TIMBER!

The Science of Identifying Tress

Grades: 3-5

Background: Lumberjacks, like those your students will learn about during their virtual field trip to Central Michigan University's Museum of Cultural & Natural History, had to know their trees. This activity will allow your students to get to know the trees in their community.

Objective: Students will be able to recognize and identify several common trees in their community.

Source: The Arbor Day Foundation

Arbor Day Foundation®

Mystery Tree Challenge

Engage your students in learning the basics of tree identification using this fun, hands-on activity that, with some advance planning, can work in the classroom, any time of the year.

Classroom Activity Description:
Students will be introduced to basic terms in tree identification then be given a mystery tree sample which they will identify by following a series of clues posted around the room. This activity introduces the concept of classification in a way that addresses all learning styles. It works well for auditory, kinesthetic, and visual learners.

Grade level:
This activity works well for students from 4th grade through high school.

Objectives:
- Students will be able to recognize and identify several common trees in their community.

Classroom Time recommended:
- One 45 – 50 minute class period

Materials Needed:
- Tree samples (leaves and fruits/seeds) for identification
- Tree clue sheets #1-#45 (printed off from this web site)
- Scotch tape or tacks
- Mystery Tree Challenge Worksheet and pencil (one per child)

National Science Standard Correlation:
- Develop an understanding of diversity of organisms and structure
- Develop an understanding that structure can be used for identification
- Develop an understanding that the characteristics of an organism can be learned from the combination of its traits.

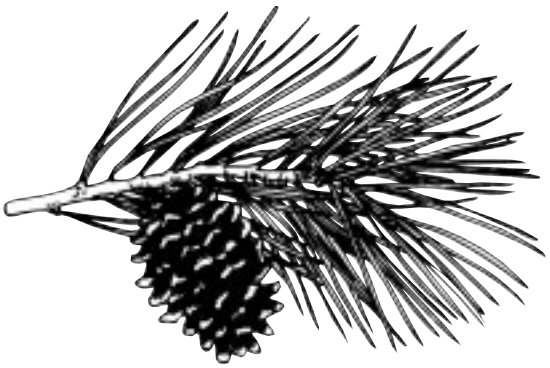
Advance Preparation:
Collect leaf and seed samples from common trees in your community or near your school. You may wish to collect samples of tree species included in “Tree Examples” list since this activity is written using these trees as models. If trees on this list are not found in your area you can select different tree species and use the existing framework to create your own clues specific to your tree samples. The National Arbor Day Foundation’s *What Tree Is That?* guide can help you identify your sample trees and aid you in creating your own clues specific to your tree samples. The *What Tree Is That?* guide is available online at www.arborday.org/trees/treeid.html.

This activity is designed for students to work in pairs so, for a class of 24 students, 12 leaf samples would be adequate. It is not necessary to have a sample of each tree on the "Tree Examples" list. Some seed and leaf samples can only be secured at certain times of the year. University extension personnel may be able to assist you with getting samples of the most common trees in your area.

Your samples should contain a good mix of common conifer and broadleaf trees. **Be sure in collecting the samples you get several leaves of each species still attached to the twig so students can determine if the leaves are simple or compound and if they have an opposite or alternate leaf arrangement.**

Put leaf samples between sheets of newspaper and put a weight on the paper for several days until the leaves are dry. Place leaf samples in sturdy, plastic page protectors with the seed/cone/fruit attached to the protector in a baggie. Even better are inexpensive, clear acrylic frames that will hold both leaf and seed samples together. These frames protect your samples so they can be used for years to come. Label each sample with a different letter.

TREE EXAMPLES LIST



This activity, as you received it, identifies the trees on this "Tree Examples" list. These trees are common to many areas in the United States. The basic tree classification structure is provided. Text that is specific to these example trees is indicated by a blue bar at the left margin. The activity will be very easy to follow by obtaining as many of the trees in this "Tree Examples" list as possible. If you would like to select different trees you may use the Foundation's *What Tree Is That?* guide at www.arborday.org/trees/treeid.html. to create your own clues specific to your tree samples. A listing of other tree options is included at the end of this "Tree Examples" list.

CONIFER EXAMPLES USED

1. Arborvitae
2. Eastern redcedar (juniper)
3. Colorado blue spruce *
4. Norway spruce *
5. Hemlock
6. Fir (Concolor/white Fir) **
7. Larch ***
8. Eastern white pine
9. Scotch pine

* Attach note, "square needle," to sample
**Attach note, "cone grows up," to sample
***Attach note, "deciduous needles," to sample
or include a summer & winter twig
****Attach note, "flowers large & showy," to sample

BROADLEAF EXAMPLES USED

1. Ash
2. Boxelder (ashleaf maple)
3. Ohio buckeye
4. Catalpa
5. Dogwood
6. Chestnut
7. Linden (Basswood)
8. Redbud
9. Magnolia****
10. Bur oak
11. Tuliptree (tulip-poplar or yellow-poplar)
12. Bitternut hickory
13. Honeylocust
14. Maple

TO REPLACE AN EXAMPLE WITH A DIFFERENT SAMPLE OF YOUR OWN..
If you wish to collect different tree samples from those listed above and, using this framework, create your own clues, you will need to replace a tree on the list with a tree from the same "clue grouping" or family of trees. Some possibilities are listed for you. You will also need to replace the marked text on the clue sheets with new clues specific to your sample. Such paragraphs are marked with a blue bar at the left, like this paragraph. (Example: If you replace Colorado blue spruce with a white spruce sample you will need to insert a descriptive clue for white spruce on clue sheet #11 and an identification of white spruce on clue sheet #14.) Clue ideas can be found at www.arborday.org/trees/treeid.html.

