccoons to make a den and raise their young.

Gray tree frogs are nocturnal. They spend the day hiding under tree bark or clinging to tree trunks. Their rough grayish skin helps camouflage them. Gray tree frogs eat ants, beetles and other insects.

Woodpeckers have strong, sharp beaks that help them drill into trees to find grubs, ants, beetles and other Insects. Woodpeckers dig their own holes in trees for nesting. Seven species of woodpeckers live in our state year round. The pileated woodpecker is the largest.

Bold jumping spiders can be found on tree trunks hunting for insects. This spider does not build a web to capture its prey. Instead, the bold jumping spider uses its good eyesight and jumping ability to find, sneak up on and pounce on its prey.

Robins make nests of twigs and mud, lined with grasses. They often make their nest in trees where two large branches come together. Robins eat worms, caterpillars and other insects.

Great horned owls are nocturnal. During the day they rest in trees. Great horned owls make nests in tree cavities or will use an old crow or hawk nest. These large owls eat rabbits, mice, rats and birds.

Gray squirrels spend most of their time in trees. They make dens in tree cavities and make cooler leaf nests to rest in during the summer. Squirrels eat acorns, walnuts and other nuts and seeds and even eat tree buds in the spring.

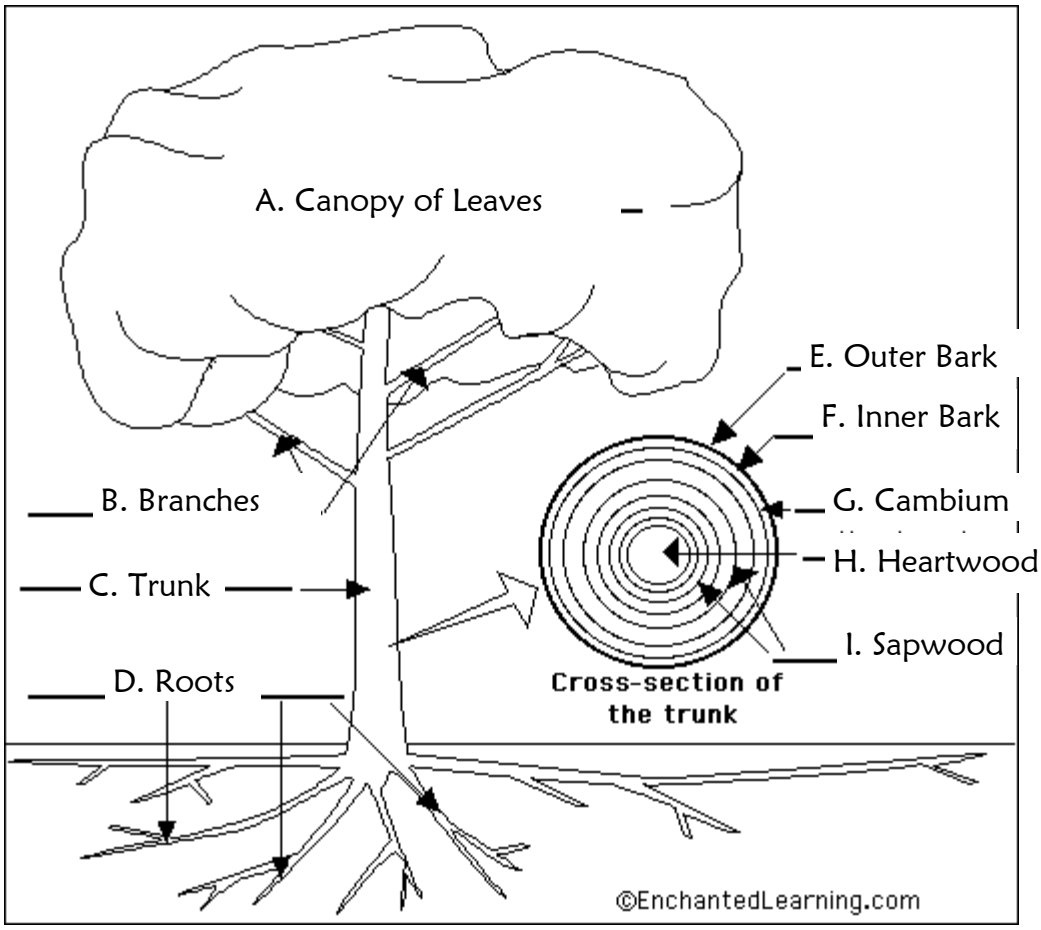
Black carpenter ants dig into wood to make tunnel-like nests called galleries. The ants do not eat the wood. Black carpenter ants eat plant juices, insects, honeydew made by aphids and food scraps.

Butterflies can often be seen flying around trees. Some trees provide nectar for butterflies. Other trees are used by caterpillars. The spring azure caterpillar feeds on dogwoods. Eastern pine elfin caterpillars feed on white pines.

Answers :Eat a Tree : 2, 4, 6, 7, 8, 9, 10, 11, 12, 13, 15, 17, 18, 20
Word Scramble: 1. books, 2. chair, 3. pencil 4. paper, 5. door
6. table, 7. gym floor, 8. folder

Planting instruction drawings adapted from Arbor Day materials and Howard Nursery Planting Instructions.

Parts of the Tree



cambium - a single layer of living cells in the trunk that is located between the sapwood and the inner bark. The cambium produces the sapwood (on the inside of the cambium) and the inner bark (on the outside of the cambium).

canopy of leaves - the upper parts of the tree, where the branches and leaves are located.

heartwood - the core of the trunk, which contains very strong, dead tissue that supports the tree.

inner bark (phloem) - the layer of the trunk through which the tree's food flows - it is located between the outer bark and the cambium. When this short-lived layer dies, it is called cork.

outer bark - the protective outer layer of the trunk.

roots - structures that obtain food and water from the soil, store energy, and provide support for the plant. Most roots grow underground.

sapwood - the layers of wood just outside the heartwood. Each year a new layer of wood is formed (by cambium tissue), forming an annual ring. Sap (containing water and some nutrients) is transported in this layer. Older, inner rings of sapwood eventually become heartwood. You can tell the age of a tree by counting its annual rings.

branches - woody parts of the tree that grow from the trunk.

