**Chapter 2 - Lesson #2 – Seasons of a tree - *Seaway Trail Wildguide***
**Grade 4 – 6**
**Subject: Science**
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**Anticipatory Set:**

Ask the students what are the four calendar seasons based on the earth relative to the sun. What are the four names and the dates on when they occur during the calendar year?

**NYS Learning Standards:**
**Mathematics, Science, and Technology Standard 4:** Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

**Objectives:**

Students will learn the difference between the calendar seasons and the ecological seasons of a tree. They will make a chart with four sections labeled the four seasons. Under each section the students will record the information about a tree and what happens to it during a season. Students will have an assignment to create drawings of a tree in the four seasons and write a paragraph about the things that happen to the tree during each season. The information from the season chart will be helpful for the students to use to write their assignment.

**Purpose:**

To have students understand how a tree reproduces will help students understand the conditions a tree needs to survive and reproduce.

**Summary: Ecological Seasons For a Tree:**

**Autumnal Coloration: September 1 – 60 days – Leaves color**

As the daylight starts to get shorter it becomes a signal to the trees to start preparing for dormancy. By late August the trees start having chemical changes where they produce several substances that trigger the onset dormancy. The plants start making a layer of cells called the abscission located between the leaves and the point of attachment to the branches. This causes the supply of water to decrease and eventfully stop going to the leaves. This marks the beginning of the ecological autumn in late August instead of September 21. Once the water supply is cut off, the green chlorophyll pigments die out and reveal the orange and yellow pigments that are normally hidden by the chlorophyll. The sunny days and cold nights of autumn make the trees manufacture red pigments to augment the orange and yellow pigments. This gives us the brilliant colors we see in autumn.

Abscisic acid and other chemical substances also transfer to the buds at this time to inhibit the buds from going into a growth mode when there is a warm spell in the winter.

**Winter: October 31 – 166 days – Leaves fall**

When the leaves begin to fade, the wind and rain in late October will blow the leaves off of the trees. Once the trees are bare this marks the beginning of the winter season. This occurs around October 31 instead of December 21. In December the forest is already in full dormant state. The forest's floor gets covered with snow and this protects it from freezing too deeply. The biggest threat to the forest is the ground freezing in the root zone, causing dehydration and cutting off the water supply to the trees.

**Spring: April 15 – 40 days – Buds swelling**

After a period of cold exposure the trees need to be exposed to an increase in temperature and daylight in order to resume growth. The signal for new growth is when the buds begin to swell and burst in to leaves. This marks the beginning of the ecological spring in mid April compared to March 21. Unlike flowers, whose cross-pollination is carried out by insects and birds, trees typically use the wind for cross-pollination. Trees that do not have large, bright flowers will not attract insects to them. The trees produce a large amount of pollen to ensure that some reproduction will be successful. The pollen starts soon after the buds swell up, but is done before the leaves are fully developed.

**Summer: May 25 – 99 days – Canopy closes**

After the buds have reached maturity, the leaves are fully grown, the canopy top of the forest closes in and the light becomes more filtered into the base of the forest. This marks the beginning of the ecological summer in the end of May compared to June 22. As the canopy closes, the temperature variations begin to drop, the air movement decreases and the humidity increases inside the forest. The temperature near the ground during the daytime will be cooler than outside the forest. The temperature near the ground during the night will be warmer than outside the forest. In early summer, by the end of June, the buds for next spring are starting to form in the axils of the leaves and at the tips of the twigs.

**Materials:**

1. Large sheets of paper
2. Markers, crayons
3. Large chart sheet to use for class.

**Teach:**

1. Review the material on the different types of vegetation in North America.
2. Review the solar calendar dates we use for the seasons:
    1. Autumnal equinox September 21
    2. Winter solstice December 21
    3. Vernal equinox March 21
    4. Summer solstice June 22
3. Have the students take a large sheet of paper and fold it into four sections
4. Have the students mark each section with the four seasons.
5. Introduce material on the ecological seasons of a tree. Point out the differences in the dates compared to the calendar seasons.

6. Once you have covered each season and the information on what happens to the tree during each season you will then hand out another large sheet of paper.
7. Have the students fold the paper into four sections.
8. Have the students mark each section with the ecological seasons.
9. The students will draw a picture of a tree in the state it would be in for each season. (The students could also cut out pictures of trees from magazines instead of drawing them.)
10. Under each tree the student will write a paragraph about the tree and the season. The paragraph will cover the information that was created on the chart earlier. The information should have the dates on when the ecological season starts and should have some details of what happens to the tree.

**Guided Practice:**

The teacher will make a large chart on the board or on a large sheet to model the chart the students need to create at their desks. The teacher will go around the room and check on the student's progress on the drawing assignment.

**Closure:**

Ask the students what are the differences between the calendar seasons and the ecological seasons. What is one thing that could threaten a forest and its survival? What does a tree need to survive and reproduce?

