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Forest Ecology: Tree Identification

Subject Area: Natural Science

Core Curriculum Content Standards: 3.3.A, 3.4.A, 3.5A, 4.2A, 5.1A, 5.5A&B, 5.10A&B, 6.6E

DESCRIPTION:

Students will be introduced to methods for classifying trees. After learning how to use a dichotomous key, groups of students compete on the tree course to identify 10 common trees by examining their leaves, bark, and branching patterns. After the competition, students will re-examine each tree and the forest area around it to learn about its value to humans and wildlife on the planet.

OBJECTIVES:

1. Given a variety of leaves, bark, or seeds, students will compare, contrast, and sort them into groups, then support their classification system by identifying the distinguishing features of each group to the class.
2. Students will match pictures of leaves to the following vocabulary: simple, compound, lobed, toothed, double-toothed, alternate, and opposite.
3. Given a dichotomous key, groups of students will collaborate to identify 10 trees in the forest.
4. Students will explore each tree in its habitat to share information about the uses of trees to humans and wildlife.
5. Given a picture or object, students will infer the value of a forest in meeting that object's goal.

MATERIALS NEEDED:

seed, bark, and leaf kits; tree key; scoring sheets/answer key;
tree course fact cards; pencils & clipboards; forest metaphors bag;

PROCEDURES:

1. Ask students what it means to **classify** a group of objects. How would they **sort** a pile of clothes? How would they **compare** and **contrast** the items within the group? What **features** would they look for?
2. Divide the students into four groups. Hand out the leaf, bark, and seed kits. Instruct each group of students to sort their objects into at least three groups, according to their similarities and differences. Inform them that they will need to explain to the whole group why they put certain objects together, so they should be able to identify the **characteristics** they used for sorting.

3. Allow the students about five minutes for sorting, and then have each group share how they classified their objects. Let the leaf group go last and use the way they classified the leaves as a springboard for teaching the vocabulary on the supplement titled "Forest Ecology Terms", which will be necessary for the tree identification competition.
4. Test students on the vocabulary by holding up examples from the laminated leaves and having the students describe them using the new terms or by having the students find leaves as you describe them from the pile.
5. Ask students if they have ever used keys to identify items in nature. What kinds of keys have they used? How did the keys work? Were they easy to use? Introduce them to the term **dichotomous**: the prefix "di" means two, and the root word "chot" means to cut. A dichotomous key takes a group of objects and divides it in half continuously until each object has been singled out and identified.
6. If there is time, and if you feel the students need practice, have them create a dichotomous key to identify each person in their group. How can you divide the group in half by a characteristic that half of them have and half do not have? Once the group has decided on a characteristic, begin creating the key on the board, being careful to point out the double use of the numbers, and the use of a characteristic and the negative of that characteristic at each set of numbers, rather than the characteristic and its opposite. Your key may begin something like this:

1a. Blonde hair	
2a. Wearing glasses	Jenny
2b. Not wearing glasses	John
1b. Not blonde hair	
3a. Blue eyes	
4a. Wearing jeans	Jeff
4b. No jeans	Jack
3b. Not blue eyes	Jill

7. When the key is complete, choose a student and show how the key could be used by a stranger to identify his or her name. You can also create a key using middle names and have a parent who has left the room use it to identify each student's middle name.
8. When you are certain that the students understand how a dichotomous key works, or if there isn't enough time to create a key with the students, hand out the tree keys and take the students outside. Lead them to a tree and, as a whole group, use the key to identify that tree.
9. When you arrive at the tree course, hand out the scoring sheets. Explain how the competition will work. The students will be divided into two or three teams and will start at different points along the trail. The trail is marked with orange blazes. There are ten different trees that they must identify along the trail; these trees are marked with yellow blazes and a wooden placard showing the tree's leaf and branching pattern. The students are to look at the pictures and the tree's bark and begin at the start of the key to identify each tree. They may move back and forth along the trail, but may not stand at or near a tree which any other group is identifying.
10. For each tree that they correctly identify, students will be given 10 points. 30 bonus points will be given for the team that finishes first, 20 bonus for the team that finishes second, and 10 bonus points for the team that finishes third. Make sure that the students understand, however, that 100 points can be gained by getting all ten trees correct, so they should not sacrifice accuracy for

speed. No tree will be used more than once, but there is one tree (Sequoia side) and two trees (Wapalanne side) which will not be used.

11. Walk along the trail and monitor the students' progress as they compete. When all three groups have finished, score the sheets and announce the winner.

13. Hand out the tree fact cards. Walk back along the trail, stopping at each tree. Have the kids try to identify it by memory, and then share the information from the card. Use this time to discuss the values of forests, such as providing shade, oxygen, water retention, preventing erosion, providing food, habitat, lumber and paper products, and filtering pollution. Also, allow the students to ask questions and explore the forest for seeds and signs of animals.

SUMMARY:

Have each student or pair of students pull an object out of the Forest Metaphors bag. Have them try to identify the object and its function, and relate that function to one of the global values of forests.

