



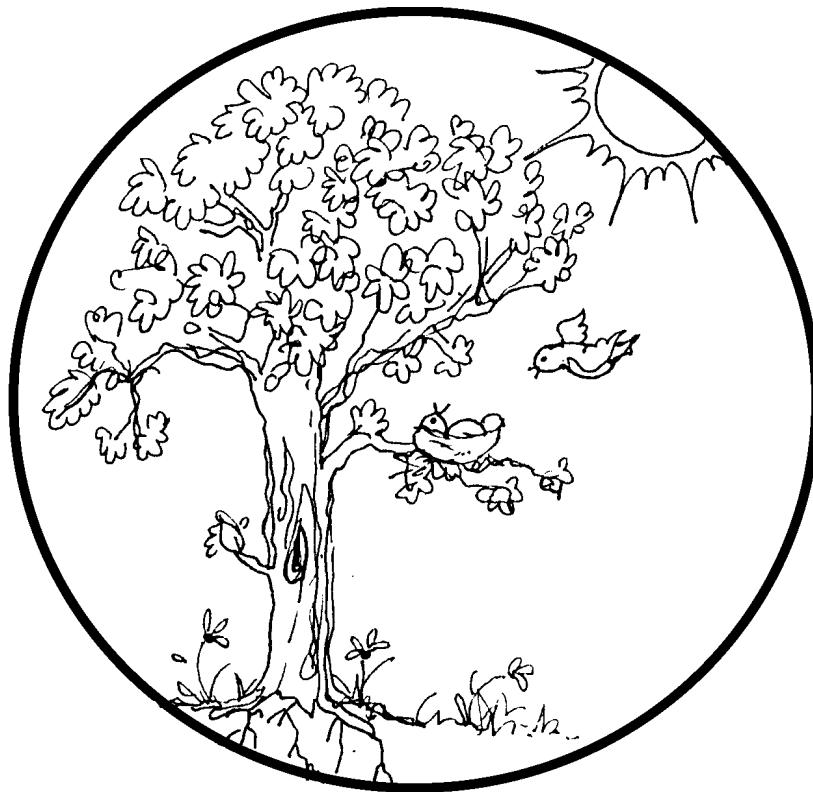
Life Cycle

Diversity in a Balance



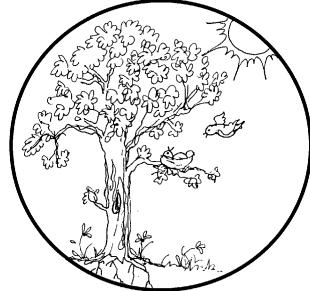
FIFTH GRADE

PLANT LIFE



2 weeks
**LESSON PLANS AND
ACTIVITIES**

LIFE CYCLE OVERVIEW OF FIFTH GRADE



ORGANISMS

WEEK 1.

PRE: Identifying animal and plant cell parts.

LAB: Exploring the different organelles of a cell.

POST: Exploring the importance of RNA and DNA.

WEEK 2.

PRE: Explaining the importance of reproduction.

LAB: Comparing asexual and sexual reproductive strategies.

POST: Comparing characteristics of the 5 kingdoms.

HUMAN BIOLOGY

WEEK 3.

PRE: Comparing functions of specific body systems.

LAB: Calculating calorie intake.

POST: Comparing how and where digestion takes place.

WEEK 4.

PRE: Comparing the three types of muscle tissue.

LAB: Calculating reflex time.

POST: Defining different components of the medical profession.

PLANT LIFE

WEEK 5.

PRE: Analyzing the structure of plant cells.

LAB: Observing different plants under the microscope.

POST: Demonstrating photosynthesis.

WEEK 6.

PRE: Exploring the diversification of plant reproduction.

LAB: Comparing reproduction of a gymnosperm and angiosperm.

POST: Discovering how seeds are dispersed.

NATURAL ENVIRONMENT

WEEK 7.

PRE: Exploring coral species.

LAB: Exploring and distinguishing the different types of corals.