**Independent Practice:**

Complete the drawing assignment of the tree in different seasons.

**Extended Activities:**

1. You could cover more material on the other plants in the forests and how the ecological seasons affect them. Create a new chart for the flowers of the forests.

2. Food Web - Have the students do some research from several categories: mammals, reptiles, birds, insects, plants, and trees (Make sure you have at least two from each group assigned to someone.) Give each student a picture of the subject they are researching. Create a mural of a forest. Have the students place their subject on the mural where they believe they would habitat in the forests. Using the information each student found about their subject, have the class start creating a web using pincushions and yarn on the food web. Each student will discuss what kind of food their subject eats and the class can start trying to create the food web based on what the students found out about their subject.
3. Field trip – Have the students go on a field trip to the local park or behind the school and try to identify the different trees in their area. The teacher can have a worksheet with the pictures and description of the tree. Students can mark off the trees they find and describe the size of the tree, what season the tree is in, how many of the type of tree seem to be in that area of the field trip.

4. Field trip to a museum that has information about the trees in that area. For example the Seaway Trail Discovery Center in Sackets Harbor has an exhibit.

5. Adopt a tree. Depending when you teach the lesson, the students could find one tree and adopt it for the season. They can record their observations of any changes they have noticed about their tree throughout the school year.

6. Have the students plant a tree at the school or local area park. Have the students try to decide on when the best time to plant the tree after learning the different changes a tree goes through during the seasons.

7. Take the students outside to collect a number of leaves. The students can create a chart with the local tree species in their area.

**Web sites:**

1. http://www.blueplanetbiomes.org/deciduous_forest.htm
   The site gives you information about deciduous forests.

2. http://lsb.syr.edu/projects/cyberzoo/deciduous.html
   The site gives information on the deciduous forests and the animals that live in the forests.

3. http://www.nhptv.org/natureworks/nwep8c.htm
   Nature works – The site gives information on the plants and animals in the deciduous forest. The site has great photos for students to see.

4. http://www.needham.mec.edu/high_school/cur/Bio96_97/p3/deciduous/DfJDKB.html
   This site gives you other links to connect to. The site gives information and photos on the animals in the forest.

5. http://mbgnet.mobot.org/sets/temp/
   This is a great site for students to visit. It has information on the seasons and the colors in the fall. The site gives a list of trees found in a deciduous forest.

6. http://www.iwc.org/hab_pgs/terres/d_forest/td_forest.htm
   Habitat Awareness - The site is great for students to learn about the plants and animals in the deciduous forest.

7. http://www.colf.edu/ete/modules/msese/earthsysflr/dforest.html
   This is another great site for students to visit.

8. http://www.edselect.com/topics/biomes.htm
   This is a great site to research biomes

9. http://mbgnet.mobot.org
   This site defines temperate deciduous forest and the types of trees you would find in these types of forests.

**Books for research:**

1. "Trees of New York State" – Donald Joseph Leopold, Harry Philip Brown, Syracuse University Press, Nov 2003, ISBN 0815630026
2. " A Walk in the Deciduous Forest", Rebecca L. Johnson, Carolrhoda Books, 2000, ISBN 1575051559

**Books for children to read:**

1. "Why do Leaves Change Color" – Betsy C. Maestro, Harper Trophy, Sept 1994, ISBN 0064451267 (ages 5-8)
2. "Be a Friend to Trees" – Patricia Lauber, Harper Collins Juvenile Books, Jan 94, ISBN 0064451208 (ages 5-9)
3. "The Secret Life of Trees", Chiara Chevallier, Barbara Shook Hazen, DK Publishing, Oct 1999, ISBN 0789447606 (ages 5-8)
4. "Sunshine Makes the Seasons" – Franklyn Mansfield Branley, Harper Trophy, May 1986, ISBN 0064450198 (ages 5-9)
5. "The Tree in the Ancient Forest" – Carol Reed-Jones, Down Pubns, April 1995, ISBN 1883220319 (ages 4-10)
6. "Trees, Leaves and Bark" – Diane Burns, North Word Press, April 1998, ISBN 1559716282 (5-10)
7. " Mary Margaret's Tree: Blair Drawson, Orchard Books, New York 1996.
8. "A Tree in a Forest", Jan Thornhill, Simon & Schuster, NY NY, 1991, ISBN 0671759019
9. "Forest Life", Barbara Taylor, DK Publishing, 1993, ISBN 1564582108, (ages 8-12)
10. "Vanishing Forests", Helen J. Challand, Childrens, 1991, ISBN 0516055054, (ages 10-13)
11. "Caring For Our Forsets", Carol Greene, Enslow, 1991, ISBN 0894903535, (ages 6-9)
12. "Temperate Deciduous Forest", April Pulley Sayre, 1994, ISBN 0805028285, (ages 9-14)