

Things To Remember When You Visit

- For your safety, the safety of others, and of the collection, please keep your hands to yourself.
- Do not touch artifacts or plants unless told you may.
- Walk, do not run.
- Please use appropriate voice levels.
- Stay with your group.
- Follow any extra rules that your Museum Instructor provides.

Vocabulary:

Use these words in class discussion, in lab reports, or in experiments!

- **Dendrology:** the study of woody plants.
- **Evolution:** a change in the gene pool from generation to generation by processes like mutation, natural selection, and genetic drift.
- **Silviculture:** the practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.
- **Mensuration:** the measuring of geometric magnitudes, lengths, areas, and volumes.
- **Forester:** the person in charge of a forest or skilled in planting, managing, or caring for trees.
- **Friction:** the resistance that one surface or object encounters when moving over another.



Keep Calm and Forest On

During this program, students will practice tree identification and math skills while learning professional techniques to measure forests. Working in small groups, they will estimate tree height using different methods and tools as well as determine the relationship between circumference, growth rate, and tree age. Groups will chart and share their findings then draw conclusions on forest management and the need for conservation.

Sizing Up Trees is an outdoor discovery workshop:

Please dress appropriately for outdoor weather. Sneakers are encouraged. Bug spray and sun screen should be applied seasonally.

Activities:

Create a class identification guide for different trees around your school. Assign one species of tree per student and challenge them to go outside to find their trees. Using the tree identification tips on the following page, the students should observe and record their assigned trees' defining characteristics for inclusion in the guide. Add in pictures, leaf rubbings, diagrams, and bark impressions to personalize the pages.

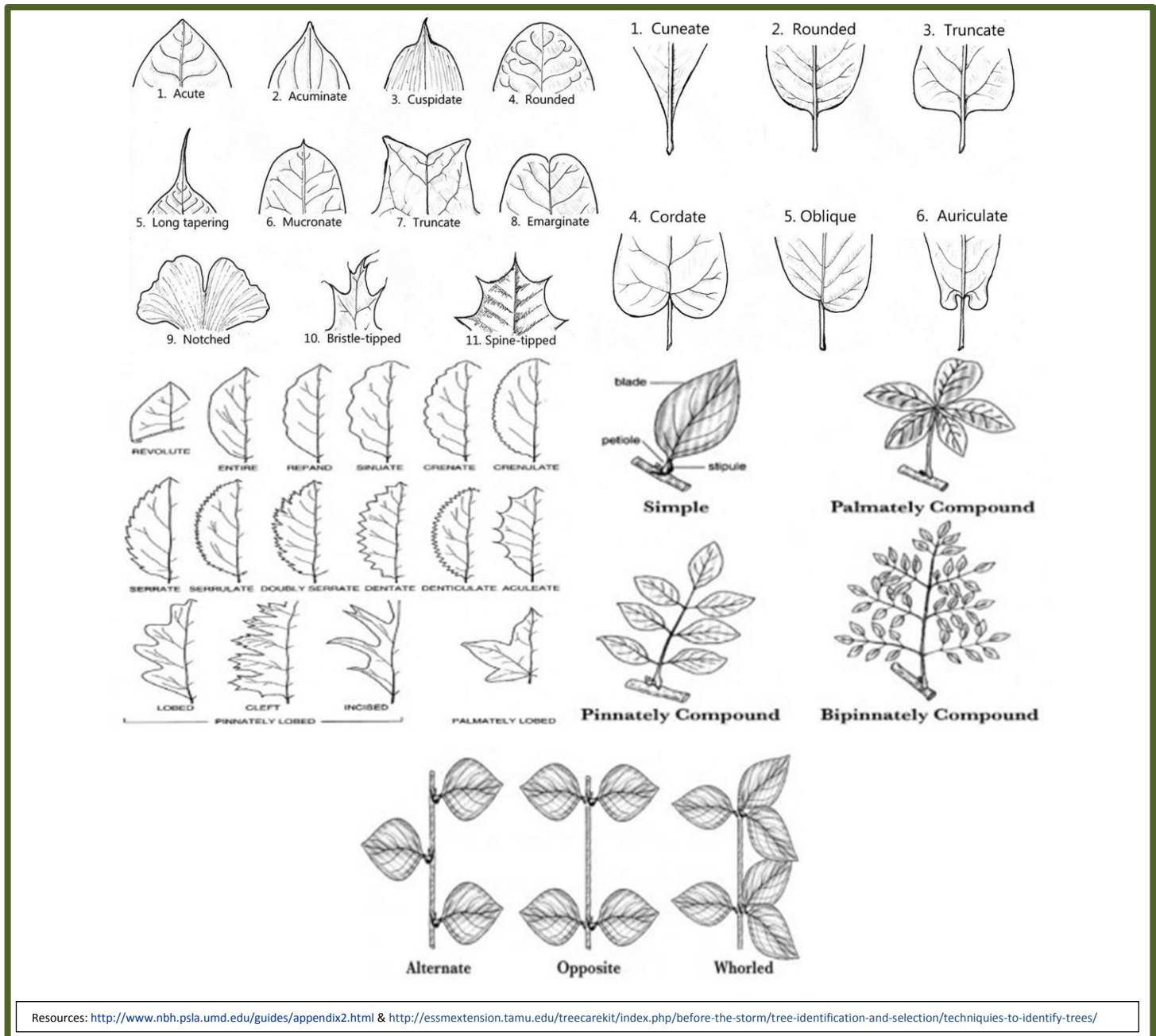
Media Release: Have students research different types of forest conservation efforts currently occurring in the United States. To creatively demonstrate their findings, students can create a comic strip, annotate a picture, create an advertisement, or write a newspaper article to share with the rest of the class.