POST: Discussing the requirements of corals.

WEEK 8.

PRE: Comparing autotrophs and heterotrophs.

LAB: Exploring the eating habits of an owl.

POST: Interpreting data obtained from owl pellets.

LIFE CYCLE - PLANTS (5A)

PRE LAB

Students use worksheets to examine the structure of plant cells.

OBJECTIVES:

1. Analyzing the structure of plant cells.
2. Comparing plant and animal tissues.

VOCABULARY:

cell wall
chloroplast
phloem
photosynthesis
vacuole
xylem

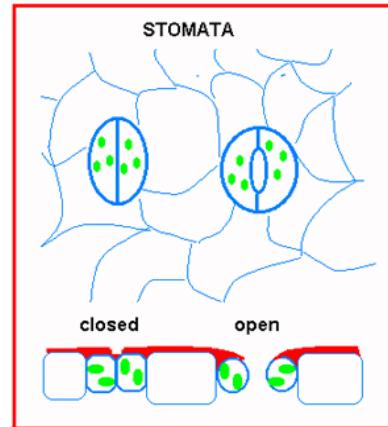
MATERIALS:

worksheets
crayons

BACKGROUND:

A plant cell is different from an animal cell in that it possesses a cell wall, chloroplasts, large vacuoles, and starch grains (amyloplasts). The cell wall is the outer wall that surrounds plant cells. Chloroplasts contain chlorophyll and function during photosynthesis. Vacuoles store food molecules, water and salts. Starch grains are used to store starch which will provide food for the plant. Plants are made up of many cells that work together to form tissues. There are many types of plant tissues.

The growth of plants occurs in the meristematic tissues. In these tissues the cells are actively dividing, and new cells are continually being produced. Apical meristems are located in roots and stems. Vascular cambium is a meristematic tissue located between the bark and wood (or phloem and xylem). Different types of plants have different types of tissues. Leaf tissue has an upper and lower epidermis which forms a relatively waterproof layer because the cuticle protects the inner cells. Cutin, a fatty material, is secreted by the epidermal cells and forms a waxy layer. There are also guard cells between which are located pores called stomata that are used when the plant transpires and in photosynthesis. Between the epidermal layers is the mesophyll which is divided into the palisade layer and a mass of loosely arranged, irregularly shaped cells called the spongy layer. The vascular bundles of the leaf are enclosed in one or more layers of compactly arranged cells forming the bundle sheath. The xylem and phloem which form a way for cells to move nutrients and water up and down a plant is a complex permanent



tissue. The xylem is the principal water conducting tissue in plants and the phloem is the principal food conducting tissue.