Clue sheet #5 – There are a number of conifers with scale-like or awl-shaped leaves. This activity uses arborvitae and eastern redcedar as examples. Other samples you might collect could include southern whitecedar, western redcedar, cypress, Port Orford-cedar, and incense-cedar. You would need to create appropriate clues on clue sheet #5 and identify your mystery samples on sheet(s) #**6** and/or #**7**.

Clue Sheet #10 - This activity uses hemlock and white fir as examples of conifers that have flat needles that attach singly to the twig. Other trees could include balsam fir, noble fir, red fir, subalpine fir, baldcypress, and douglasfir. You would need to create appropriate clues on clue sheet #10 and identify your mystery samples on sheet(s) #**12** and/or #**13**.

Clue Sheet #11 - There are many kinds of spruce. In addition to the Colorado blue spruce and Norway spruce listed in the activity, other common spruces include Sitka spruce, black spruce, white spruce, and red spruce, just to name a few. You would need to create appropriate clues on this sheet and identify your mystery samples on sheet(s) #**14** and/or #**15**.

Clue Sheet #17 – There are many species of pine. Eastern white pine and Scotch pine are the samples listed in the activity. Other common pines include pinyon pine, ponderosa pine, digger pine, Coulter pine, knobcone pine, Austrian pine, pitch pine, lodgepole pine, western white pine, sugar pine, longleaf pine, loblolly pine, slash pine, shortleaf pine, red pine, and Jack pine ...to name just a few! You would need to create appropriate clues on sheet #17 and identify your mystery samples on sheet(s) #**18** and/or #**19**.

Clue Sheet #26 - Ash and boxelder are listed in the activity. The other common tree with pinnately compound, opposite leaves is the elderberry. If you wish to switch elderberry for the ash or boxelder clue you would need to create appropriate clues on sheet #26 and identify your mystery sample on sheet #**28** or #**29**.

Clue Sheet #27 – The example listed in this activity is an Ohio Buckeye. Other samples could include yellow buckeye, California buckeye, and horsechestnut. If you have a sample for any of these other trees, just insert a new identification and description of that tree on this clue sheet.

Clue Sheet #31 - Trees that have simple, opposite non-lobed leaves include dogwoods and catalpa, which are listed in the activity. The desert-willow also has simple, opposite, unlobed leaves and could be substituted for either the dogwood or catalpa as an example. You would need to create appropriate clues on clue sheet #31 and identify the mystery sample on either sheet #**32** or #**33**.

Clue Sheet #36 – The chestnut and linden are just two examples of a wide variety of trees that have simple, alternate, non-lobed leaves with toothed (jagged edge) margins. Some other common trees that fit this description include holly, beech, certain oaks, aspen, poplar, mulberry, hackberry, alder, many elm species, birch, willow, many fruit trees, crabapple, hornbeam and hophornbeam ...to name just a few. You would need to create appropriate clues on sheet #36 and identify your mystery samples on sheet(s) **#38** and/or **#39**.

Clue Sheet # 37 – The redbud and magnolia used in this activity are just two examples of a wide variety of trees that have simple, alternate, non-lobed leaves with entire (smooth edged) margins. Some of these other common trees include Russian-olive, western redbud, Osage-orange, pawpaw, live oak, madrone, black tupelo, and persimmon ...to name just a few. You would need to create appropriate clues on sheet #37 and identify your mystery samples on sheet(s**) #40** and/or **#41**.

Clue Sheet # 42 – To arrive at this clue sheet you need to have a sample of an oak that has lobed leaves. The example used in this activity is bur oak, but a number of other oak species could be substituted on this sheet. Some other oaks that would follow this identification pattern would include black oak, white oak, Gambel oak, swamp white oak, northern red oak, post oak, overcup oak, English oak, scarlet oak, and pin oak ...to name just a few. To substitute a different oak sample (must have lobed leaves) simply change the last two sentences (printed in blue) of the identification description to best fit your new tree sample.

Clue Sheet #43 – The tuliptree used in this activity is just one example of a wide variety of broadleaf trees that have simple, alternate, lobed leaves but do not bear acorns (not in the oak family). Some other trees include ginkgo, tuliptree, sassafras, sweetgum, white poplar, sycamore, some hawthorns, and mulberry ...to name just a few. If you have a sample of any of these other trees, just insert a new identification and description of that tree on this clue sheet.

Clue Sheet #44 - The hickory is just one example of a wide variety of broadleaf trees that have pinnately compound, alternate leaves. Some of these trees include Japanese pagodatree, goldenraintree, black locust, tree-of-heaven, mountainash, walnut, pecan, hickory, tesota ...to name just a few. If you have a sample of any of these other trees, just insert a new identification and description of that tree on this clue sheet.