ADDITIONAL/ALTERNATE ACTIVITIES:

The main goal of this session is for students to undergo close inspection of the forest and form an emotional connection with it. For younger groups, it may help if the identification and competition aspect of the tree course is downplayed. If possible, divide these children into just two groups and place an adult with each group. After each tree is identified, allow children ample time to look for the seeds and leaves pictured on the tree's placard, and for signs of animals living in or around the tree.

CLASSROOM ACTIVITIES

Have students create a dichotomous key for identifying four or five trees near their school. Allow them to teach their tree knowledge to parents or a group of school personnel and have the adults attempt to identify the trees using the student's key. Make sure the students research the value of each tree to local animals and students at the school.

Bibliography

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Forest Ecology Terms

Alternate and Opposite Branching: Most trees have leaves and branches that grow alternately along the stem. A few have leaves and branches that grow in pairs, opposite one another.

Compound: A compound leaf is made of anywhere from two to several dozen **leaflets**. The leaflet of a compound leaf is attached by its stalk to a midrib which is usually not very woody. A **simple** leaf is a single leaf whose midrib is attached to a woody stem.

Lobes and Sinuses: Lobes and sinuses are, respectively, hills and valleys on a leaf blade. They can be either pointy or wavy (rounded).

Toothed: A leaf edge that is toothed has a jagged edge, like a serrated knife.

Double-toothed: A leaf that is double-toothed has teeth on top of teeth.

SOC Tree Course Fact Sheet

Sugar Maple: Sugar Maples give us maple syrup. Some 200 to 250 gallons of sap rise through a mature sugar maple on an early spring day. The sap, however, is 98 % water and only 2 % sugar. It takes 40 gallons of sap to make one gallon of maple syrup.

American Beech: The words beech and book both derive from the same Anglo-Saxon root, and in Europe, beech bark was one of the earliest writing surfaces. Beech lumber is used for flooring, handles, food containers, and butchers' blocks. The nut was an important food staple in the Iroquois diet.

White Oak: White Oaks are a highly valued tree for lumber, because the wood is durable and resistant to decay. Mammals generally prefer white oak acorns above all others for their sweeter taste. Look for Oak apple galls and Oak bullet galls on the tree and on the ground beneath the tree. These are caused by insects which lay their eggs on part of the tree. They then irritate the tree into growing a tumor around the eggs, which protects and feeds them.

Shagbark Hickory: Hickories grow slowly and live 200 to 300 years. Hickories are excellent providers of lumber and food for humans as well as animals. America's largest caterpillar, the hickory horned devil, a spiny, green creature which grows to five inches long, feeds on Hickories.

Red Oak: This is New Jersey's State tree. It is the fastest growing of all Oaks and one of the longest lived. It's acorns taste bitter because of a high concentration of tannic acid, however, they were used by Native Americans after boiling and they are used by much wildlife.

Ironwood: Although its real name is American Hornbeam, this member of the birch family is most easily remembered as, and often called, Musclewood, because of the way its smooth, blue-gray bark wraps around the trunk in stretched folds. Although the wood of American Hornbeam is very hard and excellent for making tool handles, the tree is so small it is not often used for this purpose.

Eastern White Pine: This is the only 5-needled tree east of the Rockies. White pines also grow branches in whorls of 5 around their trunk, one whorl for each year. The distance between consecutive whorls indicates a rich or poor growing season. White pines grow fast, averaging 15 to 18 inches per year. White pines used to live 250 to 300 years, but most white pines today are cut down at about age 60 for their lumber.

Eastern Hemlock: Needles stay on this evergreen tree for about 3 years. Hemlocks usually live about 150 to 200 years, although they can survive much longer. Hemlocks prefer a slightly acidic soil, and because of their highly acidic needles, the soil beneath a hemlock often becomes more acidic and is always very shady, discouraging other plants from growing there. Hemlocks are excellent shelter trees for deer, owls, and many other animals and their tiny cones provide food for many songbirds. A tea made from hemlock needles contains seven times the amount of vitamin C as an equal amount of orange juice!

Forest Ecology Answer Sheet

Cabin Trail

Tree Number	Tree Name	Score
1	Shagbark Hickory	10
2	Ash	10
3	Red Oak	10
4	Eastern Hemlock	10
5	Chestnut Oak	10
6	Black Birch	10
7	Sugar Maple	10
8	White Oak	10
9	Tulip Tree	10
10	Beech	10
Speed Score (Optional)		1st place: 30 2nd place: 20 3rd place: 10
Total		

Forest Ecology Answer Sheet

Lake Trail

Tree Number	Tree Name	Score
1	Sugar Maple	10
2	White Oak	10
3	Ash	10
4	Red Oak	10
5	Shagbark Hickory	10
6	White Pine	10
7	Beech	10
8	Eastern Hemlock	10
9	Ironwood	10
Speed Score		1st place: 30 2nd place: 20 3rd place: 10
Total		

Forest Ecology Score Sheet

Cabin Trail

Names _____

Tree Number	Tree Name	Score
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Speed Score (Optional)		1 st place: 30 2 nd place: 20 3 rd place: 10
Total		

Forest Ecology Score Sheet

Lake Trail

Names _____

Tree Number	Tree Name	Score
1		
2		
3		
4		
5		
6		
7		
8		
9		
Speed Score		1 st place: 30 2 nd place: 20 3 rd place: 10
Total		