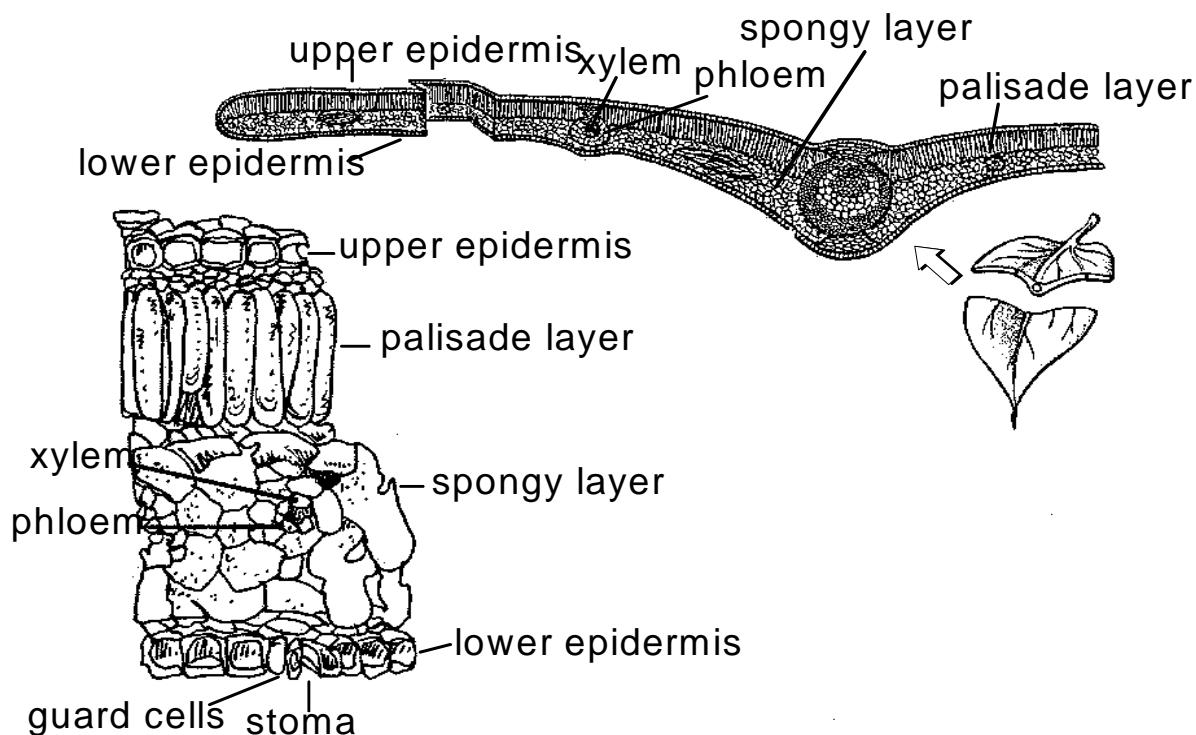
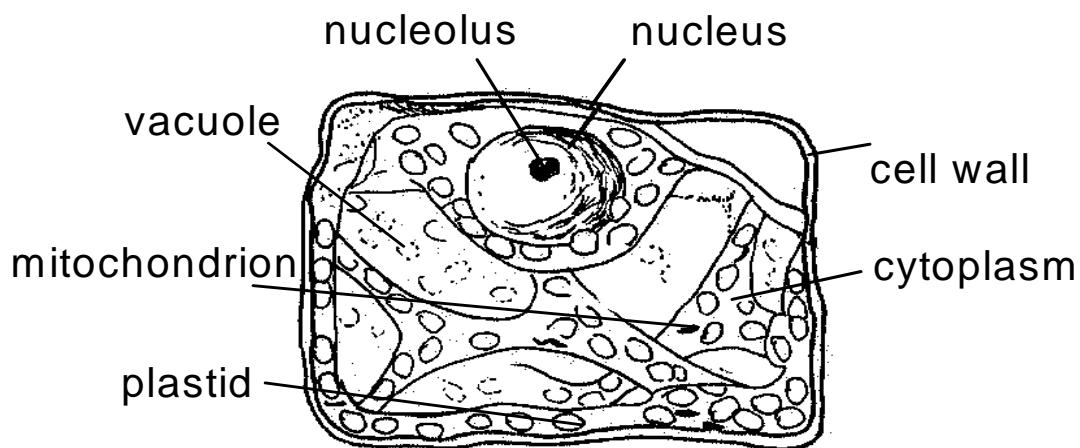
PROCEDURE:

1. On the worksheet students are to color the stated tissue by finding the tissues on the diagrams. Discuss with students the various parts of a plant. The key part is to illustrate the many components, not to memorize them.
2. Please note that these pictures are the "ideal" plant. Have students look back at **Human Biology (4A) Post** and **Human Biology (5A) Pre** so they can compare plant and human tissues. They should notice that there are few similarities between plant and animal tissue. But then, a plant and a human are quite different!

