

First Explorers

Students learn about the changing seasons and how plants, animals and humans prepare for winter. During a nature walk, students have the opportunity to act as scientists as they collect fall specimens and use their five senses to answer the question: what is fall?

Grade Level: 1st

Phenomena:

Can using our senses help us tell how the seasons are changing?

Objectives:

- Students will explore their five senses and use them while observing nature.
- Students will list the four seasons and state the current season.
- Students will discuss how the seasons change and conclude that fall leads into winter.
- Students will discuss examples of how plants, animals and people prepare for winter.

Materials:

- Seasons visual aids
- Senses visual aids
- Magnifying glasses
- Crayons
- *Seasons Changing* song
- One brown paper bag per student

Appendixes:

- *Seasons Changing* song: Page 5
- Leaf portrait: Page 6

Time Considerations:

Preparations: 30-45 minutes

Lesson Time: 55-85 minutes

Introduction: 20-30 minutes

Activity 1: 15 -20 minutes

Activity 2: 10-15 minutes

Activity 3: 5-10 minutes

Conclusion: 5-10 minutes

Related Lesson Plans:

Dinosaurs, Native American Myths, Digging Up Nevada's Past,



Next Generation Science Standards

1-ESS1-2.

Make observations at different times of year to relate the amount of daylight to the time of year.

Science and Engineering Practices (SEP):

Planning and carrying out investigations.

Disciplinary Core Ideas:

Earth and the solar system.

Background

There is a popular misconception that the seasons on Earth are caused by varying distances of Earth from the sun on its elliptical orbit. This is not correct. The primary cause of the seasons is the 23.5 degree of the Earth's rotation axis with respect to the plane of the ecliptic. This means that as Earth goes around its orbit, the Northern Hemisphere is at various times oriented more toward and more away from the sun, and likewise for the Southern Hemisphere (*Astrowiki*).

We now know that Earth orbits the sun elliptically and, at the same time, spins on an axis that is tilted relative to its plane of orbit. This means that different hemispheres are

Crosscutting Concepts:
Patterns

Excellence in Environmental Education Guidelines

Strand 2.1—The Earth as a Physical System

A? Learners are able to identify changes and differences in the physical environment.

exposed to different amounts of sunlight throughout the year. Because the sun is our source of light, energy and heat, the changing intensity and concentration of its rays give rise to the seasons of winter, spring, summer and fall.

The seasons are marked by solstices and equinoxes—astronomical terms that relate to Earth's tilt. The solstices mark the points at which the poles are tilted at their maximum toward or away from the sun. This is when the difference between the daylight hours and the nighttime hours is more acute. The solstices occur each year on June 20 or 21 and December 21 or 22, and represent the official start of the summer and winter seasons.

The vernal equinox and autumnal equinox herald the beginning of spring and fall, respectively. At these times of the year, the sun appears to be directly over Earth's equator, and the lengths of the day and the night are equal over more of the planet (*Williams, P.*).

One sign of fall that is most easily distinguished from the other seasons is leaves changing color. This happens because, "trees interpret increasing darkness as a sign that winter is on its way and start to make adjustments for freezing temperatures and harsh conditions" (SavATree). As food production slows down, chlorophyll, the substance that gives leaves their green color, begins to disappear. After this happens, the yellow and orange carotenoids already in the leaf become visible. Red and purple colors come from anthocyanins produced by some species during autumn in response to sunlight and excess sugars that get trapped in the leaves. Temperature, light and water supply conditions have the greatest influence over the timing, intensity and duration of fall color.

Leaves fall because trees are making changes to keep from drying out in the severely cold, dry air of winter. Evergreens have needle-like foliage with a heavy wax-like coating to help keep in moisture, and the fluid in

their cells contains substances resistant to freezing. Whereas, broadleaf trees hold sap that tends to freeze readily. Leaf tissues are very tender. Trees must seal them off before going dormant in order to ensure their survival through the winter. As leaf veins transfer nutrients to the trunk and roots, a special corky separation layer of cells gradually forms where the leaf stem is attached to the tree, and it begins to sever the attachment. When food production ends, the veins are sealed off. Without that connection for support, wind and gravity drop the leaves away from the tree. Once on the ground, leaves decompose and restock the soil with nutrients (SavATree).

Instructors should make sure that an hour and half is set aside to teach this lesson so there is plenty of time for the nature walk.

Preparation

Be sure to have enough leaf portrait sheets and paper bags for each student. Make a visual aid for each season and sense - simple posters work well.

Prepare an example bag with fall objects: leaves, pine cones, fruit that has fallen off trees, etc.

Doing the Activity

Introduction

Brainstorm with the students what are the four seasons? As



Examples of materials

students name the seasons have them come up and hold that season's visual aid. What things do you think of during each season? What order are the seasons? (spring, summer, fall, winter)

Sing the *Seasons Changing* song. Then, talk about how the seasons change throughout the year.

Ask the students what season it is now? (fall) How do we know? (leaves, cooler temperature, etc)

Ask the students what are some things they like to do in fall? What holidays are in fall? (Halloween and Thanksgiving) What are the months that are in fall? (September, October, November) List student responses on the board.

Ask students what fall looks like. What is different about the trees in fall as opposed to the other months? Do all the trees lose their leaves in fall? You can talk a bit about the difference between deciduous and conifer trees; for example, pine trees vs maple trees.

Tell students that today they are going to be scientists and take a nature walk.

Explain that scientists make observations in order to try to answer questions.

Tell students that during their nature walk they will be trying to answer the question: What is fall?

In order to answer the question, the students will need to use their five senses while taking a nature walk.

Ask students what the five senses are. (smell, taste, touch, sight and sound) As students name the senses have them come up and hold that sense's visual aid.

Tell students that by the time we get back to the classroom they should be able to explain what fall is using their five sense. Therefore, while on the nature walk, students should be thinking about:

- What fall looks like
- What fall smells like
- What fall sounds like
- What fall feels like
- What fall tastes like - explain that today we aren't going to be tasting anything, but they should think about what they think fall tastes like

Give each student a paper bag to collect samples in. Tell the students that they are going to

collect objects from outside that can help to answer the question of: what is fall?

Make sure to give examples of what would and wouldn't go into the bag. For example: Would you put a rock into your bag? Even if it is a super cool rock? (no) Why? (because a rock isn't a sign of fall and doesn't help answer the question: what is fall?) Show students examples of what you collected (leaves, pine cones, etc).

Activity 1: Nature Walk

Before leaving the classroom, reiterate the importance of safety. Make sure students are clear of your expectations for when you are outside and what their goals are.

Line students up, pairs of two work well, and make sure



students know how they are expected to walk outside.

Take advantage of teachable

moments during the walk. Look for signs of fall yourself and point them out and ask questions to facilitate higher level thinking skills.

Find a good stopping point along the walk, towards the end, and have students take a minute to sit still and look around them - ask students what fall look like? Listen closely - what does fall sound like? Think about what they feel - what does fall feel like? Smell the air or inside their bags - what does fall smell like?

Activity 2: Open Exploration

Weather and logistics permitting, this activity is recommended to take place outside.

Give students the opportunity to use different tools in order to explore their samples: magnifying glasses, drawing materials, etc.

Give the students time to share some of their findings with other classmates in small groups; they should show the object and explain to the group how it helps answer the question: what is fall?

Activity 3: Leaf Rubbings

Ask students if anyone has ever done a leaf rubbing before.

Demonstrate how to do a leaf rubbing. Tell students to pick their favorite leaf and pass out the needed materials (paper and crayons) and give students time to complete one of their own.

Walk around the room to help students if needed. Point out the



Students working on leaf rubbings

different characteristics of leaves: size, shape, veins, etc.

Conclusion

After students have completed their leaf rubbings, have them turn their papers over and draw a picture/ write about what they have learned about fall or what they think fall is– allow students to share their drawings/writings if time permits.

Review key questions and ask students based on what they have learned and observed about fall. Ask the students why they think fall is important.

Extensions

Ask the students what season comes after fall. (winter)

Sources

- Astrowiki. *The Seasons*. Retrieved Dec. 12, 2010, from <http://csep10.phys.utk.edu/astr161/lect/time/seasons.html>
- SavATree. (2007, Sept. 25). *Why Leaves Fall and Other Autumn Foliage Secrets Revealed*. Retrieved Dec. 12, 2010, from <http://www.savatree.com/why-leaves-fall.html>
- Williams, P. (2010). *Scientific Reasons for Earth's Seasons*. Retrieved Dec. 8, 2010, from Science on MSNBC.com: <http://www.msnbc.msn.com/id/3077384/>

Assessment

Lead a brief discussion about what people, plants and animals do during fall to help prepare for winter.

Assess students on their knowledge by what they put in their paper bags as signs of fall. What are some signs of winter? What months make up winter? What holidays are in winter?

Vocabulary

Equinox: either of the two annual crossings of the equator by the sun, once in each direction, when the length of day and night are approximately equal everywhere on Earth

Fall: Season occurring between summer and winter. Traditionally lasts from September 22 to December 21 in the Northern Hemisphere, and from March 21 to June 21 in the Southern Hemisphere.

Five Senses: sight, hearing, taste, touch and smell

Seasons: Traditional division of the year based on distinctive weather conditions. In temperate regions, there are four seasons, spring, summer, fall and winter, while in tropical countries there are often only two, a dry season and a rainy season.

Solstice: longest or shortest day of the year – either of the times when the sun is farthest from the equator, on or about June 21 or December 21

Seasons Changing

*Sung to the tune of Frere Jacques
Be creative, include movements and arm motions*

Seasons changing, seasons changing
Spring, summer, fall, spring, summer, fall
Fall into winter, fall into winter
Winter back to spring, winter back to spring

Seasons changing, seasons changing
Spring, summer, fall, spring, summer, fall
Fall into winter, fall into winter
Winter back to spring, winter back to spring

Possible Actions and Motions:

Seasons changing, seasons changing (tilt yourself like the earth and spin around)

Spring, summer, fall, spring, summer, fall (raise arms up above head like a flower blooming for spring, make a sun above head for summer and wave hands down like leaves falling down for fall)

Fall into winter, fall into winter (hand motions for leaves falling for fall, rub hands on arms like your cold for winter)

Winter back to spring, winter back to spring (cold motion for winter, raise hands back up above head for spring)

(REPEAT)



LEAF PORTRAIT

NAME: _____

