UNIT TWO:
IT TAKES ALL KINDS—EXPLORING THE DIFFERENT KINDS OF TREES

UNIT TWO DISCOVERIES

Students will be introduced to different kinds of trees (deciduous and coniferous) and their special characteristics. For background see the Introduction and Chapter One in *Where Are All The Trees? A Minnesota Primer.*

KEY

- (P) Primary Students
- (I) Intermediate Students
- (A) Advanced Students

As with any organism, trees come in an endless variety of sizes, shapes, and colors. The environmental conditions of an area (soil, rainfall, temperature, sunlight, etc.) provide the boundaries for the living things that exist there. Those living things have to have adaptations that allow their survival within those boundaries. The activities in this unit are designed to introduce you to more of your Minnesota neighbors and to explore their special characteristics.

Activity 1: Different Shapes, Same Job

(P)

One of the simplest ways to tell trees apart is to see if they have broad leaves (deciduous) or needle leaves (coniferous or evergreen). Deciduous trees lose all of their leaves every year—usually in the fall. Evergreens lose only a portion of their needle leaves during the year, staying green in the winter. Take to the back yard or park and reintroduce yourself to your old friends. (If leaf collections are not available because of seasonal restrictions, use the Minnesota species identification sheets available in Unit Four. Also, the pictures on Activity Sheets 2A-2F at the end of this unit can helpful.)

Use your leaf collection from Unit One or collect new specimens to use as a basis of classification. Make two lists; one for deciduous and one for evergreen. Divide your leaf collection into the two basic groups. Then sort again using the pictures of the Minnesota species provided in Unit Four.

"Discovery consists in seeing what
everybody else has seen
and thinking what nobody else has thought."

—Albert Szent-Gyorgyi

I A

The shape of the leaf, its size and color, how many leaves there are on a stem, and how they are arranged are all ways of telling trees apart. A leaf key can help you sort leaves and identify the tree they came from. Using Activity Sheet 2G at the end of the unit, try to identify each of the leaves listed on Activity Sheet 2H.

The key gives you two choices each step of the way. At each step, make a choice between the two and go to the step it directs you to until you reach an identification based on the clues given. (This particular key is called a dichotomous key because it is based on the process of choosing between two characteristics.)

Pick up a leaf key at the library or use the summer key in Extension Bulletin NR-BU-0486 *Minnesota's Forest Trees* (see bibliography), and see how far you can get keying the leaves of the Minnesota species listed in Unit Four.

Activity 2: Stand Tall and Shape Up!

Another way to tell trees apart is to look at their shape. There are characteristic styles of branching that belong to each species and give them their own particular shape. Trunks of most evergreens grow straight to the top of the tree. All the branches grow out from the trunk. The branches near the top are shorter than those farther down, giving the trees a "Christmas tree" shape. The trunks of most broadleaf trees do not reach to the top of the tree. Instead, the trunk divides into spreading branches, giving just the crown a unique (for example, rounded) shape.

P

Activity Sheet 2I shows how similar tree shapes can be to geometric shapes. Practice on the trees pictured on the sheet and then return to your back yard or park. Divide the trees up according to which shape—round, square, and triangle—they resemble the most.

Look at the tree shapes on the Minnesota species identification pages in Unit Four. Divide them up into groups based on their shapes.

I A

Minnesota winters provide a wonderful opportunity to learn about the different branching arrangements of trees. Just as the leaf arrangement on the twig helps to identify the leaf and tree, so does the branching out from the trunk. Following are examples of three different styles:

1. Whorl pattern: pine, fir, spruce
2. Opposite pattern: maple, ash, dogwood
3. Alternate pattern: alder, oak, cottonwood.

To see how these different branch arrangements define the tree shape, look at Activity Sheets 2C-2F and study the silhouette outlines given for each tree listed.

P

It's time to return to your backyard friends and observe their branching patterns. Develop a simple classification method based on the kinds of trees you have available. Then proceed to organize and categorize your trees based on your list.

I A

If you have a twig collection, use it now to note how the twig patterns of each of your trees compare to their branching patterns. If you didn't make a twig collection in Unit One, now would be a good time to do so. Remember to be a "Good Naturalist"—pick up the twigs from the ground and disturb the living organisms as little as possible.

Where are the buds on the twig and how are they arranged? What color and size is the twig? Locate leaf scars from old leaves. The bud arrangement helps managers and foresters identify trees in the winter and spring when that is all they have to go by.

Make "families" of trees based on their branching patterns. Find the biggest "family" in your neighborhood.

Using the Minnesota species identification pages in Unit Four, see how many twig and branching patterns you can identify and group.

Used with permission from Project Learning Tree.

Editor's note: An excellent source of a summer and winter key for identification is Extension Bulletin NR-BU-0486, *Minnesota's Forest Trees.* The summer key uses leaves and the winter key uses twig and bud characteristics. Also, the booklet has excellent drawings of 46 of the state's most common forest and windbreak trees. See the bibliography at the end of the unit for more information.

Activity 3: What's in a Fruit?

Another way to identify trees is by looking at the way they make new trees—what kind of seed or fruit does the tree produce? There are two main categories. Gymnosperms have "naked" seeds. The seeds are not enclosed in a fruit. Instead, they are produced on the scales of a female cone. Most coniferous trees are gymnosperms. Angiosperms have flowers and their seeds wind up in the fruits of those flowers (apples, maple "helicopters," acorns, etc.).

P

It's time to go back outdoors and collect seeds or use what you collected in Unit One. Divide the seeds into cones and fruits. How many different cone trees are represented? How many different flowering tree seeds did you find?

Use a shoe box, tissue box, or paper bag to make a touch-feel box with the cones, seeds, and twigs you collected. How many things can you identify by just feeling?

I A

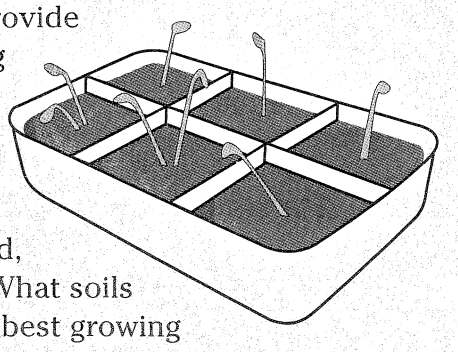
Collect seeds and identify the trees from which they came. Activity Sheets 2A-2E or Extension Bulletin NR-BU-0486, *Minnesota's Forest Trees,* can be helpful here. If you are not familiar with some of the trees in your area and a key is not available, introduce the young naturalists to the use of the library and books that can help them with their search. Never miss an opportunity to help them learn how to find out about something they don't know by using the resources available to them.

Make a display case or exhibit combining all you now know about your tree neighbors: name, leaf structure, bark characteristics, branching and twig styles, and seed type.

After looking at your own tree neighbors, use the Minnesota species identification pages in Unit Four to learn about seeds and trees not common to your area.

P I A

Remember that the purpose of seed is to perpetuate the species. To do this conditions must be right. Do some of the following experiments with a variety of seeds to see which factors provide the best growing conditions.



1. Plant the same seeds in a variety of soils: sand, loam, clay. What soils provide the best growing medium?
2. Plant two trays of seedlings. Put one in a dark room (closet) and keep one in the daylight. Water both the same and be sure to plant both sets in the same soil type. See what difference the amount of light makes on the growth of the seedlings.
3. Plant identical trays of seedlings and measure and vary the amount of water you give each.

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I A

Animals and humans benefit from plant and tree seeds—we love to eat them! See how many seeds you can find in the cryptogram on Activity Sheet 2J.

"Nature is the living, visible garment of God."