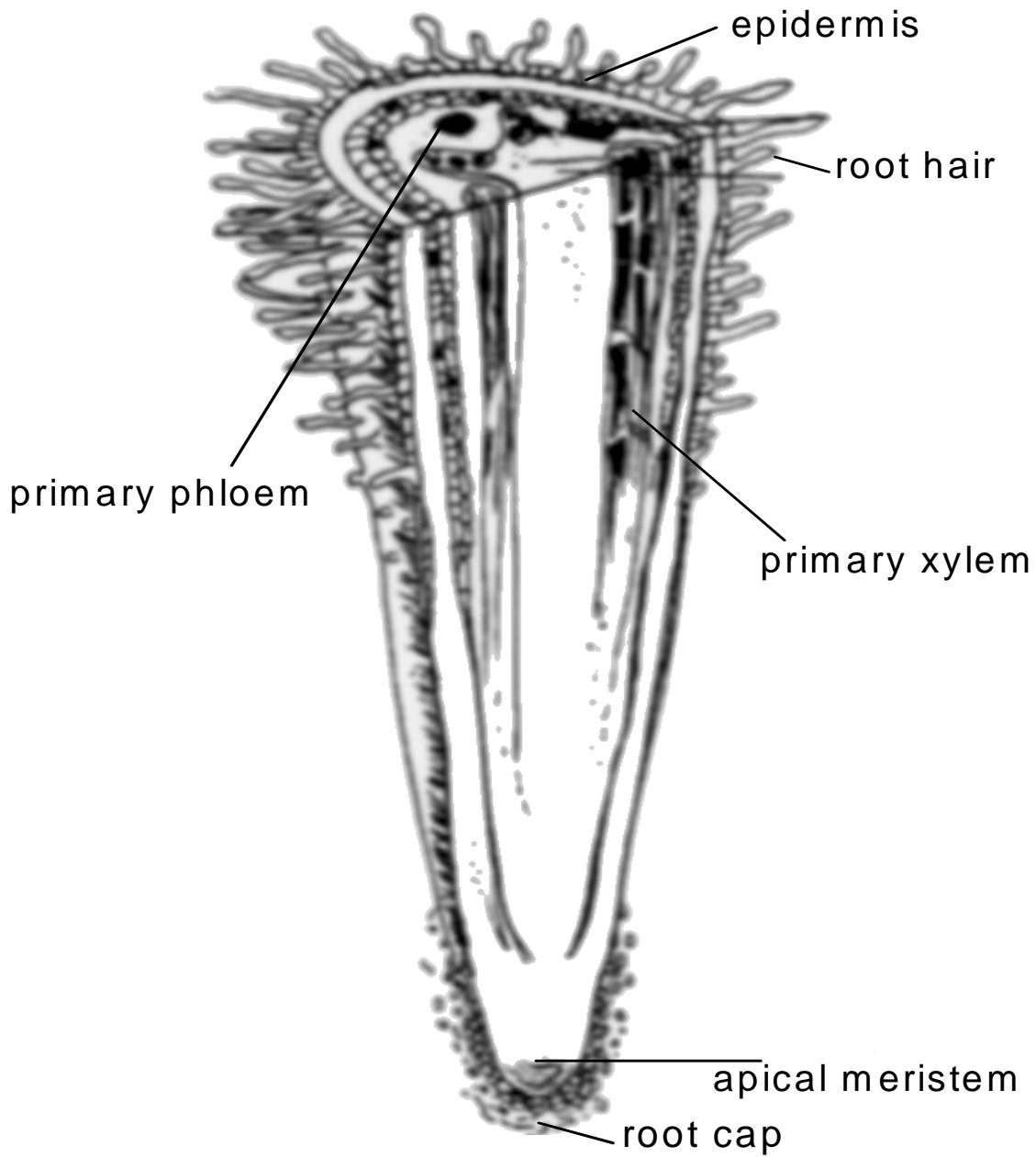
LIFE CYCLE - PLANTS (5A)

PRE

color the xylem and phloem tissue (blue), spongy layer (green), palisade layer (yellow), upper epidermis (red), and the lower epidermis (pink).



LIFE CYCLE - PLANTS (5A) PRE



Color the apical meristem, orange; the phloem, green; the xylem, blue; and the epidermis, red.