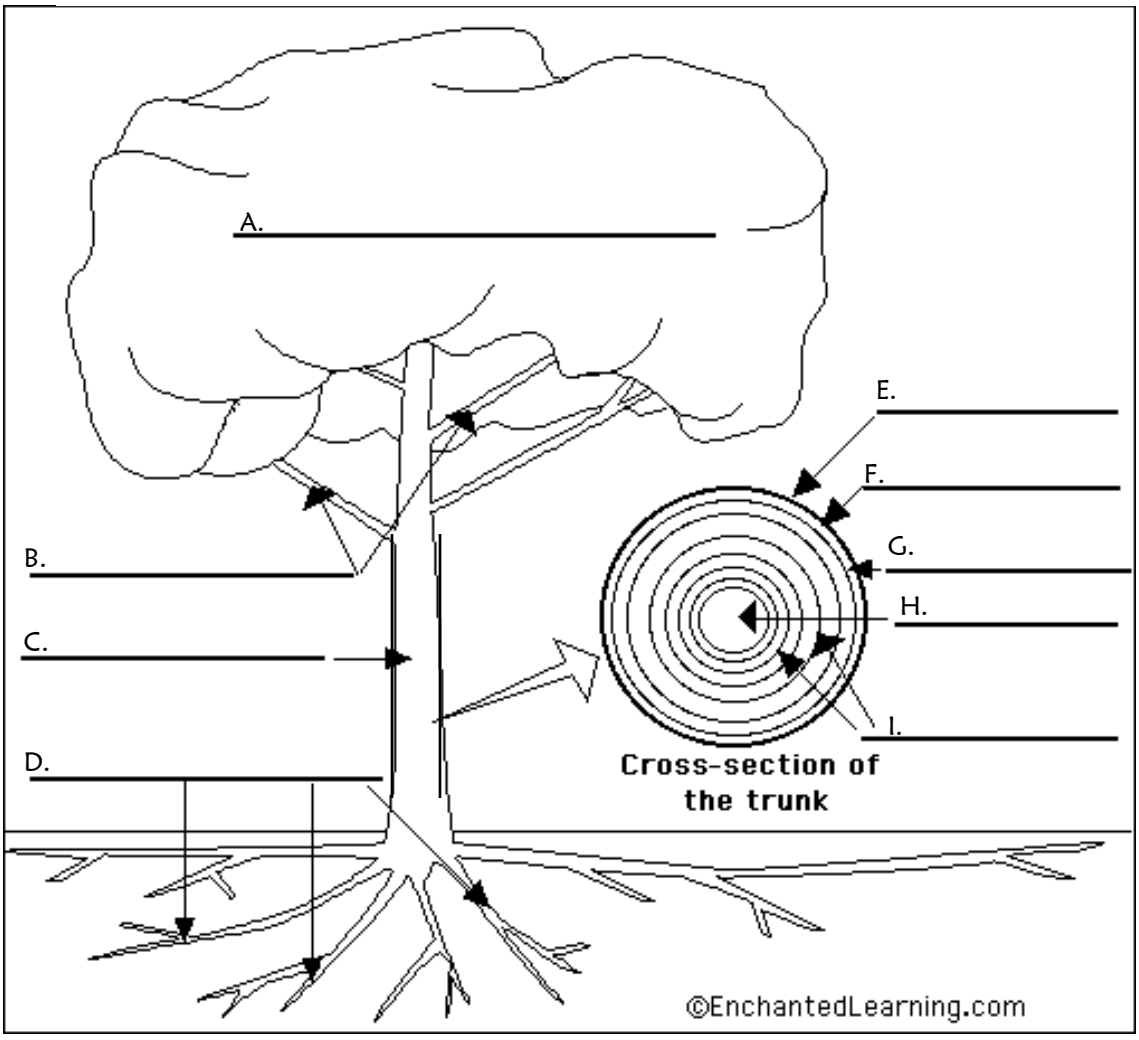
trunk - the main support of the tree.

From Enchanted Learning
www. EnchantedLearning.com

Name:_____ Date:_____

Parts of the Tree

Use the word band and definitions to help you label this tree.



cambium - a single layer of living cells in the trunk that is located between the sapwood and the inner bark. The cambium produces the sapwood (on the inside of the cambium) and the inner bark (on the outside of the cambium).

canopy of leaves - the upper parts of the tree, where the branches and leaves are located.

heartwood - the core of the trunk, which contains very strong, dead tissue that supports the tree.

inner bark (phloem) - the layer of the trunk through which the tree's food flows - it is located between the outer bark and the cambium. When this short-lived layer dies, it is called cork.

outer bark - the protective outer layer of the trunk.

roots - structures that obtain food and water from the soil, store energy, and provide support for the plant. Most roots grow underground.

sapwood - the layers of wood just outside the heartwood. Each year a new layer of wood is formed (by cambium tissue), forming an annual ring. Sap (containing water and some nutrients) is transported in this layer. Older, inner rings of sapwood eventually become heartwood. You can tell the age of a tree by counting its annual rings.

branches - woody parts of the tree that grow from the trunk.

trunk - the main support of the tree.

From Enchanted Learning
www. EnchantedLearning.com

Can This Animal Live Here?

Grades: 2-5	Skills: evaluation, recording
Subjects: Science, language arts	Vocabulary: habitat, evaluation

Objectives: Students will be 1) evaluate a habitat 2) determine if a specific species can live in that habitat 3) make recommendations to improve the habitat .

Method: Students will become biologists and evaluate a habitat to determine the suitability of the habitat for a specific species.

Materials: Habitat Evaluation Sheets, pencils, and clipboard

Background: All animals need food, water, shelter, and space to survive. Animals meet these needs in their habitat. Each animal species has its own specific requirements for food, water, shelter and space. A squirrel eats nuts and lives in and around trees, robins also need trees, but prefer earthworms for food. The food, water, shelter and space requirements must all be found in an arrangement that is suited to the species. For example, an eagle may fly many miles to find food, but a rabbit must find food in a relatively small area.

Procedure:

1. Go over the basic needs of animals. Explain that the class will now be teams of wildlife biologists who must determine if a specific species could live in their schoolyard.

2. Divide students into teams of 2-4 then give each team a Habitat Evaluation Sheet.

3. Take students outside and have them evaluate the schoolyard for their assigned animals. Ask them to answer the questions on the sheet.

4. Make a large chart to summarize the findings of the students. Which animals can live in the schoolyard, which cannot. Which animals actually live in their schoolyard? Are there any animals that could live there with some habitat improvements?

5. Discuss what students could do to help the wildlife that does live in the schoolyard and what they could do to attract other wildlife to the schoolyard.

Evaluation:
*Students explain why or why not the schoolyard is a good habitat for specific wildlife species.
*Students make a display of wildlife species that lives in their schoolyard and how they meet their needs.

Extension:
-Students conduct a habitat inventory of their schoolyard.
-Students conduct a wildfire inventory of their schoolyard.
-Students research other wildlife that might live in their schoolyard.
-Students develop and implement a plan to improve their schoolyard for wildlife.

Developed by T. Alberici, Information and Education
Pennsylvania Game Commission

HABITAT EVALUATION WORKSHEET

Name (s) _____ **Date**_____

_____

Today's Weather_____ **Temperature**_____

Directions: You are a team of biologists. You have been assigned an animal. Your task is to determine if this habitat is suitable for your animal.

Instructions:

1. **Read** about your animal.
2. **Complete** PART 1
3. **Examine** the habitat in your area and complete PART 2.
4. **Determine if** this habitat is suitable for your animal and complete PART 3.

PART 1: Animal Information

Animal species name:_____

Describe your animal:

What is your animal's habitat? *(what type of habitat does it live in?)*

_____

Basic needs of your animal: complete the following

A. Water: Where do you think your animal gets water to drink?

_____

_____

B. Food: What does your animal eat?_____

_____

Shelter: Where does your animal take shelter?

_____

_____

Space: How much space does your animal need to survive? A lot of space to find all of it needs or just a small amount of space?

_____

PART 2: Habitat Information.

Describe the habitat of your site (what does your site look like):

1. Is there food for your animal on this site?_____

a. If yes, list some examples:

b. Where would be the best places for your animal to find this food?

2. Are there places for your animal to take shelter?_____

If yes, list some examples:

3. Are there places for your animal to make a nest or raise their young?_____

If yes, list an example:

4. Can your animal find water on or near your site?____

If yes, where?

5. Is there enough space for your animal on this site?_____ Please explain.

PART 3: Evaluate the Habitat.

6. Could your animal live in this site? _____

Why or why not?

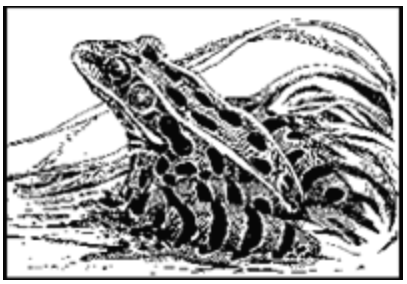
7. Do you think your animal lives on this site?_____

a. Why or why not?

b. If you do not know, how could you find out?