Clue Sheet #45 - The honeylocust sample is just one example of a wide variety of broadleaf trees that have bi-pinnately (two or three times) compound, alternate leaves. Some of these other trees include goldenraintree, mesquite, paloverde, Kentucky coffeetree, mimosa, and Jerusalem thorn ...to name just a few. If you have a sample of any of these other trees, just insert a new identification and description of that tree on this clue sheet.

https://www.arborday.org/programs/

Activity Directions:

Prior to the activity, tape or tack up the numbered clue sheets on the wall, putting them up around the room in numerical order from 1-45. Photocopy the Mystery Tree Challenge Worksheet.

Start the activity by introducing students to some of the necessary concepts they must have prior to trying to identify their mystery tree samples. Have some of the mystery tree samples on hand to serve as visual examples of these concepts. Have several examples of conifers, some with scale-like leaves and some with needle-like leaves. Have a number of examples of broadleaf trees, one that shows an opposite attachment to the twig, one that shows an alternate attachment to the twig, one that shows a compound leaf and one that shows a simple leaf.

Basic information - Explain to students that there is a scientific process scientists use to classify plants and animals. This process is called TAXONOMY. Taxonomy provides an organized system for grouping things based on certain "like" characteristics. When scientists classify trees they start by dividing trees into two main groups.

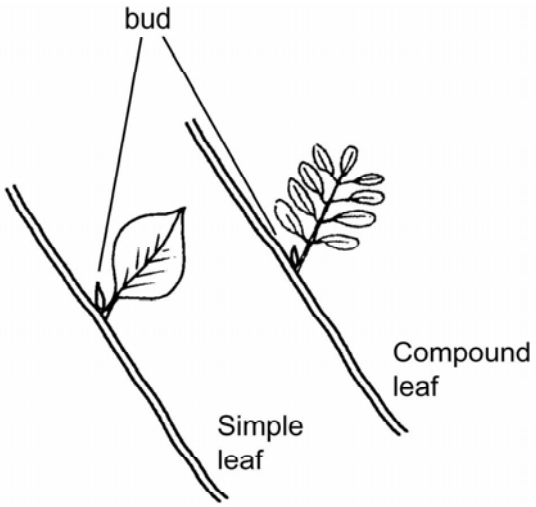
1. **CONIFERS** – Conifers are cone bearing trees and most are evergreen. Conifers have needle-like or scale-like leaves.
   A. Conifers with needle-like leaves – Tell students to closely examine a conifer sample with needle-like leaves. Have them look to see if each needle attaches singly to the twig or if the needles are attached to the twig in bundles of needles grouped together. Tell them this is one clue they may need to look for when identifying a mystery tree.
   B. Conifers with scale-like leaves – Have students look closely at a sample of a conifer that has scale-like leaves. Point out how the tiny, scale-like leaves overlap each other. Explain to students that some of these conifers may have cones that look more like small berries.

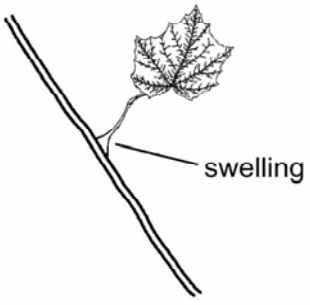
   Make sure students can distinguish between conifers with needle-like and scale-like leaves before proceeding to a discussion of broadleaf trees.

2. **BROADLEAF TREES** – Broadleaf trees have thin, flat leaves that are usually shed annually (deciduous). Broadleaf trees bear a variety of fruit and flowers.

   In the classification process of broadleaf trees, scientists look at two important clues to further separate these trees into groupings. Carefully explain to students that where the leaf stalk attaches to the twig there is usually a BUD. That bud is next year's leaf, already on the tree. The leaf will fall off, but the bud will remain on the twig through the winter, opening into a leaf the following spring. Point out that if a bud is not exposed or visible, look for a swelling at the base of the leaf to determine attachment. Tell students that the bud (or swelling) is an important clue...it tells them THE LEAF STARTS HERE!

   A. **Simple leaves OR Compound leaves** - One important reason to look for the bud is to determine if the tree has simple leaves or compound leaves. Draw sample pictures on the board to illustrate what students should look for. Tell students they should find the bud and then look at the leaf stalk (petiole). If there is just one blade on the leaf stalk, it is a SIMPLE LEAF. If there are many blades on the leaf stalk, it is a COMPOUND LEAF. Tell students that the multiple blades of the compound leaf are called LEAFLETS.





Examples of Simple leaves

Examples of Compound leaves

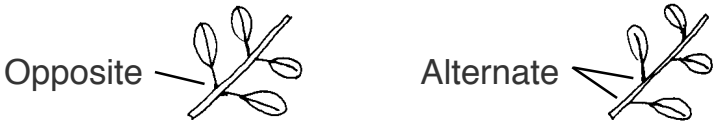
Pinnate (like a feather)

Bipinnate or twice compound (2 x like a feather)

Palmate (like a hand)

Also important for students to know is that the LEAFLETS of the compound leaves are attached to the leaf stalk (not the twig) in several ways. When leaflets are attached across from each other on the leaf stalk in a pattern that resembles a feather, that leaf is referred to as a PINNATELY COMPOUND LEAF. If the leaf stalk comes up and branches out again giving the appearance of a number of feathers attached to the leaf stalk, that leaf is referred to as a BIPINNATELY or TWICE COMPOUND LEAF. If the leaflets are arranged on the leaf stalk in a pattern that looks like the fingers on the palm of a hand, that leaf is referred to as a PALMATELY COMPOUND LEAF.