LIFE CYCLE - PLANTS (5A)

LAB

Students compare cork, elodea, and onion cells.

OBJECTIVES:

1. Observing different plants under the microscope.
2. Comparing and contrasting cells and tissues.

VOCABULARY:

cell wall
chloroplast
nucleus



MATERIALS:

Swift-GH Microscope
elodea plant
onion slides
cork
medicine droppers
iodine stain
prepared and clean microscope slides

BACKGROUND:

Elodea plants are found in fresh water, and are common fish tank plants. Students will observe many chloroplasts throughout the cells. Photosynthesis is occurring in each cell in the plant. The Elodea plant is much simpler (less complex structurally) than the onion or cork. An onion bulb is the root of the onion plant.

Cork is found as the outer layers of stems and roots of woody plants and also as the protective layer that forms when a plant is damaged. Water conservation and protection are the functions of cork. In the case of the oak cork such a profuse formation of cork occurs that this tissue is removed and used commercially (ie. cork stoppers, life preservers). Removing of the cork does not harm the tree as long as it has time to regrow another thick layer every 3 to 4 years.

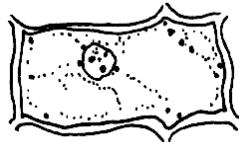
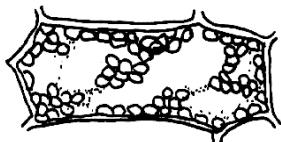
PROCEDURE:

1. Place a small, thin piece of the elodea, onion and cork on one slide. Put a little iodine on each (less than a drop). If you are using the Swift-GH you do not need the cover slips. If you are using a transmitting light microscope, make sure the pieces of elodea, onion, and cork are very thin. You may need to place a drop of water and use a cover slip

on top of the specimens.

2. Emphasize with students that they have looked at 3 types of plants and these do not look like the ideal pictures of the pre-lab worksheet. The common structure that can be seen in all 3 specimens is the cell wall. The pictures below should help you illustrate the differences with your students. Plants are more complex than most books present. Students should be aware of this. Looking at cork tissue under the microscope, students should see empty cells. There are no chloroplasts, but very thick cell walls. Cork does not undergo photosynthesis, so students should not see chloroplasts.