—Johann Wolfgang von Goethe

Activity 4: Nature Detectives—Scavenger Hunt

P I A

By now your young naturalists should be getting pretty familiar with their backyard neighbors. To help them proudly display and use their new found knowledge, develop a scavenger hunt list appropriate to their level. Make sure it includes items from all of the areas they have learned about: leaves, twigs, seeds, bark. Check the game area prior to the activity for safety and availability of the materials. Pass out the list of items, remind the children of the "Good Naturalist" code, and turn them loose to have a wonderful time. As always, save the collections for art activities.

Activity 5: Dining with the Neighbors

P I A

Ask the children to "forage" at home for things to eat that are provided by our neighbors, the trees. Or go on a field trip to the store and treasure hunt your way through for "tree goodies." Gather the booty (apples, oranges, plums, peaches, maple syrup, walnuts, almonds, chestnuts, pecans, fruit juices, etc.). Discuss the different foods. Talk about primitive people or American Indians and pioneers—how important was it for them to be able to find food in the forest? After your discussions, have a hearty, healthy snack, compliments of the "neighbors"!

ARTS AND CRAFTS

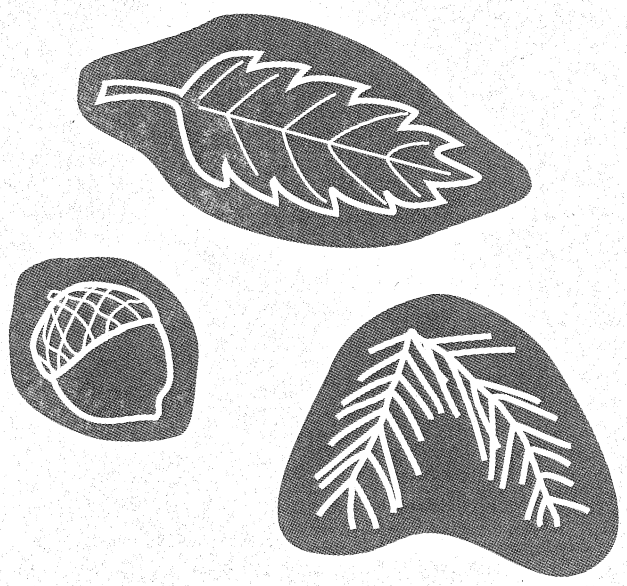
LACY LEAF FINGERS (PRINTING WITH INK)

A dramatic way to add variety to your leaf collection is to do ink prints of each specimen you collect. After pressing your leaves, place the underside (veined side) of the leaf on a stamp pad. Cover with a newspaper to keep your hands clean and press down firmly to cover the stem, veins, and margin with ink. If the leaf is too big, move it around until the whole bottom is covered. Place the leaf carefully on a piece of white paper, cover with a CLEAN newspaper, and press. Remove newspaper and leaf carefully and add your "lacy" fingers to your collection.

Adapted with permission of Minnesota Extension Service, University of Minnesota, from Minnesota's Forest Trees, *NR-BU-0486, revised 1989.*

IN THE DOUGH!

Using the following recipes for playdough or salt dough, let the children mold their own trees and leaves. As a variation, let them make a print in the dough with a leaf, twig, or seed. Set aside and allow the playdough to dry or bake the salt dough. Allow the children to paint their creations.



PLAYDOUGH

3 cups flour
1/2 cup salt
3 Tbsp. cooking oil
1 Tbsp. alum
2 cups boiling water
food coloring

Boil the water and add the food color to it. Mix remaining ingredients in large bowl. Add the hot water (this step should be done only by the adults present to prevent accidents) and mix only until everything is moistened and cool enough to turn out on the table and knead. Knead until smooth (this step can be done by the children as the dough cools very quickly). The food color can also be added in after the dough is mixed. When done using, store in a plastic bag inside a closed container.

SALT DOUGH

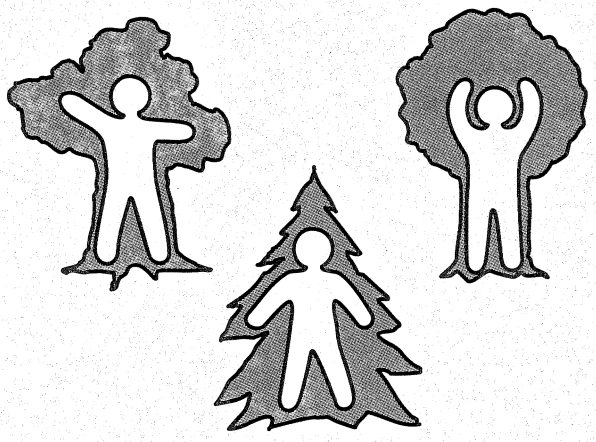
2 cups flour
1 cup salt
1/2 cup water
2 Tbsp. cooking oil
food coloring

Mix all ingredients and knead until a soft, pliable ball forms. Keep hands floured to prevent sticking. Color with food color (this can be added to the water before all the ingredients are mixed) and shape. Bake on an aluminum cookie sheet at 300° for at least one hour or until shapes are hard.

Fossilized prints of leaves, twigs, and seeds have long been used as clues to help identify the plant species of the past. Using clay or playdough, have the students make impressions and then plaster casts of their specimens. (Follow the directions in Activity 7 in Unit One.) The students can make a whole set of casts for their trees: bark, twig, leaf. These casts can also be used for some of the matching games in the activities.

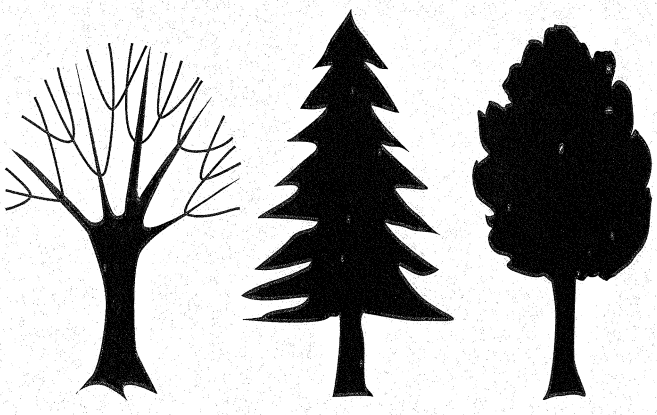
SHAPELY PICTURES

Give children pieces of paper large enough to lie down on. Ask them to shape their legs and arms into the outline of their adopted or favorite tree. Broadly trace the outline of the shape around them. See examples below. Have them color or paint in their "tree."



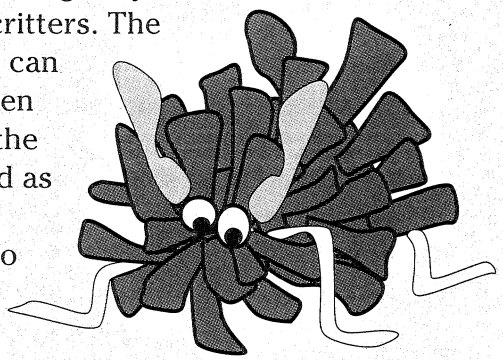
SILHOUETTES

Give the children large pieces of heavy art paper, black paint, and brushes. Ask them to paint in silhouette (outline only) pictures of the trees in their area. From the lacy fingers of bare winter branches reaching into the winter sky to the full-bodied shapes of the summer foliage, the pictures can be dramatic and poetic. See examples below.