8. Are there ways to improve this site for your animal?

a. If yes, give some examples.

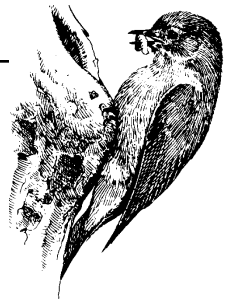


NORTHERN LEOPARD FROG

HABITAT:
The Northern leopard frog lives in small ponds, damp fields and wetlands.

FOOD:
This frog eats insects, spider, worms, grasshopper and snails.

PA Game Commission,; Bureau of Information and Education



EASTERN BLUEBIRD

HABITAT:
The Eastern Bluebird lives in grassy fields, farsm, parks, schoolyards and neighborhood. They need large grassy areas to hunt for food. They nest in the holes in trees or wooden fence posts. They also nest in nest boxes.

FOOD:
The Eastern Bluebird eats insects such as ants, caterpillars and grasshoppers. Sometimes they eat holly berries, dogwood berries and other berries.

PA Game Commission,; Bureau of Information and Education

RACCOON

HABITAT:

Raccoons live by lakes, streams, ponds and wetlands. They also live in towns, cities, parks and neighborhoods. Most raccoons have a home den site in a hollow of a large tree or in an old groundhog hole. They travel a mile or more to search for food. .

FOOD:

Raccoons eat many different kinds of food. They will eat grapes, raspberries, corn, grasshoppers, beetles, frogs and eggs. They will also get into trash cans searching for left over foods, like apples, chicken and other foods.

PA Game Commission,; Bureau of Information and Education

GREY SQUIRREL

HABITAT:

Gray squirrels live in towns, parks, forests and neighborhoods. They live any place where there are large trees that produce nuts. Gray squirrels den in holes in tress. They also will make large nests of leaves high in trees for shelter. They prefer deciduous trees (trees that lose their leaves in the winter)

FOOD:

Gray squirrels eat many different foods but especially nuts. Acorns, walnuts, hickory nuts and pine seeds are their favorites.

PA Game Commission,; Bureau of Information and Education

BLACK SWALLOWTAIL BUTTERFLY

HABITAT:

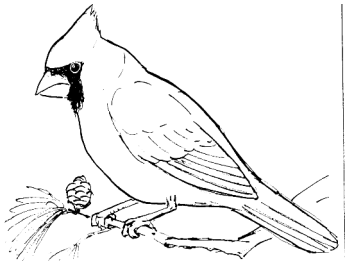
Black swallowtail butterflies live in fields, backyards and gardens. They live in sunny places with low wind where there are flowers for nectar and plants for their caterpillars.

FOOD:

Black swallowtail butterflies eat the nectar from flowers such as butterfly weed, butterfly bush, coneflowers, black-eyed Susan, Joe-Pye weed, and zinnias. The caterpillar feeds on parsley.

PA Game Commission,; Bureau of Information and Education

CARDINAL



HABITAT:

Cardinals live in open woods, brush areas, parks, schoolyards and backyards. They build their nests in shrubs and trees. The nest is usually located less then 10 feet from the ground.

FOOD:

The main foods of cardinals are seeds, fruits and berries. They eat the seeds from many different flowers as well as the berries from dogwood and other trees and bushes. At bird feeders, cardinals eat many different seeds, especially sunflower seeds.

PA Game Commission,; Bureau of Information and Education

AMERICAN ROBIN

HABITAT:

The American Robin lives in many different habitats including towns, farms, backyards, parks and the edges of forests. The robin builds a nest in a tree or shrub usually where two strong branches come together. The nest can be 3 feet to 40 feet from the ground.

FOOD:

Robins eat earthworms, grasshoppers, caterpillars and other insects. Robins will eat some fruits, such as grapes, poison ivy Berries mulberry and dogwood berries.

PA Game Commission,; Bureau of Information and Education

LITTLE BROWN BAT

HABITAT:

In the winter, little brown bats hibernate in tunnels, mine shafts, caves and houses. From Spring to Fall, female bats form nursery colonies in attics, barns, bat boxes and other dark, warm places. Nurseries are where the females raise their young. The nurseries can be small, with just several bats or large with over 1000 bats living together. When the females are in the nursery the adult males remain alone, roosting in hollow trees, under loose boards or shingles and in rock crevices.

FOOD:

Little brown bats eat many different kinds of flying insects such as, moths, beetles, flies and mosquitoes. A little brown bat can eat around 1000 mosquitoes in one night.

PA Game Commission,; Bureau of Information and Education

MINK

HABITAT:

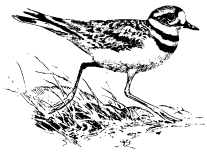
Minks live around streams, wetlands, ponds, lakes and rivers near forests. Minks take cover in hollow logs, muskrat lodges and opening in rock piles.

FOOD:

Minks are predators. This means they hunt and eat other animals. One of their favorites animals to eat is the muskrat. They also eat rabbits, mice, fish, frogs, crayfish and snakes.

PA Game Commission,; Bureau of Information and Education

KILLDEER



HABITAT:

Killdeer live in grassy fields, wet meadows, and along lake shores. Killdeer often live in schoolyards or in business areas where there are lots of grassy areas. Killdeer do not really build a nest instead they scratch the ground a bit and lay their spotted eggs. They will even lay eggs among pebble borders or in the gravel often found on the roofs of school and business buildings.

FOOD:

Killdeer will search the ground for food. Most of their diet is made up of insects, but they will eat spiders, snails and earthworms.

PA Game Commission,; Bureau of Information and Education

Pennsylvania Game Commission
Habitat Evaluation For Wildlife

Grades: 5-9 **Subjects:** Biology, Environmental Science, English
Vocabulary: habitat, evaluation **Skills:** observation, evaluation, recording, conclusions
Environment and Ecology Standards: 4.6.7A, C Demonstrate the dependency of organisms on the non-liv
Explain how a change in an ecosystem that relates to humans.

Objectives: Students will be 1) evaluate a habitat 2) determine if a specific species can live in that habitat 3) make recommendations to improve the habitat

Method: Students will *become* biologists and evaluate a habitat to determine the suitability of the habitat for a specific wildlife species.

Materials: Habitat Evaluation Sheets, pencils, Pennsylvania Game Commission Wildlife Notes., plant and animal ID materials, clipboard

Background: All animals need food, water, shelter, and space to survive. Animals meet these needs in their habitat. Each animal species has its own specific requirements for food, water, shelter and space. A squirrel eats nuts and lives in and around trees, robins also need trees, but prefer earthworms for food. The food, water, shelter and space requirements must all be found in an arrangement that is suited to the species. For example, an eagle may fly many miles to find food, but a rabbit must find food in a relatively small area.

Procedure:

1. Go over the basic needs of animals. Explain that the class will now be teams of wildlife biologists who must determine if a specific species could live in their schoolyard or assigned area.

2. Divide students into teams of 2-4. Assign each team a specific wildlife species to research. Students should obtain basic information about the animal- natural history, food, shelter, space and water requirements and other information pertinent to the species. Species can found at the Pennsylvania Game Commission website www.pgc.state.pa.us click on wildlife then wildlife notes.

3. Take students outside and assign them an area to evaluate. Student should then complete the first section of the Habitat Evaluation Form, recording their names, the location, date and type of habitat. Give students time to look for wildlife in the area and identify plants found in the area.

4. Next, have each team complete the sections regarding their assigned wildlife species based on the information they compiled in their research.

5. Then, have each team evaluate the area as wildlife habitat based on the needs of their assigned animals. Does the area provide the needed habitat for their wildlife species?