B. Opposite Arrangement OR Alternate Arrangement – Another very important reason for students to look for the bud or swelling where the leaf stalk attaches to the twig is that it will also help them determine the ARRANGEMENT of the leaves on the twig. When two or three leaves are arranged directly across from each other on the twig it is called an OPPOSITE ARRANGEMENT. When leaves stagger up the twig and are <u>not</u> located directly across from each other on the twig that is called an ALTERNATE ARRANGEMENT. **It is VERY important to stress to students that opposite and alternate arrangement refers to the way the <u>LEAVES</u> are arranged on the TWIG, <u>not</u> the way the leaflets are arranged on the leaf stalk.**



Encourage students to closely examine the leaf attachment. Sometimes many buds will be clustered close together near the end of the twig giving the impression of being opposite (often common with oaks) but if students look down a little further on the twig they will see that these buds or leaves actually have an alternate arrangement.

C. Margin – The MARGIN of a leaf is the leaf edge. Some broadleaf trees have leaves with smooth edges or ENTIRE MARGINS. Some broadleaf trees have LOBED LEAVES, leaves with projections that shape the edge of the leaf. Some broadleaf trees have TOOTHED MARGINS characterized by a saw-like edge on the leaf.

https://www.arborday.org/programs/

Mention to students that many other factors are important in tree identification. Other things scientists look at are the bark, the seeds/fruits, the shape of the tree, and the shape of the leaf. Once you have reviewed the basic information with your students and you are confident they understand the terms they will need to know to answer the classification questions it is time to begin the activity.

Divide students into pairs. Give each pair of students a mystery tree sample and a worksheet. All students will start at clue sheet #1 with their mystery tree sample in hand. (If you have a large class, you may need to stagger the starting time for some groups of students.) Instruct students to read the two questions on clue sheet #1. Students must decide which question best describes their mystery sample, and **follow the "GO TO" directions for that question, proceeding to whatever clue sheet number is indicated by the best question**. By repeating this process and physically moving to each new clue sheet indicated by the GO TO number, the GO TO directions will eventually lead the students to the identification of their mystery tree. Have students identify as many samples as time permits.

NOTE: This hands-on activity is not designed to replace direct observation and identification of living trees. It merely offers a great introduction to the classification process. When time and weather permit, get your students outside exploring the world of trees on their school grounds or in their community. Once your students have the basic skill and the enthusiasm for tree identification this can lead to the use of a more detailed dichotomous tree key or field guide like *What Tree is That?* (For ordering information visit the web site at arborday.org)

GLOSSARY

Alternate – leaves that are staggered, not placed directly across from each other on the twig.
Blade – The flat part of a leaf or leaflet, characteristic of broadleaf trees.
Bract – a modified leaf that bears a flower/seeds.
Broadleaf – a tree with leaves that are flat and thin, and generally shed annually.
Compound leaf – A leaf with more than one blade. All blades are attached to a single leaf stem. Where the leaf stem attaches to the twig, there is a bud.
Conifer – a cone bearing tree.
Deciduous – shedding all leaves annually.
Entire – a leaf margin with smooth, untoothed edges.
Evergreen – trees with needles or leaves that remain alive an on the tree through the winter and into the next growing season.
Lobes – projections that shape the edge of a leaf.
Margin – the edge of a leaf.
Opposite – 2 or 3 leaves that are directly across from each other on the same twig.
Palmate – arranged like fingers on the palm of a hand.
Petiole – the leafstalk that connects the blade(s) to the twig.
Pinnate – arranged like the vanes of a feather.
Samara – winged fruit
Simple leaf – a single leaf blade with a bud at the base of the leaf stem.
Teeth – saw-like notches on the outer edge of a leaf.

Mystery Tree Challenge Student Worksheet

Student name(s): _____

Directions: It is your challenge to identify as many different mystery leaf samples as possible. Each mystery leaf sample is marked with a different letter. Write the letter of your mystery leaf sample in the left-hand column of this worksheet. Then go to clue sheet Number 1 posted on the wall. Read the two clue questions. Which one best describes your mystery leaf sample? Follow the "GO TO" directions of the question most correctly answered yes, moving to next clue sheet indicated. By repeating this process and moving to correct clue sheets, you will eventually identify your mystery sample. Record each clue sheet number as you proceed. When you have identified your mystery sample record the name of the tree you have identified in the space provided on the worksheet. See how many samples you can identify!

Example:

Mystery Leaf sample	These are the clue sheets I went to, in order (Always start at #1)	This is my mystery tree
Sample Z	#1 → #3 → #4 → #9 → #17 → #18	White Pine

Mystery Leaf sample	These are the clue sheets I went to, in order (Always start at #1)	This is my mystery tree

1

Start Here

Do you have a....

BROADLEAF (tree with leaves that are thin, flat & usually shed annually)?
If so, GO TO #**2**.

Broadleaf

OR

CONIFER (tree that bears cones and has needle-like or scale-like leaves)?
If so, GO TO #**3**.

Conifer
Needle-like

Conifer
Scale-like

2

Are the leaves SIMPLE (one blade attached to the leaf stalk or petiole)? If so, GO TO #**20**.

Simple — 1 Blade

OR

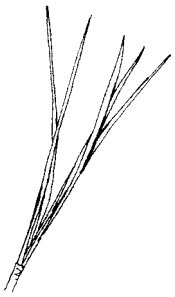
Are the leaves COMPOUND (more than one blade attached to the leaf stalk or petiole)? If so, GO TO #**21**.

Compound — Many Blades (or leaflets)

3

Does the conifer have...

NEEDLE-LIKE LEAVES? If so, GO TO #**4**.



OR

SCALE-LIKE or AWL-SHAPED LEAVES?
If so, GO TO #**5**.

4

Are the needles attached...

SINGLY, each needle attached directly to the twig?
If so, GO TO #**8**.

OR

In BUNDLES OR CLUSTERS of needles?
If so, GO TO #**9**.

5

Does your mystery sample have blue, berry-like cones with both scale-like & awl-shaped leaves? If so, GO TO #**6**.

OR

Does your mystery sample have scale-like leaves in a flattened fern-like spray? If so, GO TO #**7**.

You have a **JUNIPER** or **EASTERN REDCEDAR**. The wood of this tree is especially noted for its ability to resist the effects of moisture. The wood is also notable for its fragrance and it is often used in cedar chests. The berries are eaten by many kinds of birds. These trees are often called cedars, however they are not true cedars.

(The Juniper is just one of a number of conifers with scale-like or awl-shaped leaves.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

7

You have an **EASTERN ARBORVITAE** or **NORTHERN WHITECEDAR**. This is one of the most easily recognized of the evergreens because of its flattened, fern-like branches.

(The Arborvitae is just one of a number of conifers with scale-like or awl-shaped leaves.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

Are the needles FLAT? If so, GO TO #**10**.

OR

Are the needles SQUARE or 4-SIDED? If so, GO TO #**11**.

Does your tree have...

Soft, DECIDUOUS needles growing in clusters of many needles? (These needles that are shed in the fall)
If so, GO TO #**16**.

OR

EVERGREEN needles that grow in bundles of 2-5? These needles stay on the twig through the winter)
If so, GO TO #**17**.

10

Does your sample have short needles, less than 1" long, and a small cone that hangs down? If so, GO TO #**12**.

OR

Does your sample have needles over an inch long with cones that grow upward? If so, GO TO #**13**..

11

(These are spruce trees. Most spruce have 4-sided, stiff, sharp-pointed needles.)

> Does your spruce sample have blue-green or silvery blue needles with a cone that is 2"-4" long? If so, GO TO #**14**.

OR

> Does your spruce sample have a dark green needles and a cone that is 4"-8" long? If so, GO TO #**15**.

12

You have a **HEMLOCK**. Its needles are arranged in flattened sprays along the twig. Native Americans and early settlers valued the hemlock for the tannin in its bark which was used to tan leather.

(The hemlock is just one of several kinds of conifers that have flat needles. Others include fir, douglasfir, and baldcypress.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

13

You have a **FIR**. Your mystery sample is a **WHITE FIR** or **CONCOLOR FIR**. White fir do not begin producing cones or seeds until the tree is about 40 years old. The white fir makes a beautiful Christmas tree and it is important to many species of wildlife.

(The fir is just one of several kinds of conifers that have flat needles. Others include hemlock, douglasfir, and baldcypress.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

14

You have a **COLORADO BLUE SPRUCE.** Because of its beautiful blue-green needles and adaptability to different soils and climates, the Colorado blue spruce is one of the most popular evergreens for ornamental planting.

(This is just one of a number of spruce species in the United States.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

15

You have a **NORWAY SPRUCE.** These trees are easily recognized by their drooping branches. They have rapid, symmetrical growth and keep foliage on the lower as well as upper branches, making it a popular conifer for planting.

(This is just one of a number of spruce species in the United States.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

16

You have a **LARCH**. Larches have their needles in clusters of many needles. These soft, needle-like leaves are shed each year in the fall so the tree appears bare, except for the cones, through the winter. There are many larch species including the Tamarack (eastern larch), western larch, European larch, and subalpine larch.

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

17

(These are **PINE** trees. Pines are evergreen conifers that grow their needle-like leaves in bundles.)

Does your tree have needles held in BUNDLES OF 5?
If so, GO TO #**18**.

OR

Does your tree have needles held in BUNDLES OF 2?
If so, GO TO #**19**.

18

You have an **EASTERN WHITE PINE**. White pine have needles that grow in bundles of 5's and their cones are long with thin scales. Towering white pines were used as masts for ships in Colonial America. It is believed that J. Sterling Morton was the first person to plant eastern white pine in Nebraska.

(There are many species of pine. Your eastern white pine sample represents just one of the many kinds of pines found in the United States.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

19

You have a **SCOTCH (or SCOTS) PINE**. This species of pine is widely planted for Christmas trees. While it is an adaptable tree, it is vulnerable to disease.

(There are many species of pine. Your Scotch pine sample represents just one of the many kinds of pines found in the United States.)

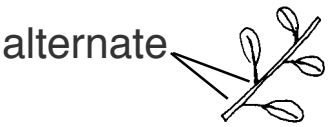
Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

20

Do the SIMPLE leaves have an OPPOSITE arrangement? (Leaves located directly across from each other on the same twig.) If so, GO TO #**22**.

OR

Do the SIMPLE leaves have an ALTERNATE arrangement? (Leaves that are staggered, not located directly across from each other on the same twig.)
If so, GO TO #**23**.



21

Do the COMPOUND leaves have an OPPOSITE arrangement?

(Leaves located directly across from each other on the same twig.)*

If so, GO TO #**24**.

OR

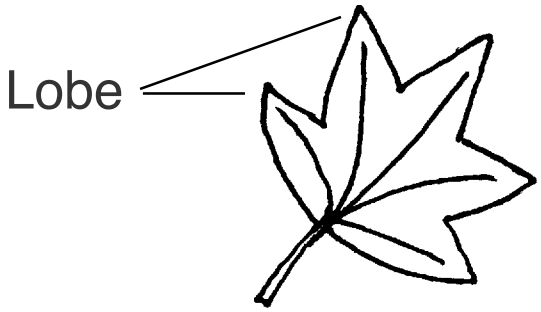
Do the COMPOUND leaves have an ALTERNATE arrangement? (Leaves staggered, not located directly across from each other on the same twig.)*

If so, GO TO #**25.**

**Remember to look at how the leaves, <u>not</u> the leaflets, are arranged on the leaf stalk.*

22

Are the simple, opposite leaves LOBED?
If so, GO TO #**30**.

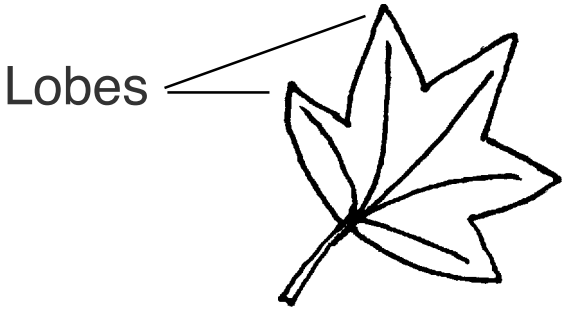


OR

Are the simple, opposite leaves NOT LOBED?
If so, GO TO #**31**.

23

Are the simple, alternate leaves LOBED? (Lobes are projections that shape a leaf) If so, GO TO #**34**.



OR

Are the simple, alternate leaves NOT LOBED?
If so, GO TO #**35**.

24

Are the leaves PINNATELY COMPOUND (with blades or leaflets arranged like vanes of a feather)?
If so, GO TO #**26**..

Pinnately compound

once compound

twice compound

OR

Are the leaves PALMATELY COMPOUND (with blades or leaflets arranged like fingers on the palm of a hand)?
If so, GO TO #**27**.

Palmately compound

25

Are the leaves only ONCE PINNATELY COMPOUND?
If so, GO TO #**44**.

OR

Are the leaves TWO OR THREE TIMES PINNATELY COMPOUND (sometime once compound)?
If so, GO TO #**45**.

26

Are there generally 3-5 BLADES that are LOBED or very coarsely toothed, and is the fruit a double SAMARA (winged seed)? If so, GO TO #**29**.

OR

Are there generally 5-13 BLADES that are NOT LOBED, and is the fruit a single SAMARA (winged seed)?
If so, GO TO #**28**.

27

Your sample is an **OHIO BUCKEYE**. These trees have nut-like seeds that are shiny and dark brown with a light-colored spot that gives them the appearance of a deer's eye, which gave rise to the buckeye name. While these seeds are poisonous if eaten, they were popularly believed to bring good luck when carried in a pocket.

(Other common trees with PALMATELY COMPOUND leaves include other buckeye species and the horsechestnut.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

28

You have an **ASH**. There are a number of species of ash in the United States including green ash, white ash, and blue ash. Ash wood is hard and durable; it is often used for tool handles and for baseball bats.

(Boxelder and elderberry are other common trees that have pinnately compound, opposite leaves.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

29

You have a **BOXELDER**, also called **ASHLEAF MAPLE**. This tree is really a maple, but it resembles an ash because of its opposite, compound leaves. The weak wood of the boxelder makes it of little use to the lumber industry, but its seeds that appear in the spring are eaten by a variety of wildlife.

(Ash and elderberry are other common trees that have pinnately compound, opposite leaves.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

30

These are **MAPLE** trees. Maples have winged seeds, called SAMARAS, that flutter to the ground like little helicopters. Maples usually have lovely fall color. The wood of the maple is prized for its strength and beauty. A number of different maple species can be found in the United States.

Samara – 

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

31

Does your tree have LARGE, HEART-SHAPED LEAVES and a long BEAN-LIKE SEED POD? If so, GO TO #**32**.

OR

Does your tree have leaves with veins that follow the leaf edge and a BERRY-LIKE FRUIT? If so, GO TO #**33**.