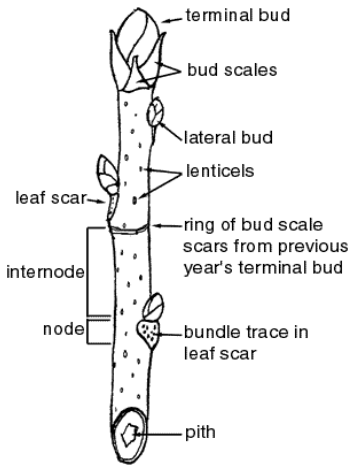
Math: Work on some forest word problems that utilize the Pythagorean Theorem. Here is one to start you off: A 20-foot fir tree must be staked to prevent the wind from blowing it over. The base of the tree is clogged with small shrubs, so to avoid them, the stake must be set three feet from the base of the tree. How much rope is required to support the tree if the rope is tied to the stake and around the trunk of the tree 15 feet from the ground? Illustrate and solve.

Tree Identification Tips

Tree Type: There are two basic kinds of trees: coniferous and deciduous. Conifers usually have needle-shaped leaves that do not drop in the colder seasons; therefore, they remain green year-round and are sometimes known as evergreens. Deciduous trees tend to have broad, flat leaves that are lost every fall after changing color.

Leaves: Leaves come in all shapes and sizes, and these differences can help you determine a tree's identity. Just as every human has a unique fingerprint, every tree species has a unique leaf shape. Some characteristics to look for in the leaves are: shape (tips, bottoms, and margins), styles, arrangements, textures, colors, sizes, etc.





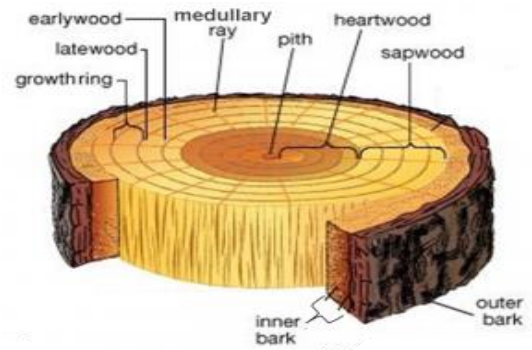
<http://www.clemson.edu/extfor/publications/bul117/characteristics.htm>

Twigs: Even leafless trees leave clues to their identity. By the time a tree's leaves drop, its leaves for next spring are formed. Tiny leaves, stems, and sometimes flowers are located on the twigs in packages or buds. These buds are made of tough scales that form a waterproof case around the miniature tree parts until the temperature is warm enough for them to survive and flourish. The arrangement of the buds, as well as size, color, and shape can help determine a tree's identity. Some trees also have spines or thorns that can help identify it.

Bark: Bark comes in many shades, textures, and thicknesses; think of it like your fingernails. Bark can be shaggy, smooth, or rough; it may have deep markings or furrows. It is best to look at bark growing on the trunk rather than branches because it will

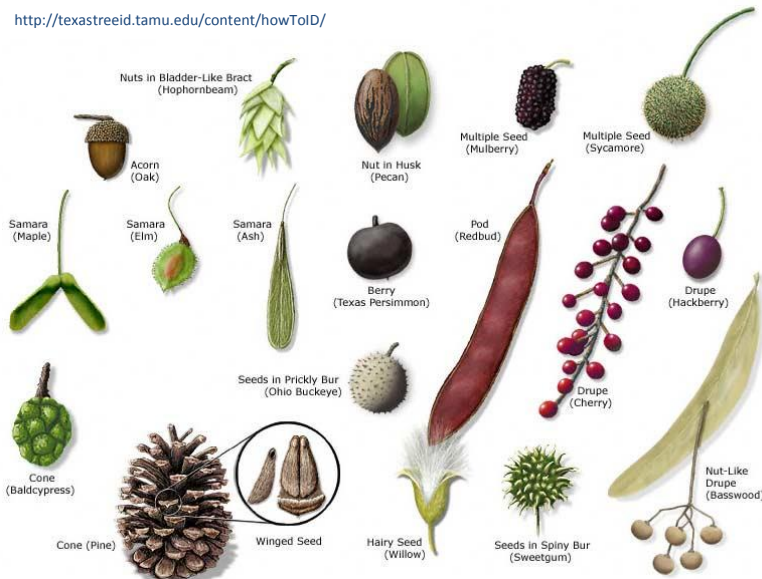
give a better indication of the tree's true age; the older the tree, the darker the bark. Bark on branches tends to be thinner and lighter.