ELODEA	ONION	CORK
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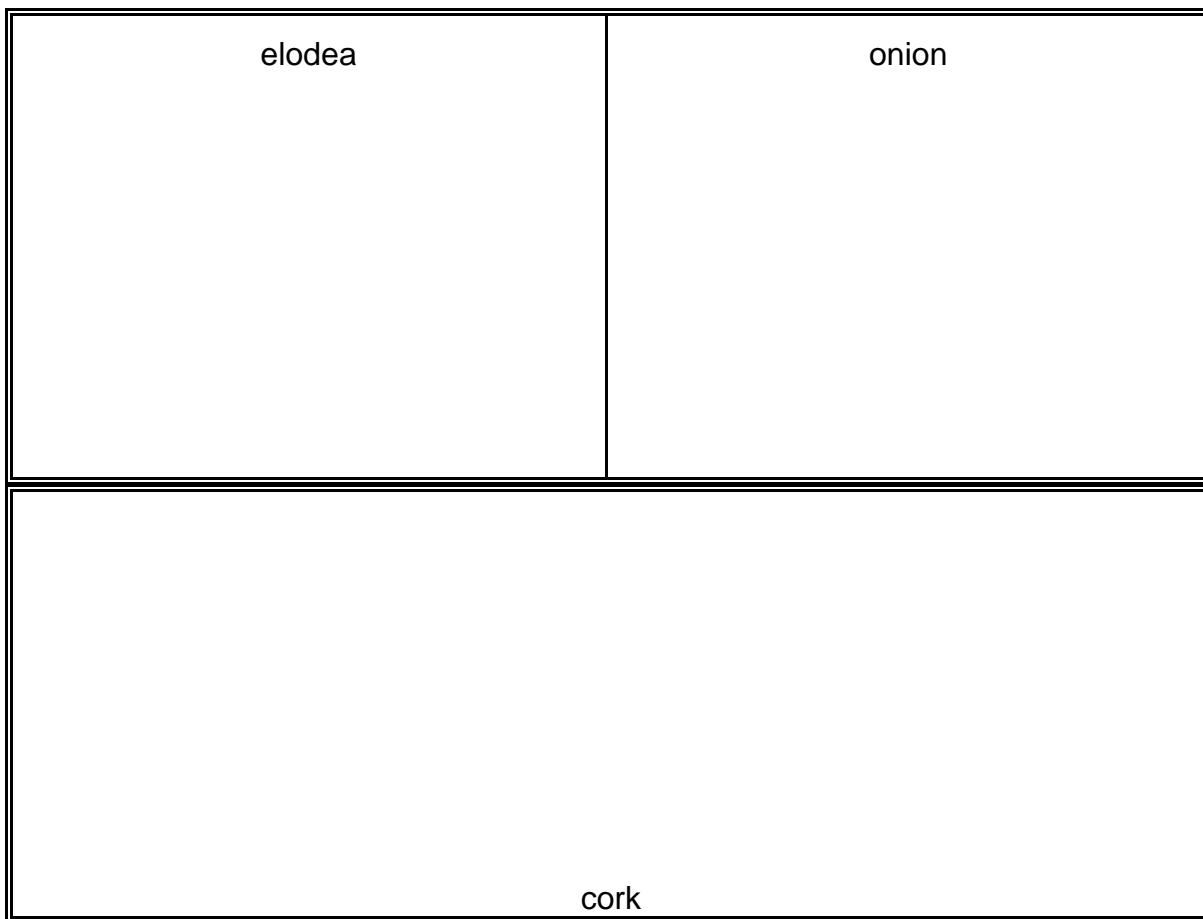
LIFE CYCLE - PLANTS (5A)

PROBLEM: What are the characteristics of a plant cell?

PREDICTION: _____

MATERIALS: Microscopes, Elodea Plant, Onion, Cork, Medicine Droppers, Stain, Prepared and Clean Microscope Slides

PROCEDURE: Observe and listen carefully to your lab instructor as you look at the microscope slides of elodea, onion, and cork cells. Illustrate what you see and label all parts of the cells (cell wall, chloroplasts, vacuole, nucleus, and starch grains).



CONCLUSIONS:

Are all plant cells the same?

What are the major differences between the Elodea, Onion, and Cork cells?

LIFE CYCLE - PLANTS (5A)

POST LAB

OBJECTIVES:

Students demonstrate that oxygen is produced by plants.

1. Demonstrating photosynthesis.
2. Analyzing the mechanism of photosynthesis.

VOCABULARY:

chlorophyll
chloroplast
photosynthesis
respiration

MATERIALS:

elodea plant
light source
Bromothymol Blue
straws
five - 25 ml graduated cylinders
demonstration prepared the night before - see step #5 in Procedure



Chloroplasts

BACKGROUND:

The production of food from carbon dioxide and water in the presence of chlorophyll utilizing light energy and releasing oxygen is called photosynthesis. Plants produce food in the form of simple sugars (carbohydrate). In order for photosynthesis to occur sunlight and chlorophyll must be present. There are different types of chlorophyll, but the one involved in photosynthesis is called chlorophyll-A. Chlorophyll is a pigment which is stored in chloroplasts. During autumn and winter chlorophyll is not produced allowing the other pigments of brown and red to predominate giving plants their autumn colors.

PROCEDURE:

1. Add 1-2 drops of bromothymol blue to 15mL of water in a 25 ml graduated cylinder. Gently blow into the tube using a straw until it changes color to yellow. Have the students discuss the change. [The change occurs because CO_2 , has been added to the solution, making it more acidic therefore causing a color change. Remember, humans produce carbon dioxide and utilize oxygen whereas plants utilize carbon dioxide and produce oxygen]

2. Place a piece of elodea in the 25mL graduated cylinder with the yellow solution and insert a cork stopper in the beak of the cylinder. Expose the cylinder to sunlight for 20 minutes. [The yellow solution will change back to blue because the plant will utilize the carbon dioxide, making the solution less acidic, converting the color back to blue.]