32

You have a **CATALPA**. Catalpa trees have showy blossoms in early summer that are succeeded by long, slender pods, which make the trees easy to identify in the fall.

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

33

You have a **DOGWOOD**. Many species of dogwood are planted as ornamental trees because of their lovely spring flowers. In the fall these trees have berries that are food for woodland birds. In the winter dogwood trees can be identified by the little button-like buds on the twig.

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

34

Is the seed or fruit an ACORN in a cap? If so, go to #**42**.

OR

Is the seed or fruit NOT an ACORN? If so, go to #**43**.

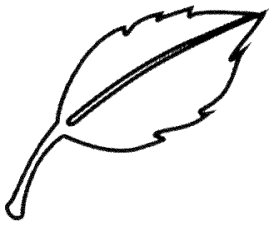
35

Are the LEAF MARGINS ENTIRE (SMOOTH EDGED)?
If so, GO TO #**37**.

Entire margin
(smooth, edge)

OR

Are the LEAF MARGINS TOOTHED (JAGGED EDGED)?
If so, GO TO # **36**.



Toothed margin
(jagged edge)

36

Are the LEAVES LONG with SHARP TEETH and is the fruit a NUT in a SPINY CAP? If so, GO TO #**38**.

OR

Are the LEAVES HEART-SHAPED and is the fruit a few BERRY-LIKE SEEDS attached to a leaf-like bract?
If so, GO TO #**39**.

37

Are the leaves heart-shaped, is the fruit a small pod and are the spring blooms purple? If so, GO TO #**40**.

OR

Are the leaves oval shaped, are the flowers large and showy, and do the flowers grow at the branch tips? If so, GO TO #**41**.

38

You have a **CHESTNUT**. The American Chestnut was once widely planted, but American chestnuts have been damaged by blight. The Chinese chestnut is more blight resistant and more commonly found.

(Your chestnut sample is just one example of a wide variety of trees that have simple, alternate, non-lobed leaves with toothed (jagged edge) margins. Some of these trees include holly, beech, certain oaks, aspen, linden, poplar, mulberry, hackberry, linden, alder, many elm species, birch, willow, many fruit trees, crabapple, hornbeam and hophornbeam...to name just a few.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

39

You have a **LINDEN** or **BASSWOOD**. These tall, stately trees make attractive street trees. The lightweight, soft wood is often used for carving.

(Your linden sample is just one example of a wide variety of trees that have simple, alternate, non-lobed leaves with toothed (jagged edge) margins. Some of these trees include chestnut, holly, beech, certain oaks, aspen, linden, poplar, mulberry, hackberry, linden, alder, many elm species, birch, willow, many fruit trees, crabapple, hornbeam and hophornbeam...to name just a few.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

40

You have an **EASTERN REDBUD**. These small trees welcome spring with a burst of vivid purple color. These trees grow well in a shaded location.

(Your eastern redbud sample is just one example of a wide variety of trees that have simple, alternate, non-lobed leaves with entire (smooth edged) margins. Some of these trees include magnolia, Russian-olive, redbud, Osage-orange, pawpaw, magnolia, live oak, madrone, black tupelo, and persimmon...to name just a few.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

41

You have a **MAGNOLIA**. Throughout American history, the beauty of the magnolia has made it a popular tree for planting.

(Your magnolia sample is just one example of a wide variety of trees that have simple, alternate, non-lobed leaves with entire (smooth edged) margins. Some of these trees include redbud, Russian-olive, redbud, Osage-orange, pawpaw, magnolia, live oak, madrone, black tupelo, and persimmon...to name just a few.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

42

These are **OAK** trees. 58 species of oak are native to North America. Some oaks do not have lobed leaves, but all oaks bear acorns. Its amazing strength, beauty and long life have made the oak a central part of American history.

> Your sample is a **BUR OAK**. These broad spreading trees have fuzzy capped acorns that help identify this hardy tree.
>
> (Other examples of broadleaf trees with simple, alternate, lobed leaves include ginkgo, tuliptree, sassafras, sweetgum, sycamore, hawthorns, and mulberry.)

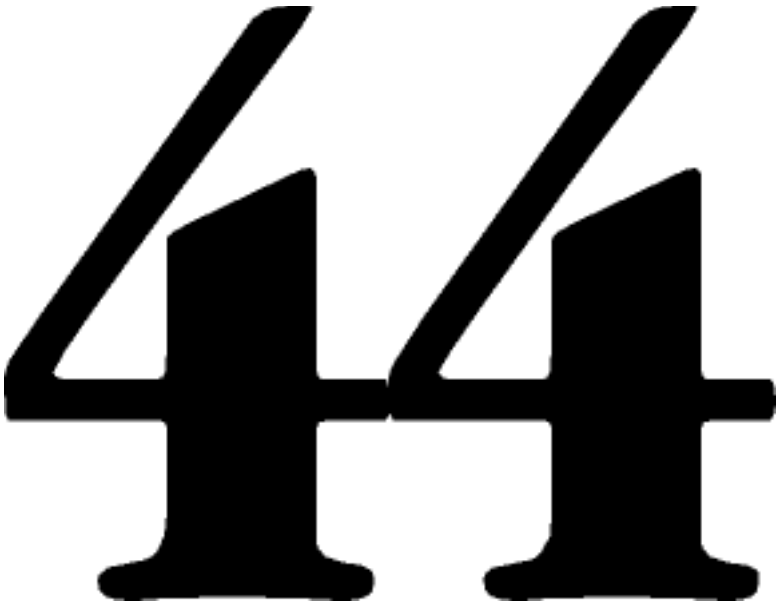
Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

43

Your tree sample is a **TULIPTREE**, also called **TULIP-POPLAR** or **YELLOW POPLAR**. Not only an important timber tree, the tuliptree is prized for its beautiful, yellow-orange, tulip-like blossoms that appear in early summer. Its leaves have a T-shirt shape and its winged seeds grow in an upright cone-like container.

(Other examples of broadleaf trees with simple, alternate, lobed leaves include ginkgo, sassafras, sweetgum, sycamore, hawthorns, oaks and mulberry.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.



Your sample is a **BITTERNUT HICKORY**. The nut of this tree is so bitter even a half-starved squirrel often passes it up.

(Hickory trees are just one example of the wide variety of broadleaf trees that have pinnately compound, alternate leaves including Japanese pagodatree, goldenraintree, locust, honeylocust, tree-of-heaven, mountainash, walnut, pecan, hickory, tesota ...to name just a few.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

45

You have a **HONEYLOCUST**. These trees have a long, brown, leathery pod with seeds inside about the size of watermelon seeds. In the wild these trees have hard, sharp thorns. Thornless honeylocusts are available that make a beautiful, hardy city tree.

(Your honeylocust sample is just one example of a wide variety of broadleaf trees that have bi-pinnately (two or three times) compound, alternate leaves. Some of these other trees include goldenraintree, mesquite, paloverde, Kentucky coffeetree, mimosa, and Jerusalem thorn...to name just a few.)

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

If you choose to replace any or all of the optional trees, you may use the following replacement pages to post your clues.

REPLACEMENT PAGES

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

10

11

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

13

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

15

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

17

18

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

19

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

26

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

28

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

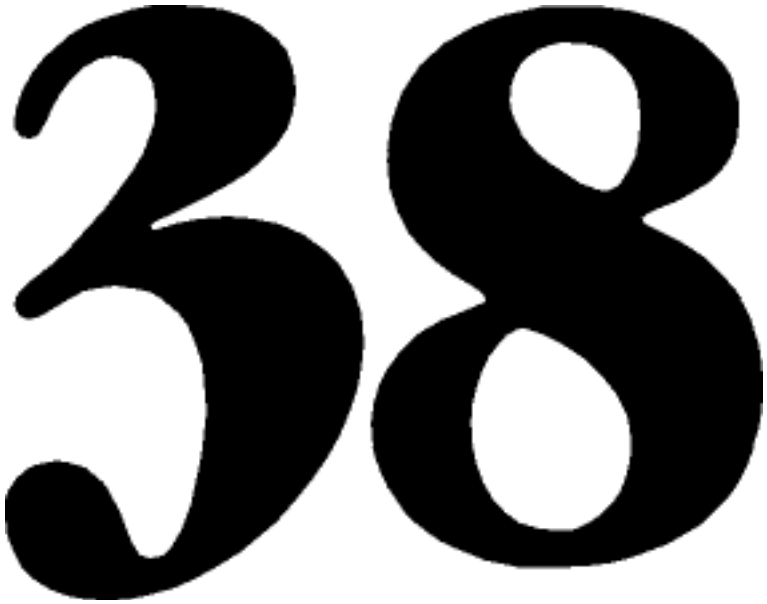
31

32

Please take your tree sample to your teacher and he/she will let you know if you have correctly identified your mystery tree.

36

37



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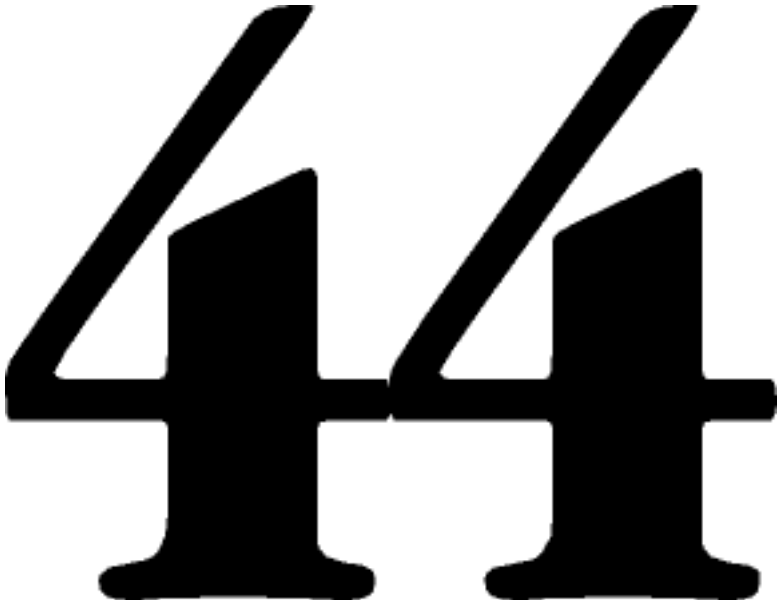

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