6. Have students complete the Human Interactions and Management sections of the Habitat Evaluation Form.
7. Make a large chart to summarize the findings of the students. Which animals can live in the area , which cannot. Which animals actually live in their area . Are there any animals that could live there with some habitat improvements?

8. Discuss what students could do to help the wildlife that does live in the area and what they could do to attract other species wildlife to the area.

Evaluation:

*Students complete worksheet and explain why or why not the schoolyard or other assigned area is a good habitat for specific wildlife species.

Extension:

-Students conduct a land-use inventory of their schoolyard and explain how this affects wildlife on their site.
-Students conduct a habitat inventory of their schoolyard explain how this affects wildlife on their site.
-Students conduct a wildlife inventory of their schoolyard.
-Students research other wildlife that might live in their schoolyard.
-Students develop and implement a plan to improve their schoolyard for wildlife.
-Students make a video or slide show about the wildlife species that lives in their schoolyard assigned area- natural history, and how species meet their needs should be included.

Developed by T. Alberici, Information and Education, Pennsylvania Game Commission

HABITAT EVALUATION WORKSHEET

Name(s)_____ Date_____

_____ Location:_____

You will be assigned a species of wildlife. Once you are assigned an animal, please read about your

Part 1: Natural History– Record the information about your species in the space provided.

Wildlife Species:_____

Description of animal:

Specific needs of animal:

Food:

Water:

Space:

Shelter (all types-nesting, wintering, storage, resting, protection)

Other:

Part 2: Habitat Description– Briefly describe your assigned habitat area.

Habitat type: (circle all applicable)

Mixed Forest	Lake	Urban
Deciduous Forest	River	Suburban
Agricultural field	Pond	Rural
Mixed field/shrub	Stream	
Mixed field/shrub/some trees	Wetland	
Shrub	Park	
Shrub with some trees	Houses, many trees, mowed lawn	
Schoolyard	Houses, few trees and little lawn	
Neighborhood	Buildings, scattering of trees, little or no lawn	
Business Area	Buildings, lots of mowed lawn, some trees	

Briefly describe habitat:

Major vegetation:

Wildlife known to be on site:

Part 3: Evaluate the suitability of this habitat for your species.

Food: Does this site provide food for this animal?_____
If yes, list foods found on site:

Are foods limited to one or more seasons?_____Which seasons?_____

Shelter: Animals require different types of shelter. Place an "x" next to those shelter types your animal requires, then decide if this site meets the needs for the animal. If yes, list possible places where the animal may find this shelter on your site.

Shelter Type	Needed by Animal?	Found on Site?	Locations (be specific)
Breeding/ nesting/ Nursery			
Roosting/Resting			
Hibernating			
Protection			
Other:			

Water: Does this site provide adequate water?_____
If yes, list sources:

Space: Does this site provide adequate space?____ Explain

Part 4 People and the Environment– Answer the following questions.

1.Are there many activities by people on this site:
If yes, list

2.Are these activities compatible with this animal inhabiting this site?_____
Explain:

3.Could this habitat be easily managed to attract your species or to encourage your species to inhabit the area? If no, explain why not. If yes, explain why and give examples of what can be done. Use additional paper to explain your answer.

Tree Identification
Using Leaves and a Dichotomous Key

Introduction:

Trees are important for wildlife, people and the environment. Trees provide food and shelter for wildlife and a multitude of resources and benefits for people. Trees are a renewable source of lumber, paper, nuts and chemicals and provide shade, oxygen, protection from winter winds and filtering of pollution. In short, trees are pretty terrific.

Pennsylvania is considered a tree state with 108 native tree species and may others from Europe and Asia. Identifying the different tree species can seem a daunting task but with a bit of practice, repetition and use of tree guides and dichotomous keys, tree identification can be within anyone's reach.

Trees can be identified in many different ways. Bark, shape of tree, twig arrangement, fruits, leaves and even smell all provide clues to the species of tree. One of the simplest methods to identify trees is by using the leaves. Of course, since we have deciduous and evergreen trees, leaves identification is only good in the seasons that all trees have their leaves. In addition, the arrangement of leaves on the tree is important, so it is helpful to have more than 1 leaf for use in the identification.

In this activity students will be introduced to tree identification using a dichotomous key. Cards are supplied with drawings of leaves and sketches indicating the arrangement of leaves on a branch. All cards have trees found in this key.

Using a dichotomous key: A dichotomous key is often used by biologists to identify various species. There are dichotomous keys for bats, mammals, insects, etc. **A dichotomous key contains a series of steps where the biologists** or any interested person **must make choices that guide them** (identify a species or a family. Since "dichotomous" means divide into 2 parts, the biologist is given 2 choices for each step. The choice made leads to additional steps and so on. An incorrect choice in the beginning of the key can lead to an incorrect answer or no answer at all

Keep in mind that a dichotomous key is limited to those species for which the key is designed. If the key is for trees of Asia or trees of Michigan, chances are they will not work for the species in our state. Keys are typically not all inclusive, therefore it is possible that you may have a tree species not covered by the key– even if the key is for trees of PA.

A Dichotomous Key for Tree ID

Leaves

leaf placement on branch is needed to ID some species

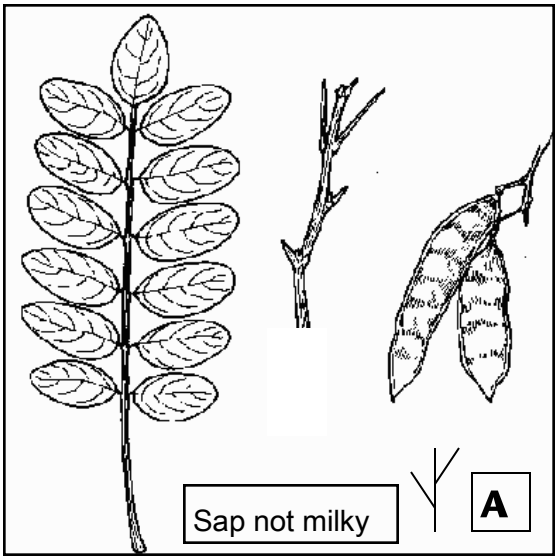
	If the tree has	Go to
1a.	Leaves needle or scale-like	2
1b.	Leaves broad and flat	12
2a.	Leaves scale-like	3
2b.	Leaves needles	4
3a.	Scales pointed, twigs not flat	red cedar
3b.	Scales blunt, twigs flat	white cedar
4a.	Needles (leaves) single on twigs	5
4b.	Needles (leaves) in bundles, tufts or rosettes	7
5a.	Needles flat, blunt	6
5b.	Needles four-side and sharp-pointed	spruce
6a.	Needles with small stalks (attaches needle to twig)	hemlock
6b.	Needles without stalks	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– 3 inches long	Virginia Pine
11a.	Needles sharp-pointed and flexible	Austrian pine
11b.	Needles stiff, snap apart when bent	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

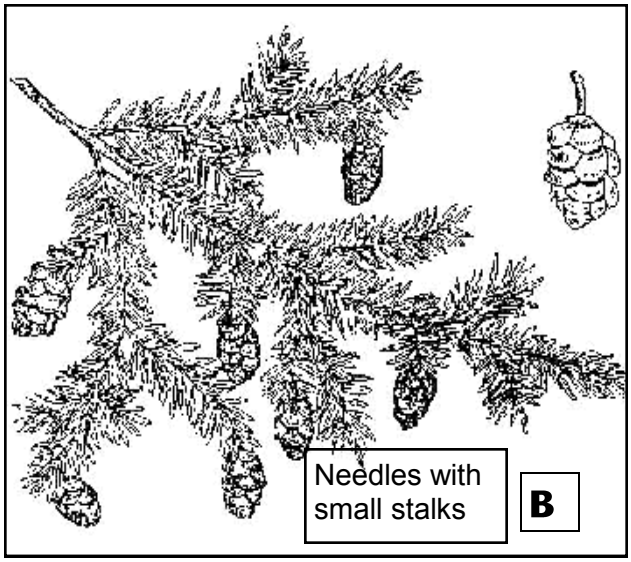
	If the tree has	Go to
15a.	Margins entire	dogwood
15b.	Margins lobed	maples
16a.	Pinnately-compound	17
16b.	Palmately-compound	horse chestnut
17a	Leaf divided into 3 to 5 leaflets	box-elder
17b.	Leaf divided into 7 leaflets	ash
18a	Leaves simple	19
18b.	Leaves compound (leaf-made up of leaflets)	40
19a.	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 5 inches long, leathery	black gum
21b.	Leaves 5 to 10 inches long, thin	cucumber
22a.	Margins deeply cut or lobed	23
22b.	Margins coarsely or finely toothed	29
23a.	Leaves with five deeply cut lobes, star-shaped leaf	sweet gum
23b.	Leaves not star-shaped	24
24a.	Leaves fairly square or notched at top	tulip poplar
24b.	Leaves not square or notched	25
25a.	Leaves from the <u>same tree</u> may be entire, or have 1 or 2 lobes, aromatic, smooth edges	sassafras
25b.	Leaves can be entire or lobed ; edges may be smooth or serrated	26
26a.	Leaf veins pinnate or palmate, leaf can be entire or have irregular lobes	27
26b.	Leaf veins pinnate, leaf has regular, deeply cut lobes, more than 2 lobes.	28
27a.	Leaf veins pinnate or palmate, leaf can be entire or possible to have 1, 3, or 5 irregular lobes with serrated edges; leaves are bluish green	mulberry spp.
27b.	Leaf veins palmate, leaf has3-5 major lobes, lobes are irregular; coarsely toothed; leaves are yellowish-green	sycamore
28a.	Lobes rounded	white oak group
28b.	Lobes sharp-pointed with hair-like bristles on end of each lobe	red oak group

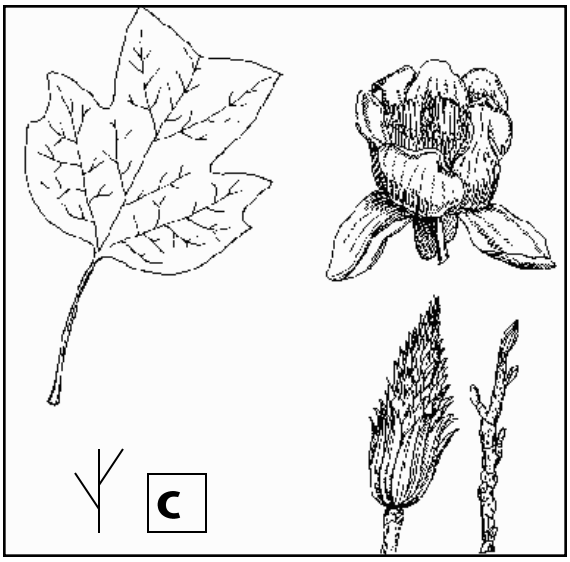
	If the tree has	Go to
29a.	Teeth coarse, one at end of each lateral vein	30
29b.	Teeth fine, several for each main lateral vein	31
30a.	Leaves slender, 3 times as long as broad (wide)	chestnut
30b.	Leave not more than 2 times as long as broad (wide)	beech
31a.	Leaves very narrow, 4 or 5 times as long as broad (wide)	willow
31b.	Leaves broad	32
32a.	Leaves not over 1.5 times as long as broad	34
32b.	Leaves about twice as long as broad	33
33a.	Unequal heart-shaped leaf base, round stem	basswood
33b.	Leaf base not heart-shaped, sides equal at base, stem tends to be flattened	aspen
34a.	Leaves smooth, single serrate, fine teeth	35
34b.	Leaves rough or hairy	36
35a.	Leaf stalk with one or two glands (small bumps on stem);has a sour odor when twig is broken	cherry
35b.	Leaf stalk without glands	Juneberry (service berry)
36a.	Rough leaves	37
36b.	Soft, hairy leaves	38
37a.	Leaf margins double-serrate from base, pinnately veined	elm
37b.	Leaf margins single serrate from above base, tips long-pointed, pinnately-veined	hackberry
38a.	Leaf margins double-serrate, base blunt to slightly heart-shaped, some aromatic	birch
38b.	Leaf margins double-serrate, base tapered or rounded	39
39a.	Leaves nearly as broad as long	alder
39b.	Leaves narrow and pointed	hops hornbeam (ironwood)
40a.	Sap milky (in stems)	sumac
40b.	Sap not milky	41
41a.	Terminal leaflet usually larger than other leaflets	hickories
41b.	Terminal leaflet as larger or smaller than other-leaflets or it may be lacking	42

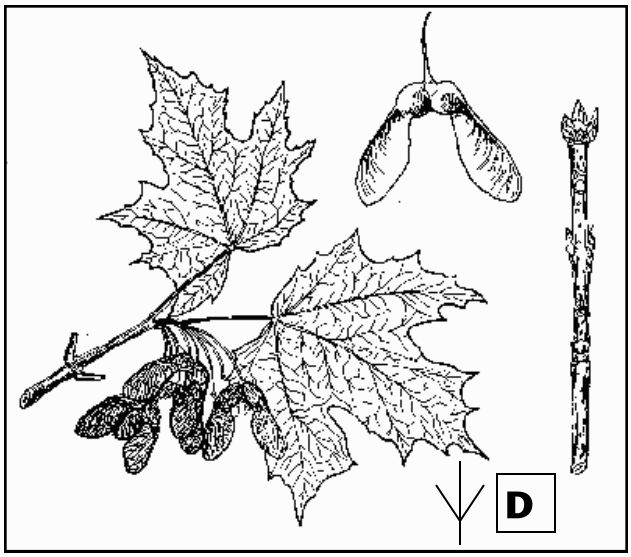
	If the tree has	Go to
42a.	Leaflet rounded at tips	black locust
42B.	Leaflets pointed	43
43a	Leaves smooth	44
43b.	Leaves hairy	45
44a.	Leaves not over 7 inches long	mountain ash
44b.	Leaves over 12 inches long	ailanthus
45a	Terminal leaflet as large as other leaflets	butternut
45b.	Terminal leaflet small or lacking	black walnut

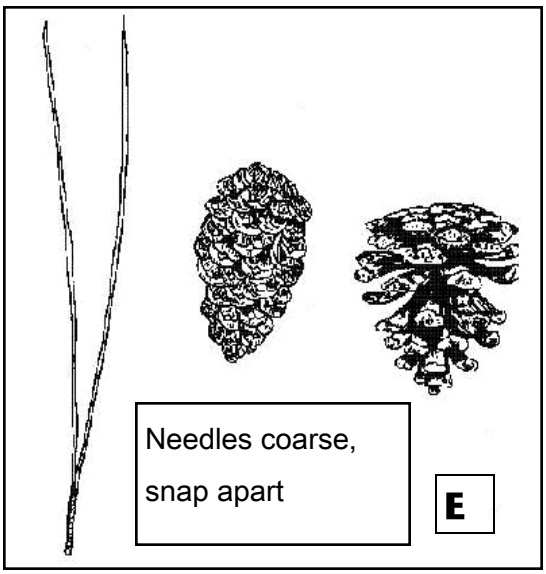
End of this key

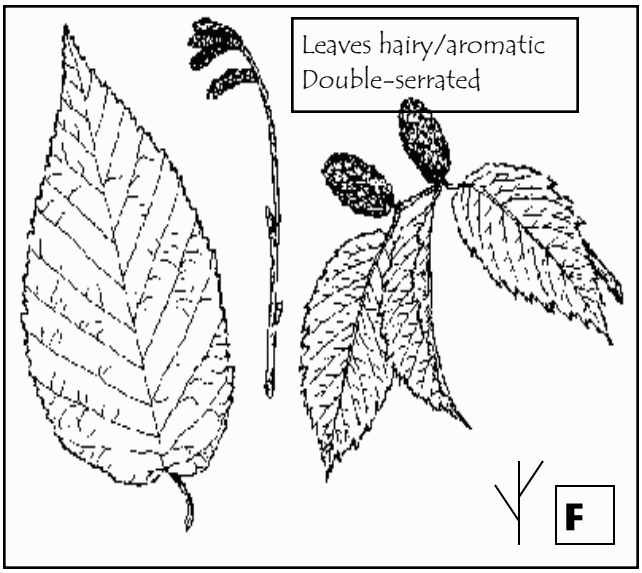

Sap not milky
A

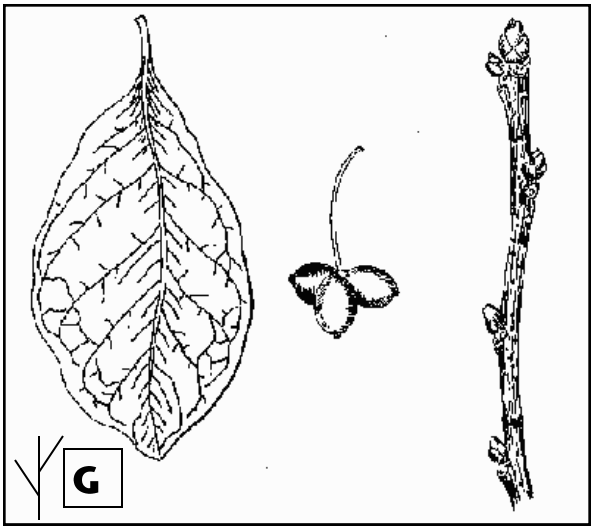

Needles with
small stalks
B

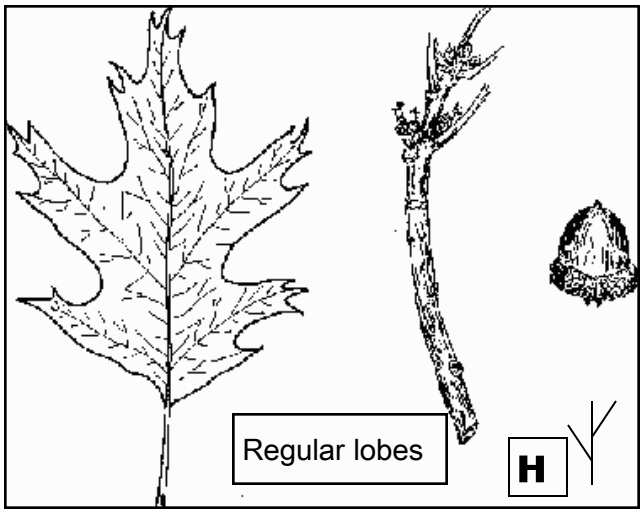

C

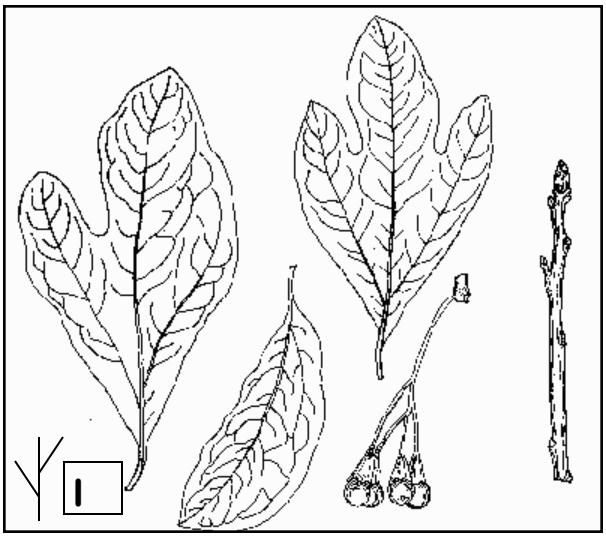

D


Needles coarse,
snap apart
E


Leaves hairy/aromatic
Double-serrated
F


G


Regular lobes
H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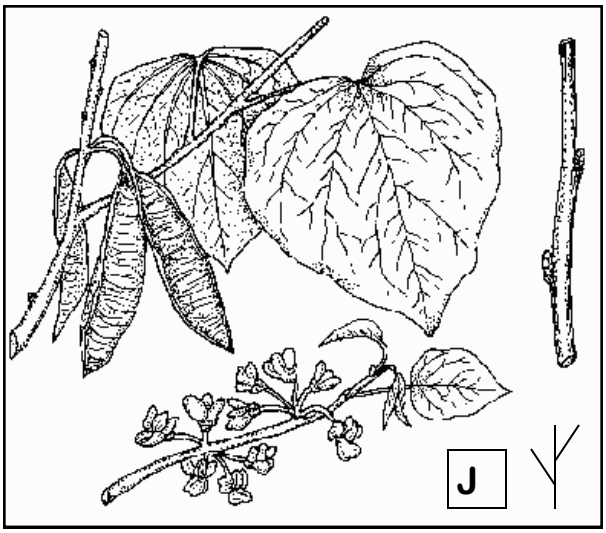
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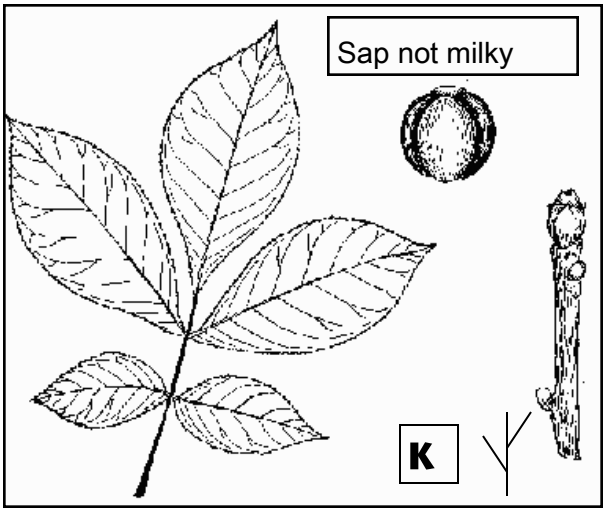
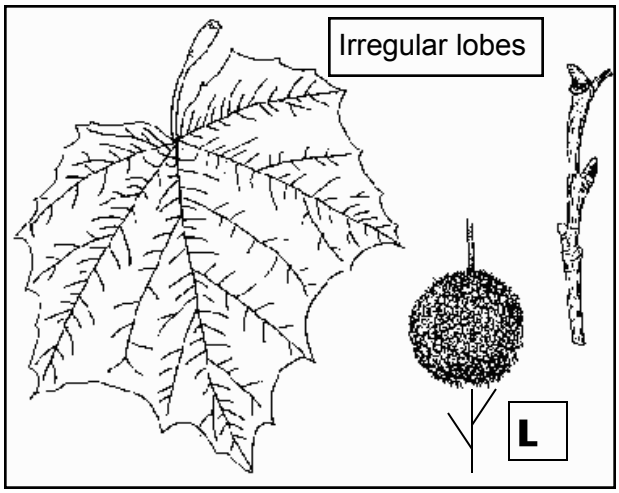
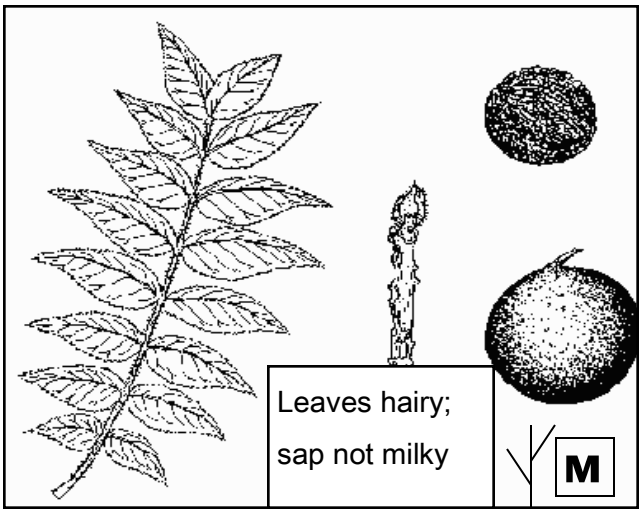
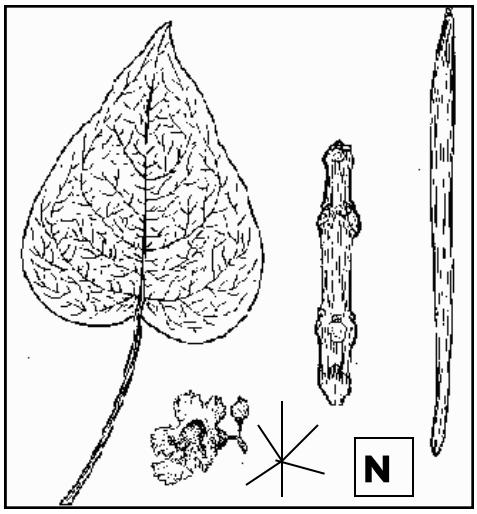

Sap not milky
K


Irregular lobes
L


Leaves hairy;
sap not milky
M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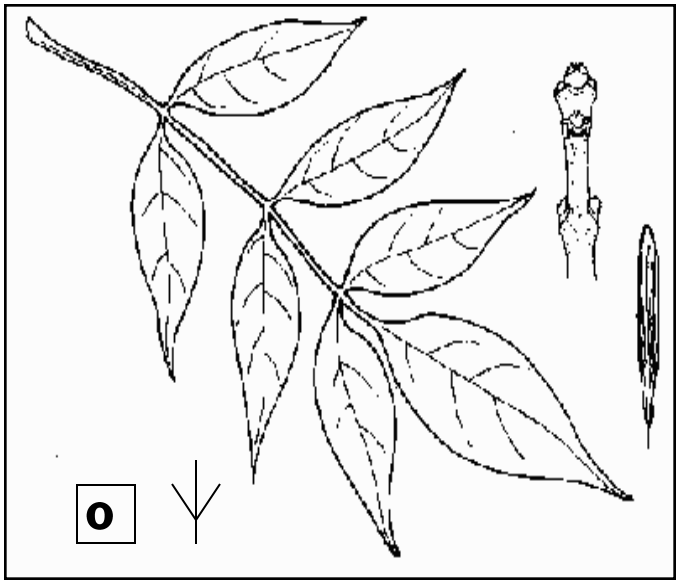
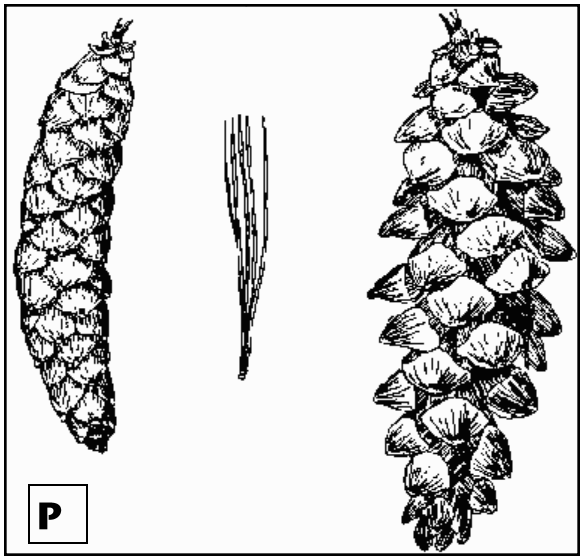
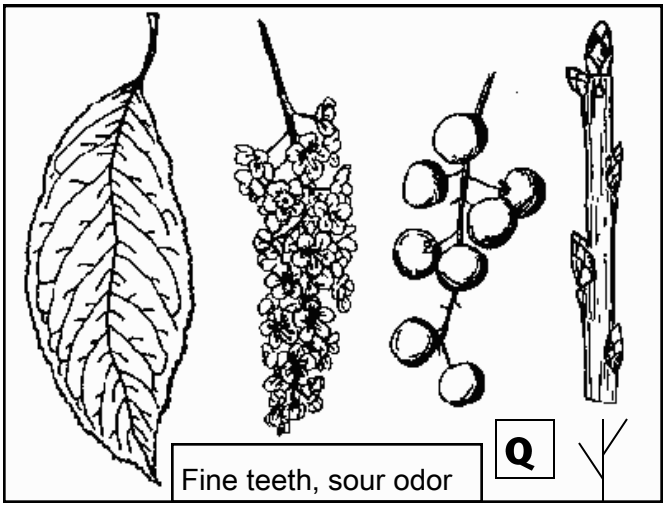
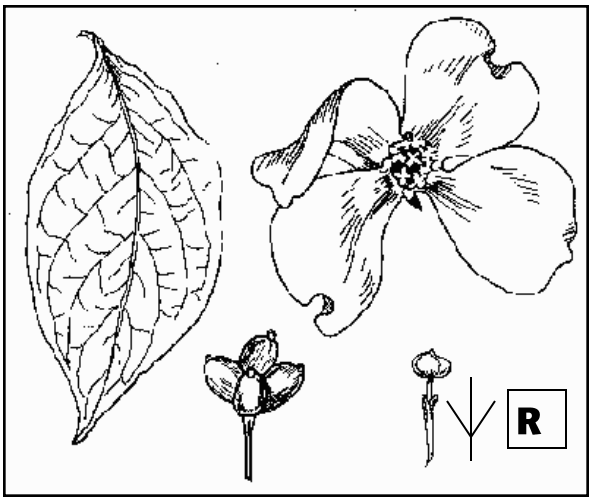

O


P


Fine teeth, sour odor
Q

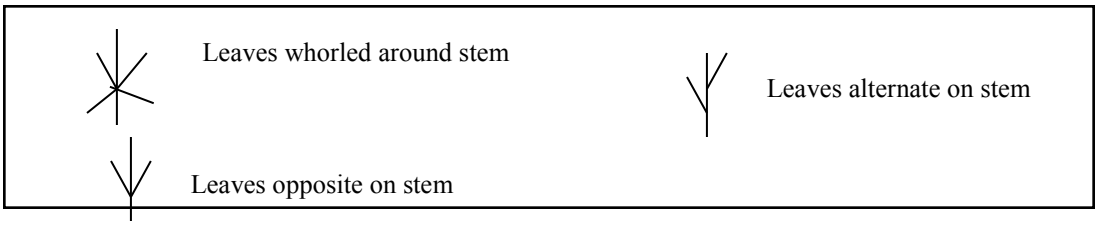

R

Key to Names

A	Black Locust
B	Eastern Hemlock
C	Tulip Tree
D	Sugar Maple
E	Red Pine
F	Yellow Birch
G	Black Gum
H	Red Oak
I	Common Sassafras

J	Redbud
K	Shagbark Hickory
L	Sycamore
M	Black Walnut
N	Catalpa
O	Ash
P	Eastern White Pine
Q	Black Cherry
R	Flowering Dogwood

Key to Symbols



Glossary

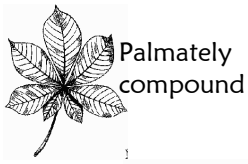
<u>*Leaves:*</u>

Simple– each leaf made up of a single leaf

Compound– leaf made up of several leaflets

Pinnately compound– leaflets arranged opposite one another

Palmately compound– leaflets come from 1 point and fan out

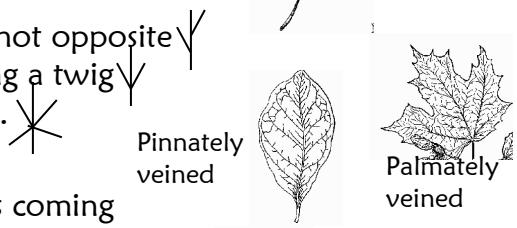


<u>*Leaf Arrangement*</u>

Alternate leaves– arranges at intervals along twigs, not opposite

Opposite leaves– arranged opposite each other along a twig

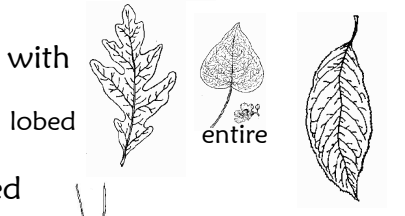
Whorled leaves– arranged in circles around the twig.



<u>*Veins*</u>

Pinnately veined– one major vein with smaller veins coming off acentral vein

Palmately veined– several main veins coming from 1 location with smaller veins wih smaller veins coming off each main vein



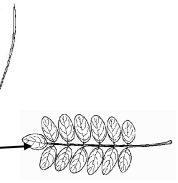
Leaf entire– no lobes or cuts in leaf; edge of leaf is smooth

Lobed leaf– leaf has deep indentations or cuts; can be rounded or sharp

Serrations/toothed– leaves has small indentations/jagged edges

Sheath- needles have a small, papery covering at the bottom

Terminal Leaf- leaflet on the end of a compound leaf



Safety Note: Please Read

This information is generally given to those who work in nurseries or are avid gardeners and horticulturalists. This is being distributed as a courtesy so that caution is used to prevent an <u>uncommon</u> infection. Plants, seedlings, sphagnum moss, hay, soil, along with most organic matter, may carry a fungus known as "Sporotrix Shenkii" which could cause an infection called "Sporotrichosis."

Sporotrichosis is a fungus borne infection that **is relatively *<u>easy</u>* to prevent** and ***<u>easy</u>* to treat if caught in the early stage of development**. It <u>may</u> be found in sphagnum moss, soil, humus, organic fertilizer, mushrooms, hay, bark, wood, flowers, leaf litter, pine needles, sawdust, seedlings, and even cacti.

The fungus, or its spores, invades the skin through puncture wounds or small cuts, cracks or nicks in the skin. It is also believed that the spores can become airborne, creating a risk of infection by inhaling the spores (this is even rarer). When infected with the fungus it causes small lesions on the skin that may resemble a pimple in the early stage. However, the lesions do not respond to normal treatment and are often misdiagnosed as other infections such as staph. If you have a minor infection that is not responding to treatment, you should see a doctor and inform him/her that you have been handling seedlings and may have come in contact with a fungus which can cause the disease known as Sporotrichosis.

PREVENTION

- Everyone working with seedlings should protect their hands and arms by wearing protective gloves and long sleeves.

- Use an antibacterial soap to wash hands and other exposed areas of the body often (Be sure to wash at each break and definitely when finished working with the seedlings for the day.)

- All scrapes, cuts or puncture wounds should be thoroughly cleaned and treated with a disinfectant such as Tincture of Iodine, then bandaged and kept clean.

(If working in a small or enclosed area with many seedlings and particulate organic matter, it is recommended that a dust mask be worn)

If you do develop any infections that do not respond to normal treatment, be sure to see a doctor and insist on being tested for fungus infections which may be associated with the handling of seedlings or other nursery products.

Pennsylvania Game Commission

Programs, Resources and Workshops for Teachers and Students

WWW.PGC.STATE.PA.US

The Pennsylvania Game Commission is the state agency responsible for conserving and managing the wild birds and mammals of our state. In carrying out this mission, the Game Commission provides a variety of services such as, enforcing wildlife laws; managing lands for wildlife; providing wildlife education programs for educators, youth and adults; conducting hunter education classes; conducting wildlife research; working with farmers and other land owners to benefit wildlife and cooperating with other agencies and wildlife organizations. Education is a key component of conserving and managing wildlife. Through a variety of programs, workshops and materials, the Commission is committed to providing educational opportunities to all Pennsylvanians.

CLASSROOM PROGRAMS - Wildlife Education Supervisors/Specialists and Wildlife Conservation Officers conduct classroom and club programs for youth of all ages. Programs cover a wide range of wildlife topics and are developed to directly correlate to classroom curriculum or club programming. Examples of programs include: adaptation, wildlife and their habitats, predator/prey relationships, ecosystems, endangered species, bluebirds, songbirds, white-tailed deer, habitat improvements, and wildlife management.

EDUCATOR WORKSHOPS- The Commission sponsors *Project WILD* and *Pennsylvania Songbirds*. Project WILD is a national hands-on interdisciplinary curriculum supplement about wildlife and habitat. Pennsylvania Songbirds is a Pennsylvania-based curriculum supplement about songbirds and their environment. Topic and species oriented workshops are also offered. These vary by region and by year. Examples of workshops include: Endangered Species, Neotropical Migratory Birds, Peregrine Falcon, WILD about ELK, Black Bears Habitat Improvement on School Grounds, Biodiversity, WILD about Bats, and WILD about Deer.

WILD ACTION GRANTS: Each year mini-grants are awarded to schools and youth organizations for habitat improvement projects on school and community grounds.

AUDIO-VISUAL RESOURCES: Each region has a selection of videos, films and slide programs for loan to schools, organizations and groups. These resources vary and cover a wide variety of topics .

RESOURCES- There are many free and "cost" publications available. Publications include,:

**Pennsylvania Game News* is a monthly magazine providing current information about wildlife, conservation and management. A free subscription is provided to all school libraries on request.

* *Wildlife Notes* is a series of pamphlets providing in-depth natural history of Pennsylvania mammals and birds. These are available free of charge and can be obtained in quantity. A shipping fee may be required for large quantities.

**Pamphlets* on a wide variety of topics are available free of charge. There may be a shipping fee for large quantities. Examples include, but are not limited to, 50 Birds and Mammals, Nesting Boxes, Bird Houses, What do Deer Eat?, Wings Out Your Window, Pheasant Recovery Project, The Hunter, Deer Diseases and Parasites and Some Plants are Poison.

**Charts* depicting birds and mammals grouped by habitat are available in two sizes for a small charge.

*Books for sale about Pennsylvania's wild birds and mammals.

*Woodworking for Wildlife book and actual boxes for sale.

To view all items for sale, please visit our General Store on our web page un

For more information about the Commission, arranging an education program for your classroom or acquiring publications, please contact your local office and visit the our website at www.pgc.state.pa.us

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