<https://www.woodstairs.com/tradepage/how-to-evaluate-wood/tree-diagram/>



Seeds: A seed is a fertilized plant egg. In general, seeds develop within a plant's flower after being pollinated. In order to germinate, the seed needs certain growing conditions- the right amounts of sunlight, air, water and nutrients. Many times the seeds of deciduous trees are protected in a fleshy tissue known as fruit. Coniferous trees tend to produce cones that are hard and sometimes prickly to protect their seeds.

<http://texastreeid.tamu.edu/content/howToID/>

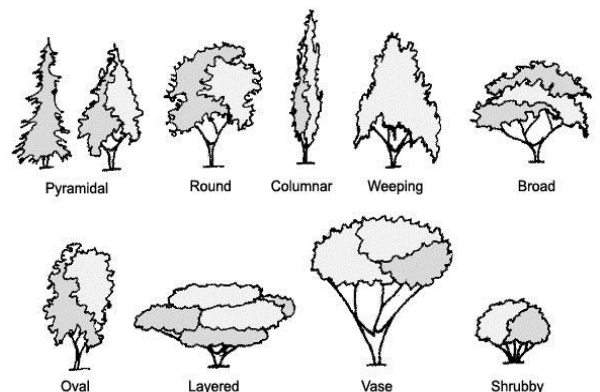


Cones: Every evergreen produces its own type of cone; the shape, size, and texture help reveal its identity.

Fruit: Certain trees produce specific types of fruit, such as apples, oranges, berries, nuts, etc.

Flowers: The shape, texture, color, size, and markings of a tree's bloom will help to identify its species.

Shape: Many trees have a characteristic shape that can be used to identify them from afar. Some trees are tall and thin (like birch), some have wide flat leaves (palm), some droop (weeping willow), and some are triangular in shape (fir) to name a few.



<http://www.ratomodeling.com/articles/base1/base1.html>

Fun Facts

The world’s oldest and most massive tree is the giant sequoia. Some sequoias are over 3000 years old and can grow to be more than 250 ft. tall and 20 ft. in diameter!

Interdisciplinary connections

Math: A tree grows 4 cm a year. This relationship can be modeled by a linear function that shows the number of centimeters grown as a function of time in terms of months. Find the rate of change, slope, and intersection points then graph the function.

Science: Your climb through the trees was filled with physics forces such as gravity, inertia, and friction. Do some research on how these forces affected your motion through the trees. Then tackle some word problems to see how force is related to mass and acceleration ($F=m*a$). Try this one to start: A student with a mass of 50 kg is moving with an acceleration of 5 m/sec^2 . Calculate the force that will act on the student.

History: Have students draw a life size cross-section of a tree from around the school. Make sure the appropriate number of growth rings are present, varying widths of 2-4 rings per inch. Have the students research possible significant events in the tree’s life along with important historical events that coincided with its lifetime.

Reflecting on Your Visit:

Land Management: Turn your students into land managers of a 100 acre forest. Discuss what types of activities that take place on forest land; which conflict with each other? Which are the most cost-effective? Which have the greatest impact on the ecosystem? Which are meeting a need in the community? Break the class into groups and have each develop a land management plan that they believe will serve the best interests of the entire ecosystem. Share each plan and debate the positives and negatives; then vote for the plan most suited.



Adopt A Tree: Now that your students understand more about individual trees, have them go out and pick one for extended observation. Provide students with a journal where they can record information on their tree, such as location, type of tree, health and size measurements, details on leaves and bark, types of animals it supports, and seasonal changes. Make sure students also document their tree through drawings, photos, poems, rubbings, etc. Every week, pose a new question for the students to think about, for example: what human activity is having an influence on your tree?

Patterns of Association: Using the provided data sample construct, analyze a two-way frequency table to determine the association between pitch pine height and pitch pine circumference at The Adventure Park at Heritage.

		Circumference greater than 10 feet		
		Yes	No	
Height greater than 60 feet	Yes	12	14	Total: 26
	No	9	15	Total:24
		Total: 22	Total: 29	Total: 50

Additional Resources:

- Nature’s Wild!**, Nicole Carmichael
- Crinkleroot’s Guide to Knowing the Trees**, by Jim Arnosky
- The Trees in My Forest**, Bernd Heinrich
- Managing Our Natural Resources**, William Camp and Thomas Daughtery
- They Came From Below**, Blake Nelson
- Chomp**, Carl Hiaasen
- Project Learning Tree**, <https://www.plt.org>
- USDA Forest Service**, <http://www.na.fs.fed.us/coned/teachers/teachers.shtm>
- The Science of Riding a Zipline**, <http://zipline.wvu.edu/Introduction/>
- Society of American Foresters**, <http://www.safnet.org/education/educators.cfm#middle>