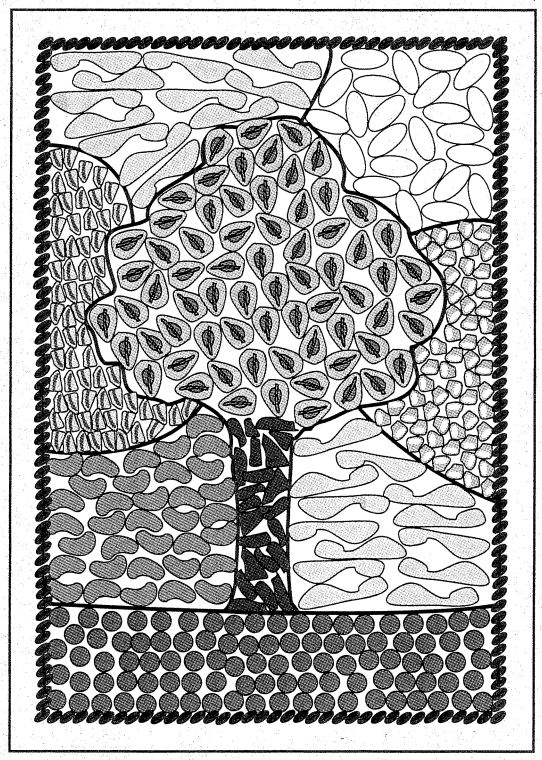
PINE CONE CRITTERS

Using whole pine cones, add paper, pipe cleaners, twigs, grass, etc., to make interesting imaginary backyard critters. The pine cones can also be taken apart and the pieces used as interesting additions to other art projects.



"STAINED GLASS" SEED PICTURES

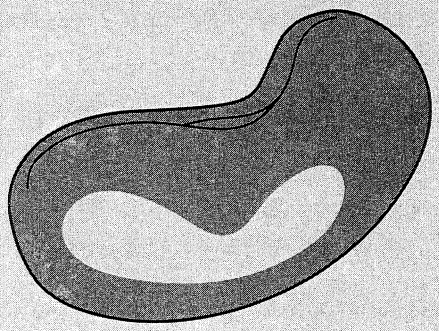
Gather a variety of seeds both collected (acorns, maple seeds, elm seeds, pine cones, flower seeds, etc.) and bought (corn, beans, peas, sunflower seeds, etc.). Draw a simple picture of a forest animal or bird or tree. Then glue the different seeds in place to make a "stained glass" seed picture. See example below.



NATURE'S MUSIC

1. "I'm a Little Sprout"

Combining movement and music is a wonderful way to reinforce ideas. Using the seed pattern below, make enough seeds for all of your young participants. Making them out of tagboard or laminating them will help them last longer. Pass them out and to the melody of "I'm a Little Teapot," sing and act out the song, "I'm a Little Sprout."



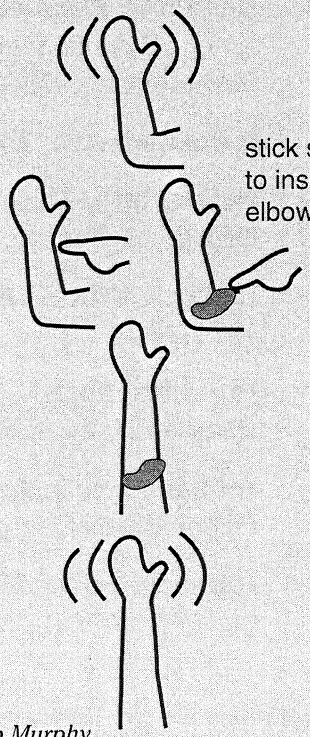
"I'm a Little Sprout!"

I'm a little plant
so bright and green.

Here is my stem
and here is my seed.

When I get so big I
poke right out.

Then I become a
"Little Sprout!"



stick seed to inside of elbow

Used with permission from Deb Murphy.

2. Magic Mood Music

Go back to any of the music selections in Unit One (page 16) or pick from the following list or use any of your personal favorites. Ask the children to listen to the music first. Then re-play it as they act it out, draw it out, or write a short story or poem about what images the music sparks in their imaginations.

"Appalachian Spring" *by Aaron Copland*

"Peter and the Wolf" *by Prokofiev*

"A Walk in the Black Forest" *by Horst Jankowski*

"William Tell Overture" *by Rossini*

"Thunder and Lightning" *polka by Johann Strauss*

"The Nutcracker Suite" *by Tchaikovsky*

"Woodland Sketches" *by MacDowell*

"Finlandia" *by Sibelius*

"Grand Canyon Suite" *by Ferde Grofe*

"Symphony No. 6" *by Beethoven*

"Rocky Mountain High" *by John Denver*

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BIBLIOGRAPHY

General resources for sharing nature with young people:

Bowden, Marcia. *Nature for the Very Young: A Handbook of Indoor and Outdoor Activities.* Wiley, 1989.

Katz, Adrienne. *Naturewatch: Exploring Nature with Your Children.* Addison-Wesley Publishing Company, 1986.

Special selection: The following book belongs in every unit. Introduce it and use it often—the message is important.

Silverstein, Shel. *The Giving Tree.* Harper & Row, 1964.

The following resources are general guides to identification. They are loosely marked with a P (Primary), I (Intermediate), or A (Advanced) to indicate a general level of the information presented. All are excellent references.

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Jordan, Helene J. *How a Seed Grows.* HarperCollins, 1992. (P, I)

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Orange, Anne. *The Leaf Book.* Lerner Publications Company, 1975. (P, I)

Overbeck, Cynthia. *How Seeds Travel.* Lerner Publications Company, 1982. (I, A)

Poling, James. *Leaves: Their Amazing Lives and Strange Behavior.* Holt, Rinehart, and Winston, 1971. (I, A)

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Scholten, Harold. *Minnesota's Forest Trees* (NR-BU-0486). Minnesota Extension Service, University of Minnesota, Natural Resources, 1989. (I, A)

Selsam, Millicent. *Tree Flowers.* W. Morrow, 1984. (P, I, A). Excellent!

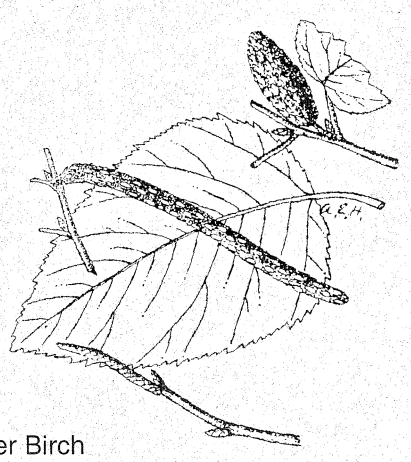
Simon, Seymour. *A Tree on your Street.* Holiday House, 1973. (I, A)

Sullivan, George. *Trees.* Follett Publishing Company, 1970. (P, I)

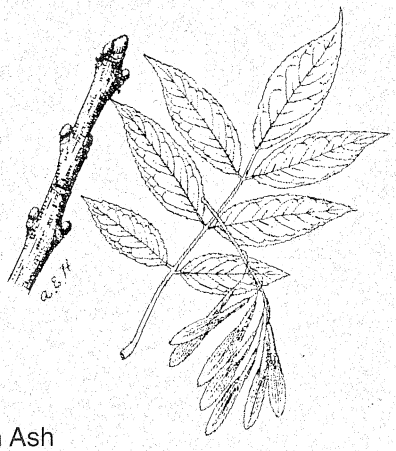
Wexler, Jerome. *Flowers, Fruits, Seeds.* Prentice Hall Books for Young Readers, 1987. (P)