3. In another cylinder, add 1-2 drops of bromothymol blue to water and gently blow with a straw until the solution changes color. Plug the top of the cylinder with a stopper and place it in the sunlight for 20 minutes without elodea. [No change will occur because the carbon dioxide remains in solution and the acidity of the solution does not change.]

4. Prepare another cylinder in the same manner as the previous one, but do not expose it to sunlight, wait 20 minutes. [Again, no change will occur because no plant is present and photosynthesis is not occurring therefore the acidity of the solution remains the same.]

5. A final cylinder containing an elodea plant bromothymol blue and water should have been prepared before this activity and left in a dark place for 24 hours. [No change will occur because sunlight is required for photosynthesis to occur.] Ask the students to describe what they observe.

6. Write the following reaction on the board:



Explain the exchange of gases and how humans and plants live together in a mutual relationship. Without plants humans would not have oxygen and without humans plants would have no carbon dioxide. Through photosynthesis, plants produce food for both themselves and other living organisms. Remind students that when animals eat plants they too are eating the food that the plants produced.

LIFE CYCLE - PLANTS (5B)

PRE LAB

Students look at how plants reproduce.

OBJECTIVES:

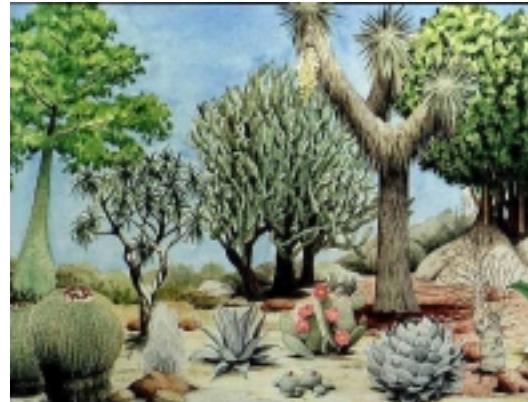
1. Exploring the diversity of plant reproduction.
2. Comparing and contrasting plant reproduction.

VOCABULARY:

asexual
sexual

MATERIALS:

worksheet



BACKGROUND:

Sexual reproduction in plants occurs when a detached reproductive cell unites with another reproductive cell. Unlike animals, plants do not have to have separate male and female sexes, in many plants both sexes are located on the same species. In asexual reproduction, the cell, tissue, or organ develops directly into a new organism. Sexual reproduction allows combinations of different genetic material to be introduced into a new individual (this is the method by which humans reproduce and provides for genetic rearrangement and assortment.) In asexual reproduction an exact copy is made from the mother cell, therefore, the genetic material remains the same. Vascular plants are more complicated than non-vascular plants. The development of complex tissues and organs in vascular plants to aid in the movement of water and food, created the need for different strategies to reproduce.

ASEXUAL REPRODUCTION OF NONVASCULAR PLANTS. Unicellular algae reproduce by the simplest type of reproduction which consists of cell division. In simple cell division, two daughter cells are produced from one mother cell. Some algae have asexual spores which produce specialized reproductive cells that are capable by themselves of producing new plants by cell division and growth.

ASEXUAL REPRODUCTION OF VASCULAR PLANTS. Vegetative reproduction involves no special reproductive cells. One of the most common types of vegetative propagation occurs in plants with horizontal stems growing either above ground (runners or stolons) or underground (rhizomes). Several plants propagate vegetatively by tubers or the thickened, fleshy ends of rhizomes. Some plants have long slender stems that develop

roots when they touch the ground. Bulbs such as those of onions form large buds that grow. Corms are the short, fleshy vertical underground stems have more stem tissue and smaller scale leaves than a bulb. Some plants reproduce by having horizontal roots while others have leaves that will start to ground. Some plants can propagate by cutting either stems or tubers into pieces that will grow. There are many different types of asexually reproducing vascular plants.

SEXUAL REPRODUCTION OF NONVASCULAR PLANTS. Although not common, many small algae will reproduce sexually by forming specialized sex cells. This usually happens when the asexual cycle has terminated its cycle. (This is called alteration of generations.) Some spores are also formed by asexual means.

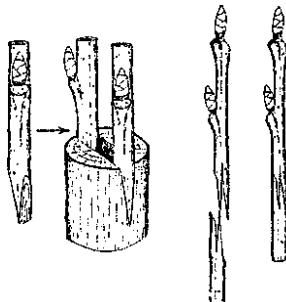
SEXUAL REPRODUCTION OF VASCULAR PLANTS. Trees reproduce sexually through seeds (female) and pollen (male). Gymnosperms produce a naked seed whereas angiosperms (flowering plants) produce a true seed.

PROCEDURE:

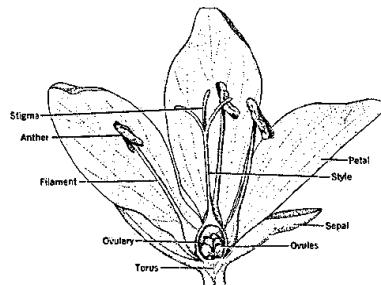
1. Plants provide an excellent means to review reproduction. Plants reproduce in so many ways that students will get a better understanding of the complexities needed to duplicate their own species. This will help students understand human reproduction.
2. Review the different methods of plant reproduction. Make sure students remember the difference between vascular (more complex) and non-vascular (mainly bryophytes and algae) plants.
3. On the students' worksheet have the students determine whether the organisms reproduce by sexual or asexual means. **Answers:** Asexual: 1,3,5,6; Sexual 2,4,7,8

LIFE CYCLE - PLANTS (5B) PRE

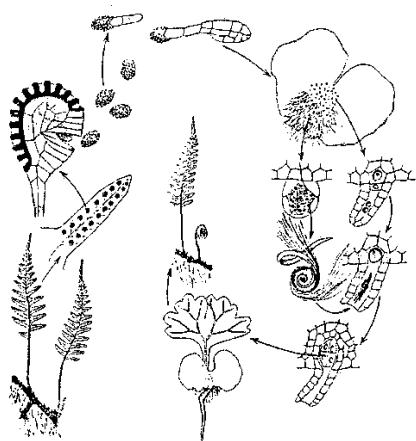
DIRECTIONS: DETERMINE WHICH PLANTS REPRODUCE ASEXUALLY AND WHICH REPRODUCE SEXUALLY.



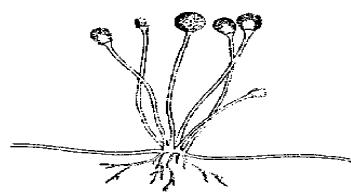
1. Grafting



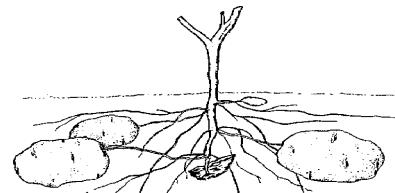
2. Flower



4. Life of Ferns



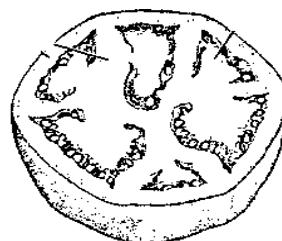
3. Underground rooting



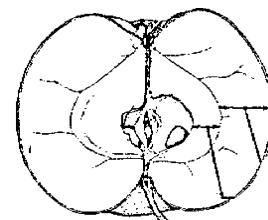
6. Potato



5. Rooting



7. Tomato



8. Apple

LIFE CYCLE - PLANTS (5B)

LAB

Students compare the reproductive organs of different plants.

OBJECTIVES:

1. