Activity #1 Teacher Card

Life Processes Science Circus
Title: Life Cycles
SOL: 1.4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include
b) parts (seeds, roots, stems, leaves, blossoms, fruits)

Key concepts of this activity: Plants, fruits, and vegetables all have different life cycles depending on whether they grow above ground, under the ground, on a tree, or from a flower. However, they all follow the same basic cycle. Most plants, fruits, and vegetables start as seeds planted in the ground. They require water, sunlight, nutrients, and air to grow and be healthy. As the seed sprouts, it can emerge above the ground or remain under the ground as a root. For those that emerge above the ground, the life cycle is visible to humans. The plant then grows a stem and leaves. Next, it blossoms or bears its fruit or vegetable. For those that remain under the ground, the life cycle is harder to observe. For example, the potato grows off the roots of a plant so you have to dig them up. Thus, the regular plant life cycle is followed for the potato plant to grow; however, not for the potato itself since it grows just from the root of the plant. Some plants only flower and do not bear fruit or vegetables such as the oak tree. They still blossom and then just the leaves are left on the tree. The similarities and differences in each life cycle being examined are obvious for the student to observe.

Materials

Laminated pictures of the following life cycles: apple tree, oak tree, pumpkin
Poster with spaces for each picture to go numbered in order
'The Cycle of My Pumpkin Seed' book – already colored
Scissors
Glue
Staple (for the teacher to use only)

Notes: The students will each have an opportunity to put the life cycle of the apple tree, oak tree, and pumpkin in the order that they believe is correct. Discussion among the students will be allowed so that they can share ideas on what they believe the right order is for the life cycle. They will have each order checked by the teacher prior to completing 'The Cycle of My Pumpkin Seed' book. If a mistake is made, the teacher will have the student discuss why they put it in that particular order and then keep trying by using the pictures and their peers. Once all life cycles have been explored and experimented with, the student will cut out the pictures for their book and put them in the correct order. They will then glue down the pictures and complete their book. The book will already be colored so that they student can complete the activity in the time allotted. This activity connects with the parts of a plant activity because they will be exploring the parts and putting them in the order they think they belong in the life cycle. It also connects to the edible plant parts activity, which explore plant parts and they will be exploring an apple in both stations.

Safety Note: Make sure the student is careful with his or her scissors and that they are not used in an inappropriate manner. Also, make sure that only the teacher uses the stapler to compile the book.

Guiding questions:
How are the life cycles of the oak tree and pumpkin alike? Different?
Can you think of any other life cycles that are similar to these? Different from these?
What season is it now?
What stage of the life cycle is each of these in right now?

For the forum: What came first in each of the life cycles? Was this the same for each life cycle?
How is the human life cycle like the oak tree and pumpkin life cycles? Different?
Is there anyway you could change or skip part of a life cycle and still have the same result?
What are important factors in making sure each plant and food life cycle is complete? What do plants, fruits, and vegetables need to be healthy and have a complete life cycle?
What stage are the pumpkins in right now that you get for Fall decorations?
What stage are the apples in that you picked at the orchard on the field trip?
What do you think is the most important stage in the life cycle of the apple tree? Of the oak tree? Of the pumpkin? For humans?

Sources of information:

Adair, R., Ewing, J., Faircloth, S., Nikoghosian, J., Peterson, C., Smith, D., & Wiebe, S. "The Cycle of My Pumpkin Seed." AIMS Education Foundation. California: AIMS Education Foundation, 1989.

A to Z Teacher Stuff. (2006). *Life Cycles*. Retrieved October 18, 2008, from http://www.atozteacherstuff.com/Themes/Life_Cycles/

Activity #2 Teacher Card

Life Processes Science Circus
Title: Parts of a Plant
SOL: 1.4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include
b) parts (seeds, roots, stems, leaves, blossoms, fruits)

Key Concepts of this activity: In this activity, students will explore the different parts of a plant and make inferences about the function that each part performs. The roots provide the stems and leaves with water and minerals that have been dissolved in the soil. Roots are constantly growing into new sections of soil in order to gain the minerals and nutrients the plant needs. Taproots are characterized by one main root from which smaller roots emerge. Fibrous roots have a mass of roots of relatively the same size. The stem contains xylem and phloem, which carry minerals and nutrients back and forth from the roots to the leaves. The xylem tissues conduct water, minerals, and other nutrients upward from the roots to the stem and the rest of the plant. Phloem tissues transport carbohydrates that are manufactured in the leaves down the stem to the roots. The leaves are where the process of photosynthesis takes place. Sunlight is trapped by chloroplasts that contain chlorophyll. The chloroplasts transform the sun's captured energy into chemical energy, which is then, with the help of carbon dioxide from the atmosphere, transformed into glucose for the plant's food. The blossoms' bright colors attract animals such as birds and bees that help spread pollen in order for the plant to reproduce.

Materials:

Tray of small plants (at least three)
Three sets of labels: roots, stem, leaves, blossom, seeds
Newspaper to place plants to keep area clean
Blank paper for students to draw on

Notes: Before beginning the activity, have the students choose a partner. If there are an odd number of students, there can be a group of three. The students should work together in exploring the different parts of the plant and what these different parts may do for the plant. The main point of this activity is to provide a hands-on experience for students to learn about the different parts of the plant and make inferences about what function they perform. This station is connected to the life cycle of a plant station because the students will see many of these structures again in that station.

Safety Note: Have students wash hands after handling the plants, making sure that they don't touch their face before doing so.

Guiding Questions:

- Can you think of other types of plants that have these same parts?
- Where does each part of the plant grow: above ground or under the ground?
- What do you think the job of the seed is in helping the plant grow? The root? The stem? The leaves? The blossom?

For the forum: Hold up one of the plants so that all students can see it.

(Pointing to the roots) What part of the plant is this?
(Pointing to the stem) What part of the plant is this?
(Pointing to the leaves) What part of the plant is this?
(Pointing to the blossom) What part of the plant is this?
(Holding seeds) What part of the plant is this?
What do you think the roots do for the plant based on how they look? What about the stem, leaves, and blossom?
Discuss the functions that each of these parts play in plants
Why do the roots need to be underground?
Do you think all plants have these parts? If they don't, what parts do think they do not have?
Do you think some plants may have some parts that we did not see today? If so, what plants, and what purpose do those extra parts serve?

Sources of information:

Plant Facts. (2007). *Adventitious*. Retrieved October 21, 2008, from http://botit.botany.wisc.edu/images/130/Root/Adventitious_Roots/Coleus/Adventitious_roots_2_MC.low.jpg

Wikipedia. (2008). *Root*. Retrieved October 20, 2008, from http://en.wikipedia.org/wiki/Root

Armstrong, W. P. Wayne's Word. (2002). *Stem and root anatomy: Cellular structure of vascular plants*. Retrieved October 20, 2008, from http://waynesword.palomar.edu/trjune99.htm

Eames, A. J., Esau, K. Answers.com (2002). *Flower*. Retrieved October 21, 2008, from http://wpcontent.answers.com/wikipedia/commons/thumb/a/a5/Flower_poster_2.jpg/350px-Flower_poster_2.jpg

Moore, M. Freisner Herbarium: Department of Biology, Butler University. (no date*). Tree identification: Parts of a tree*. Retrieved October 20, 2008, from http://www.butler.edu/herbarium/treeid/treeparts.html

Yronwode, C. Herb-Magic. (2008). *Cardamom Seeds.* Retrieved October 21, 2008, from http://herb-magic.com/cardamom-seed.jpg

Activity #3 Teacher Card

Life Processes Science Circus
Title: Edible Plant Parts
SOL: 1.4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include
b) parts (seeds, roots, stems, leaves, blossoms, fruits)
c) characteristics (edible/nonedible, flowering/nonflowering, evergreen/deciduous)

Key Concepts of this activity: In this activity, students will look at different parts of plants including seeds, roots, stems, leaves, and fruit that are edible. The seed is a tiny plant, an embryo, waiting to grow. Seeds contain short term nutrient supply for the plant and are a plant's way of getting from one location to another either by wind, water, or animals. The root of the plant provides an anchoring support for the plant and it absorbs water and nutrients from the ground to supply the plant. The stem transports the water and nutrients that are absorbed by the roots and food produced by the leaves to other parts of the plant. The stem is also the support system for the plant and is responsible for making sure that the leaves receive sunlight. Leaves are responsible for making food. In this process, called photosynthesis, carbon dioxide and water, in the presence of chlorophyll (the green pigment) and light energy, are changed into glucose, or sugar. This sugar is the food source for the plant. The fruit is the ovary of the plant that contains all of the seeds. Then the process begins again.

Materials:
Sunflower seeds
Carrots
Celery
Lettuce
Apple
Labels for the parts of the plant (seed, roots, stem, leaves, and fruit)
Paper towels
Worksheet #3 from circus packet
pencil

Notes: Have the students get a partner in their group to begin the activity. If there are an odd number of students, there can be a group of three. This activity is to help the students understand the different parts of a plant in a more non-traditional way by examining food plant parts. They should explore, in a hands-on way, the various foods to try and determine which part of the plant they believe it is. This activity is connected to the life cycle activity because the foods represent various stages of plant life cycles. It is also connected to the parts of a plant activity although the parts explored in this activity are edible as opposed to the ones in activity two.

Safety Note: All students should was their hands before and after exploring the foods. Also, any allergies should be checked before the students are allowed to taste and handle the food.

Guiding Questions:
- What other plants can you think of that you would be able to eat?

- Describe the taste of each plant part.
- Describe how each plant part tastes different from the other plant parts.
- Describe how each plant part tastes similar to the other plant parts.

For the forum: Hold up each food and have the students identify which part of the plant they think it is: sunflower seed, carrot, celery, lettuce, and apple.
What other foods do you eat that are plants? What part of the plant are they?
Can you think of any edible plants that are not safe to eat? What are they?
What kinds of animals eat each of these plants?
What stage of the life cycle are each of the edible plants in when we eat them?

Sources of information:

Department of Natural Resources (2008).*Plant needs Investigation.*. Retrieved October 26, 2008, from http://www.dnr.state.md.us/forests/education/needs.html

Activity #4 Teacher Card

Life Processes Science Circus
Title: Plant Survival
SOL: 1.4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include
a) needs (food, air, water, light, and a place to grow)

Key Concepts of this activity: This activity focuses on plant survival and the needs of a plant. These needs include sunlight, water, air, and a good environment. Sunlight is important to the plant because plants use the light to change carbon dioxide and water in the presence of chlorophyll into glucose, or sugar, through the process of photosynthesis. Without sunlight a plant can not make food. Water is important because plants use water to carry moisture and nutrients up to the plant and food back down from the plant. If the plant could not receive water, it would not be able to transport or receive its food and nutrients. Air is important to the plant because it allows carbon dioxide for the leaves to make food and it returns clean oxygen back into the environment, which is very beneficial for humans. Without the air, the plant will not be able to produce food for its survival or clean air for the environment.

Materials:

Plant that has received water and light
Plant that has received water and no light
Plant that has received no water and light
Worksheet for station from circus packet
pencil

Notes: The students will have the opportunity to explore each plant and try to determine which basic need was and was not met. The plants will appear drastically different to the student; however, without prior knowledge of what happens to plants when basic needs are taken away, the teacher may need to facilitate discussion more with the guiding questions. The teacher should make sure that the students discuss why they chose the needs met and not met for each plant in detail to understand their reasoning. This activity relates to the life cycle activity because the student will understand that without these needs, the life cycle of plants would not be able to occur.

Safety Note: Students should wash their hands after touching the plants.

Guiding Questions:

- Based on the way these plants look, what do you think plants need to survive?
- Describe what happens to a plant when it does not get water.
- Describe what happens to a plant when it does not get sunlight.
- Where do you think good homes are for plants?

For the forum: Which plants were given water? How can you tell?
Which plants were given light? How can you tell?

Do you think plants need sunlight or water more? Why?
What would happen to a plant if it received no water, light, or air?
How do you think plants in the desert survive without very much water?
How do you think plants in the bottom of the forest, covered by taller trees, survive without very much sunlight?

Sources of information:

University of Illinois Extension (2008). *Great Plant Escape*. Retrieved October 26, 2008, from http://www.urbanext.uiuc.edu/gpe/case1/c1facts3e.html