ACTIVITY SHEET 2A

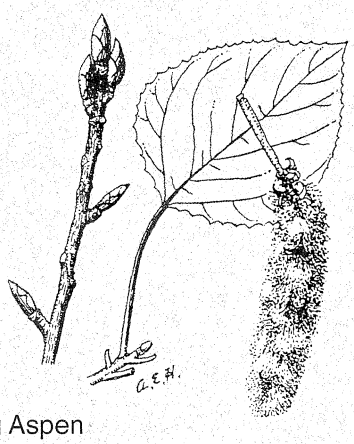
LEAVES AND SEEDS



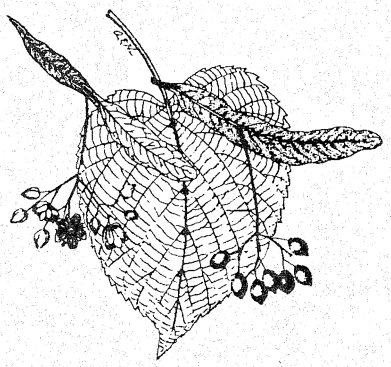
Paper Birch



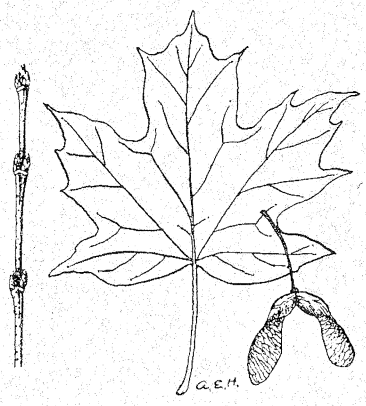
Green Ash



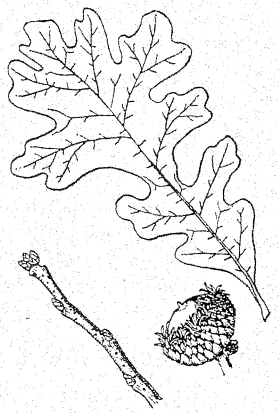
Quaking Aspen



Basswood



Sugar Maple



Bur Oak

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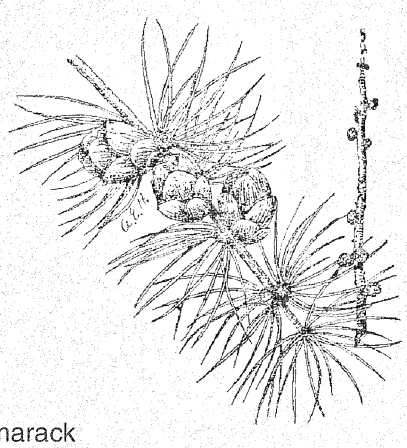
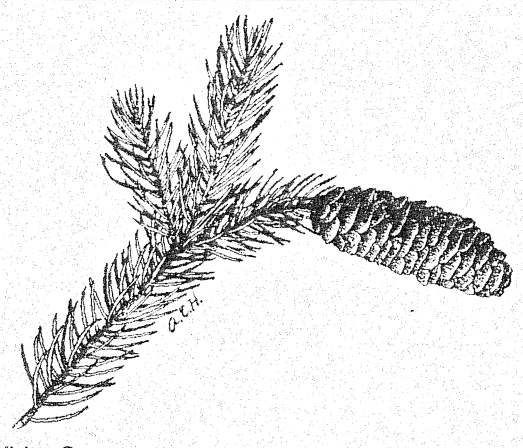
ACTIVITY SHEET 2B

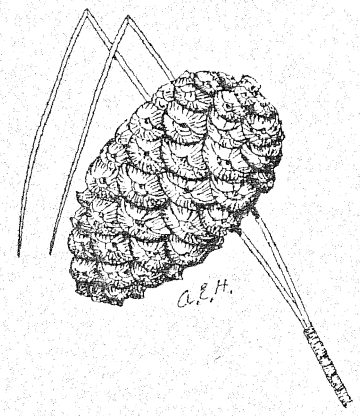
LEAVES AND SEEDS



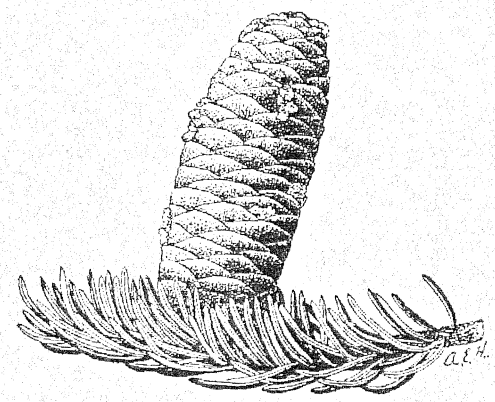
Tamarack



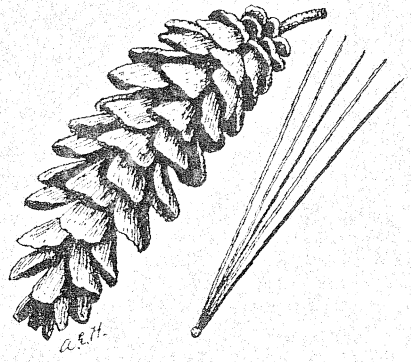
White Spruce



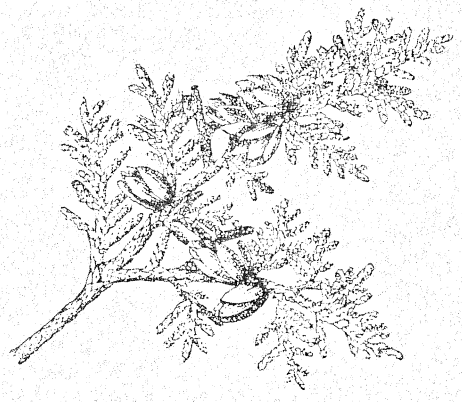
Red (Norway) Pine (Minnesota's State Tree)



Balsam Fir



White Pine



White Cedar

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ACTIVITY SHEET 2C

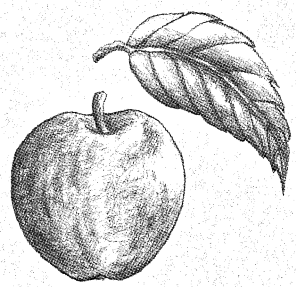
TREE SHAPES, LEAVES, AND SEEDS

Make a copy of these puzzles for each group. Grades K-2 use puzzles A-D only (letters are on back of puzzle pieces); Grades 3 and up use all puzzles.

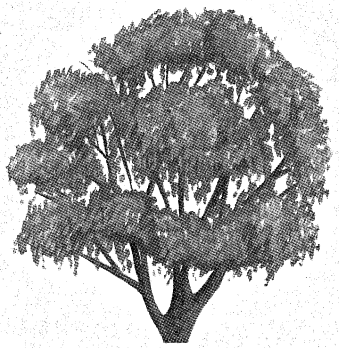
For sturdier puzzles, mount these sheets to tagboard before cutting apart. Print self-check code letters on the back of each piece, then laminate if desired.

Each group picks a leader. The "leader" shuffles and spreads the puzzle pieces. Group members work together to match the tree with its leaves and silhouette form. When everyone is satisfied that the puzzles are correctly matched, the "leader" turns them over. Matching alphabet code letters mean a correct answer. Everyone in the group studies the matched puzzle pieces and shares ideas about how to remember the shape of each tree.

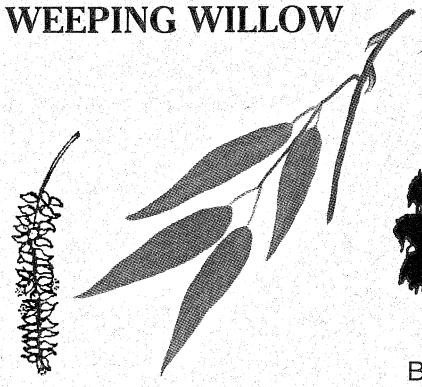
APPLE



Broadly Globe-Shaped (Rounded)



WEEPING WILLOW



Broadly Weeping

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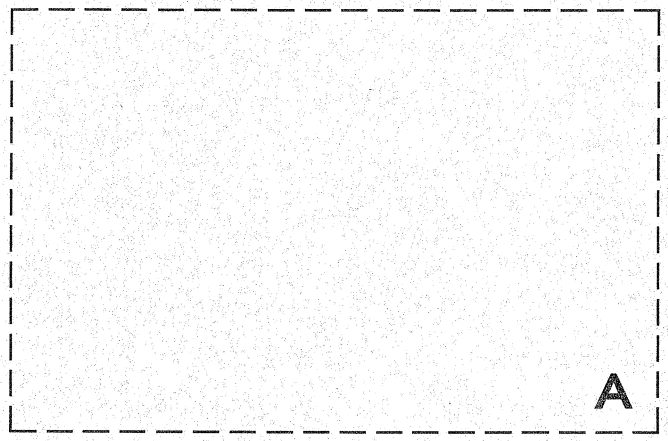
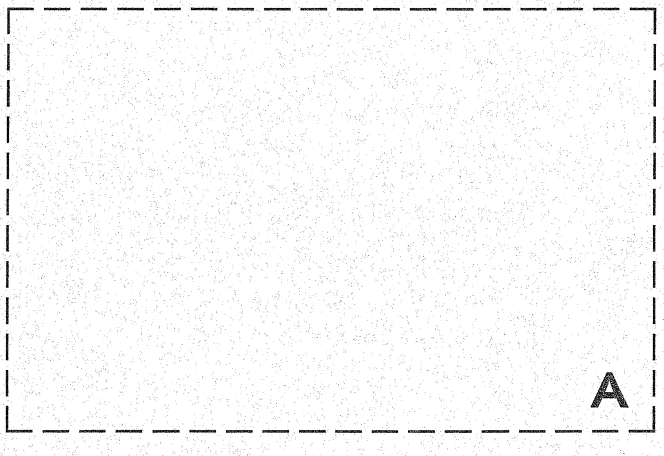

A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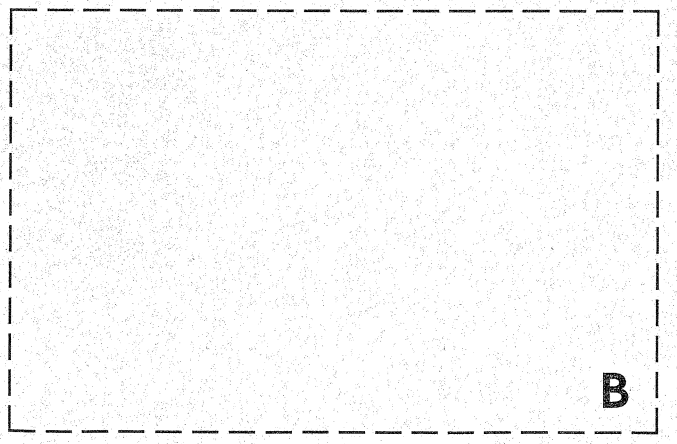
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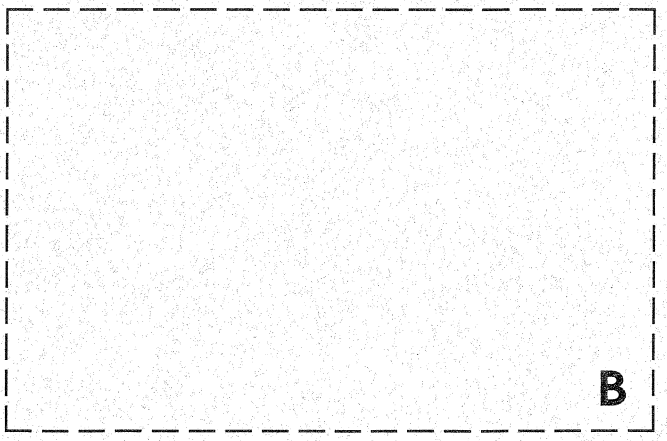
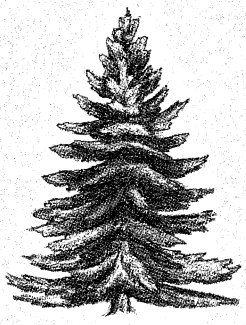

B

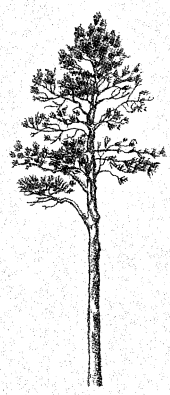
ACTIVITY SHEET 2D

TREE SHAPES, LEAVES, AND SEEDS

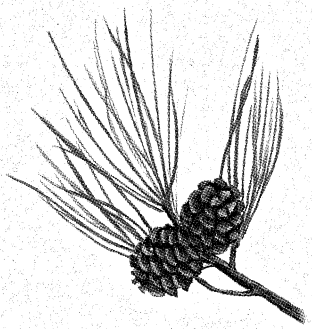


WHITE SPRUCE

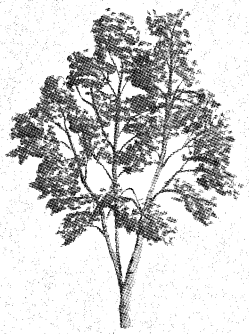
Cone



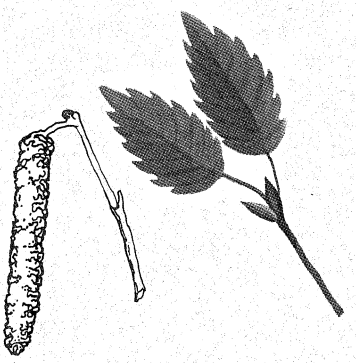
RED (NORWAY) PINE



Pyramid



PAPER BIRCH



Moderately Oval

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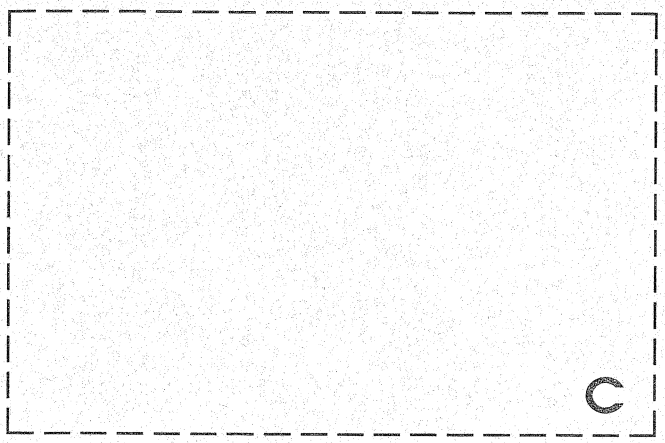
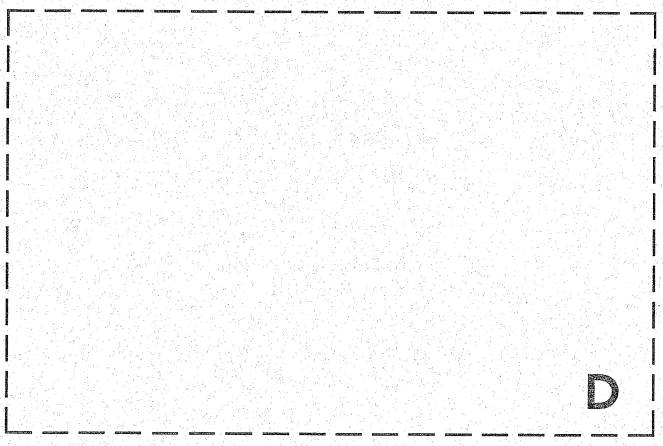

C


C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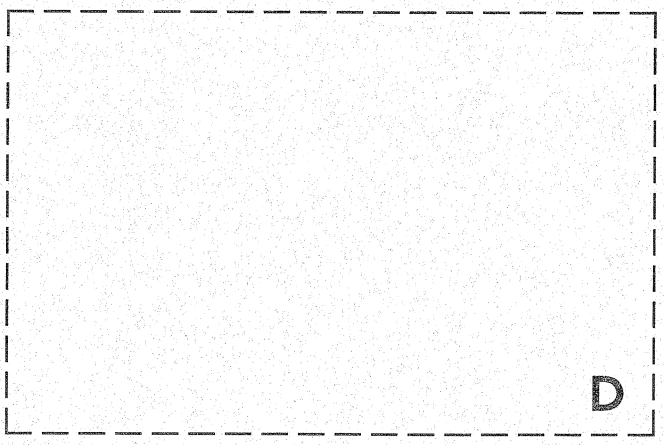
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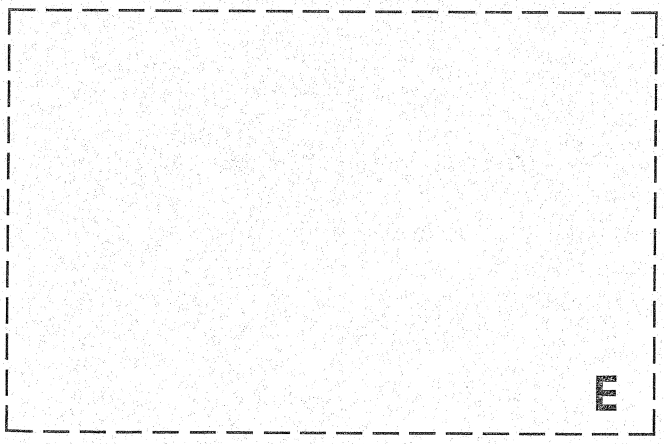
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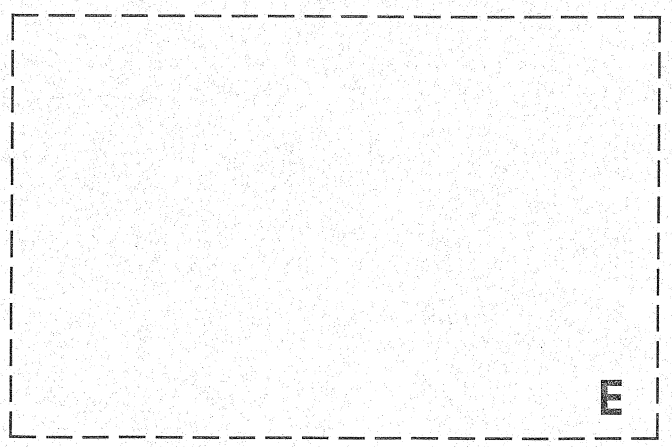
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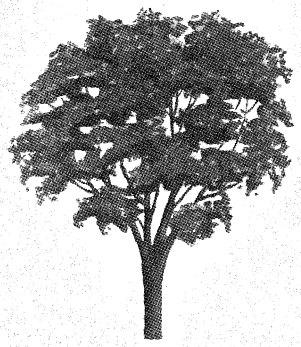
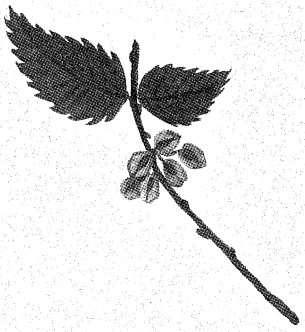
ACTIVITY SHEET 2E

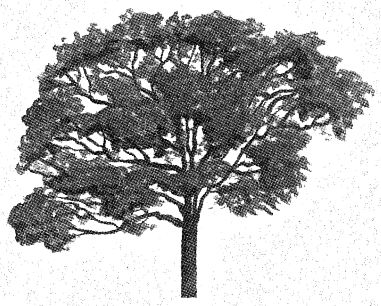
TREE SHAPES, LEAVES, AND SEEDS



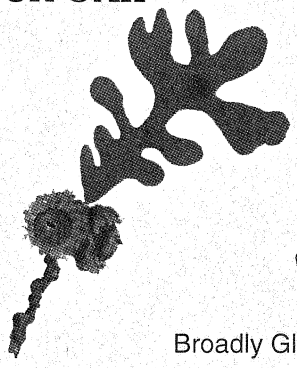
AMERICAN ELM



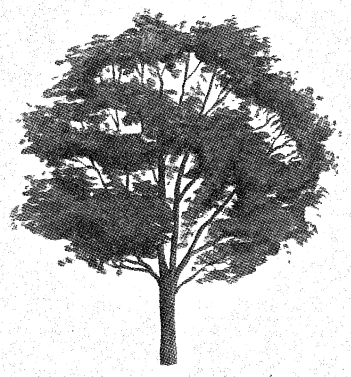
Broadly Vased-Shaped



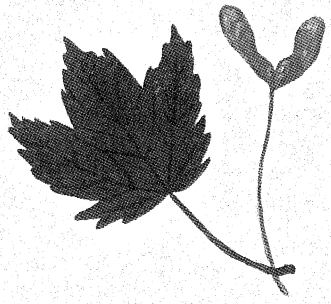
BUR OAK



Broadly Globe-Shaped (Rounded)



RED MAPLE



Broadly Globe-Shaped (Rounded)

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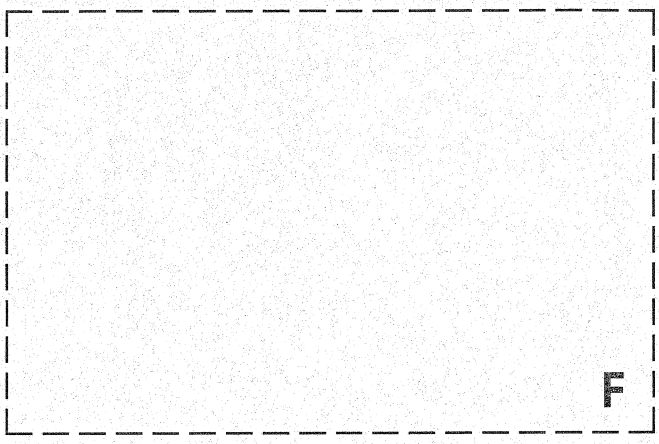
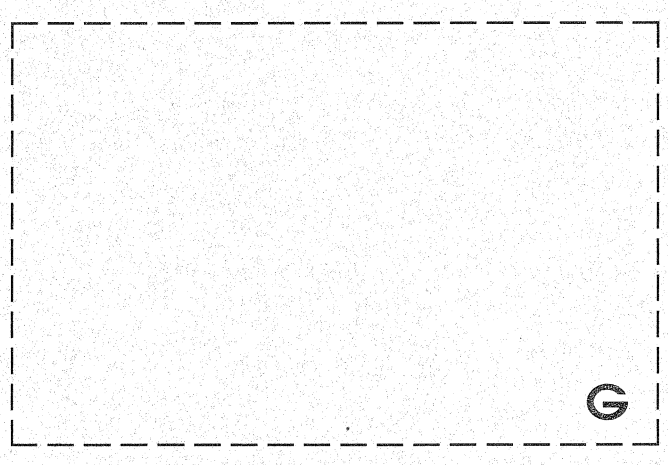
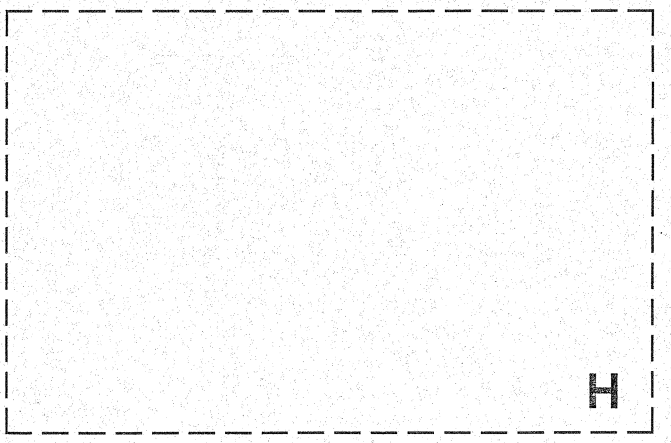
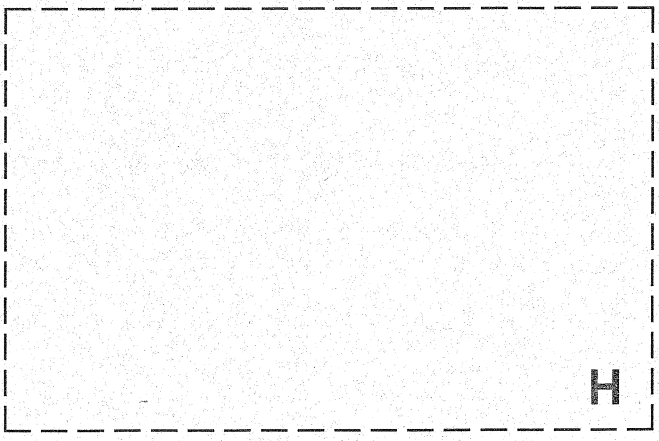
F


F


G


G


H


H

ACTIVITY SHEET 2F

TREE SHAPE MATCH-UP

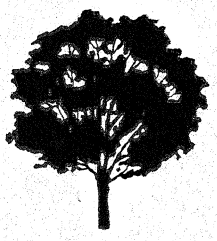
Can you identify each tree shape? (If you need help, do the puzzle game on Activity Sheets 2C-2E.) Match the letter of the tree name to its correct shape. See answers below.

1.____

2.____

3.____

4.____



5.____

6.____

7.____

8.____

A. Weeping Willow

B. White Spruce

C. Red (Norway) Pine

D. Paper Birch

E. American Elm

F. Bur Oak

G. Red Maple

H. Apple

Answers:

1. D. Paper Birch
2. E. American Elm
3. F. Bur Oak
4. B. White Spruce
5. G. Red Maple
6. A. Weeping Willow
7. C. Red (Norway) Pine
8. H. Apple

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ACTIVITY SHEET 2G

KEYING OUT TREES

Use this key to help you identify the leaves on Activity Sheet 2H.

LEAF KEY

1. Leaves are shaped like needles ..... go to 2
   Leaves are broad and flat ..... go to 3

2. Long needles grow in bunches of five ..... WHITE PINE
   Needles are short and grow singly along the branch ..... SITKA SPRUCE

3. Leaves are **opposite** ..... go to 4
   Leaves are **alternate** ..... go to 5

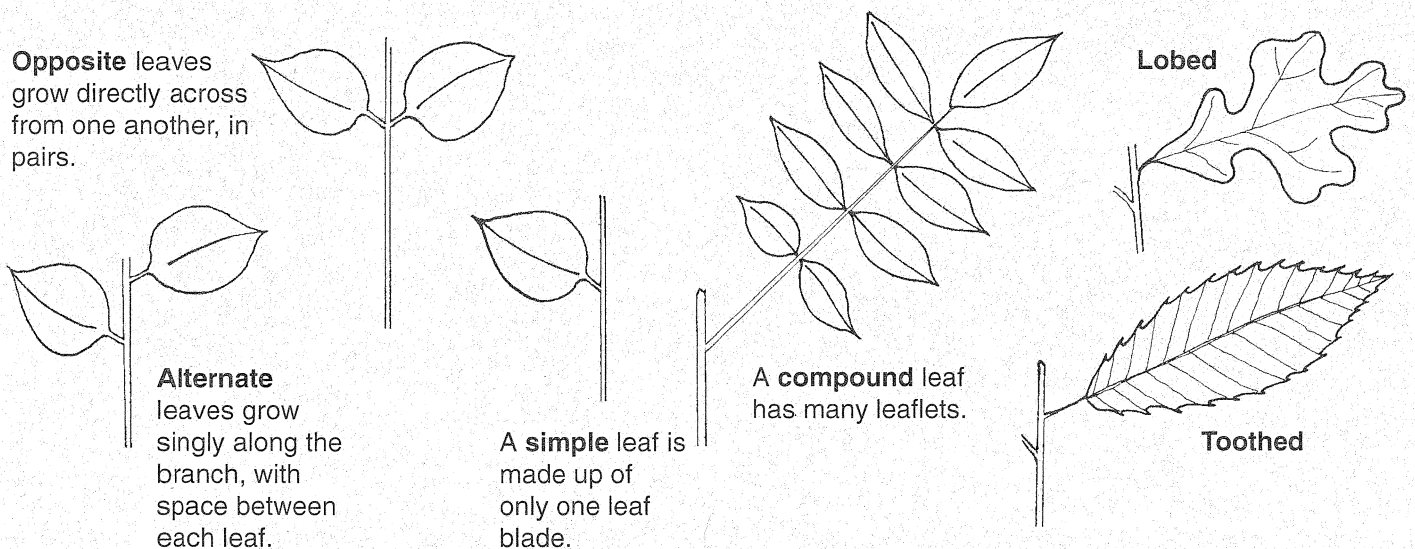
4. Leaves are **simple** ..... SILVER MAPLE
   Leaves are **compound.** Leaflets grow around the stem in a circle ....HORSE CHESTNUT

5. Leaves are **simple** ..... go to 6
   Leaves are **compound** ..... go to 8

6. Leaves are **lobed** ..... WHITE OAK
   Leaves are **toothed** ..... go to 7

7. Leaves are long and slender ..... WEEPING WILLOW
   Leaves are rounded ..... CHOKE CHERRY

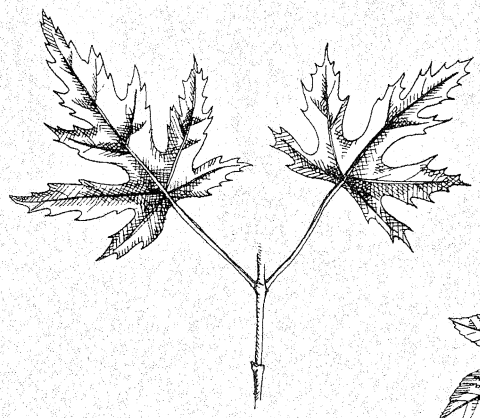
8. Branches have thorns ..... HONEY LOCUST
   Leaflets are **toothed** ..... BLACK WALNUT



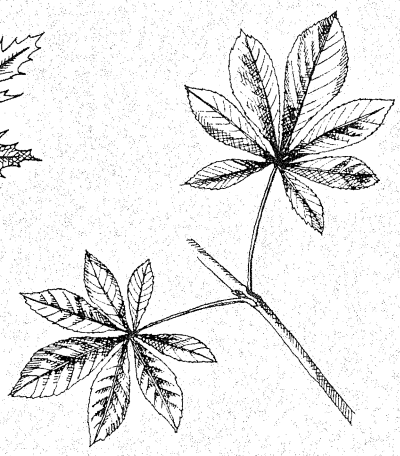
ACTIVITY SHEET 2H

KEYING OUT TREES

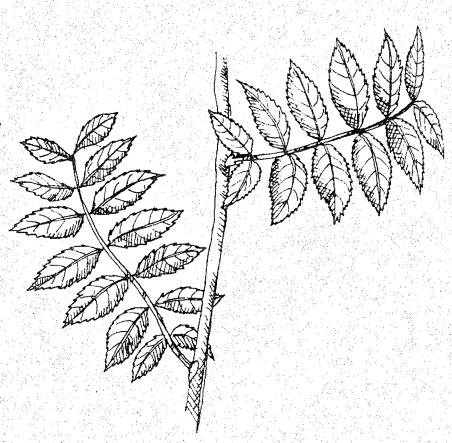
Use the key on Activity Sheet 2G to help you identify these leaves. See answers below.



1. _____



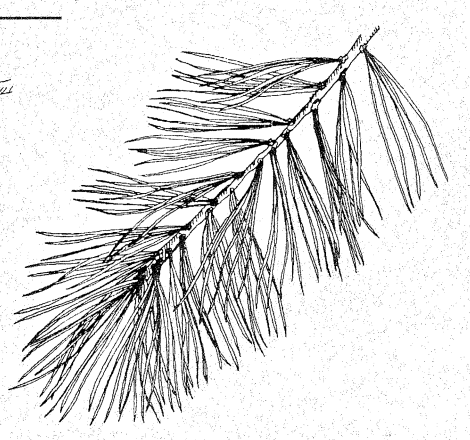
2. _____



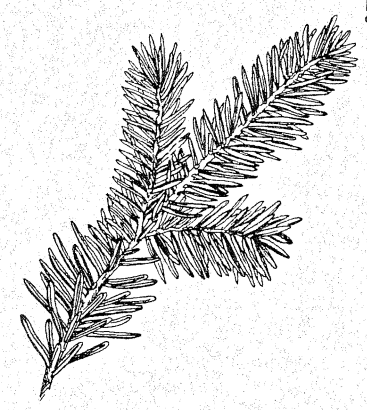
3. _____

4. _____

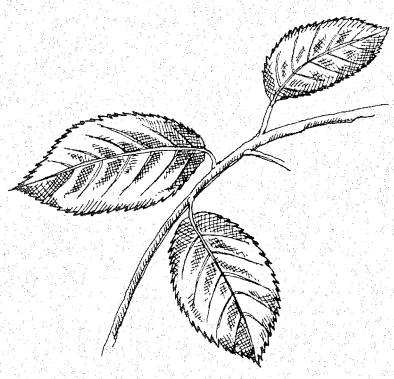
5. _____



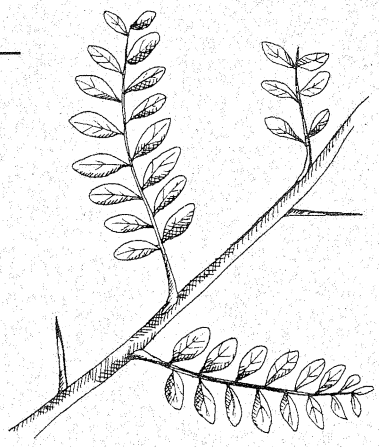
6. _____



7. _____



8. _____



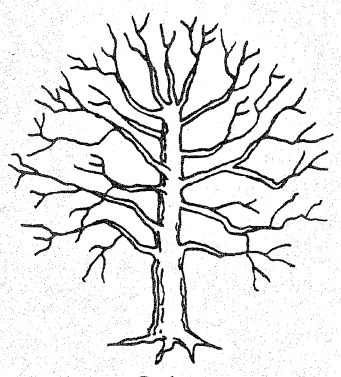
9. _____

Answers: 1. Silver Maple, 2. Horse Chestnut, 3. Black Walnut, 4. White Oak, 5. Weeping Willow, 6. White Pine, 7. Sitka Spruce, 8. Choke Cherry, 9. Honey Locust

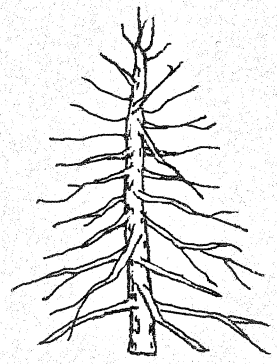
ACTIVITY SHEET 21

EXPLORE TREE SHAPES

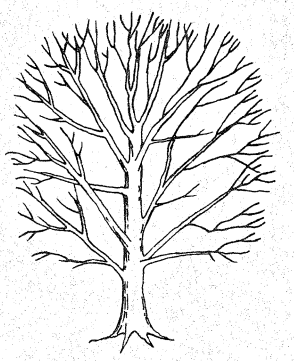
Cut out the shapes below and paste them on a tree that matches each shape.



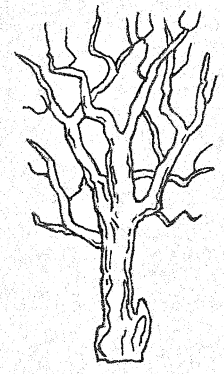
OAK



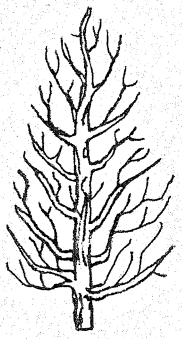
SPRUCE



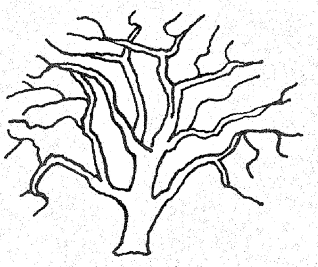
MAPLE



CYPRESS

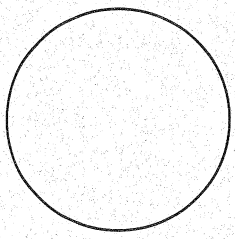


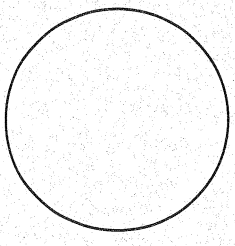
CEDAR



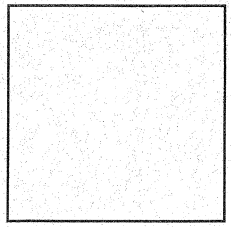
CRAB APPLE

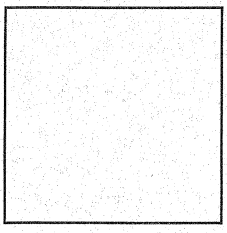
round



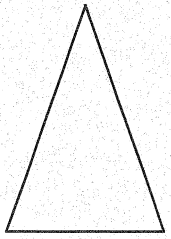


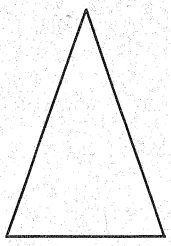
square





triangle





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ACTIVITY SHEET 2J

WHAT'S IN A FRUIT—SEED SEARCH

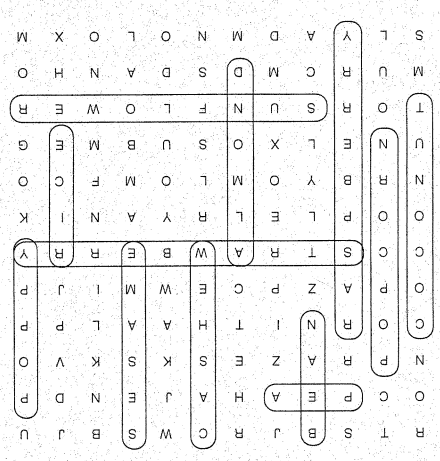
How many plants can you name whose seeds are often eaten by humans? Check out the puzzle below. Names are up and down and across. Did you find all 12?

R	T	S	B	J	R	C	W	S	B	J	U
O	C	P	E	A	H	A	J	E	N	D	P
N	P	R	A	Z	E	S	K	S	K	V	O
C	O	R	N	I	T	H	A	A	L	P	P
O	P	A	Z	P	C	E	W	M	I	J	P
C	C	S	T	R	A	W	B	E	R	R	Y
O	O	P	L	E	L	R	Y	A	N	I	K
N	R	B	Y	O	M	L	O	M	F	C	O
U	N	E	L	X	O	S	U	B	M	E	G
T	O	R	S	U	N	F	L	O	W	E	R
M	U	R	C	M	D	S	D	A	N	H	O
S	L	Y	A	D	M	N	O	L	O	X	M

Look for these seeds:

ALMOND	CASHEW	PEA	POPPY	RICE	STRAWBERRY
BEAN	COCONUT	POPCORN	RASPBERRY	SESAME	SUNFLOWER

Answers:



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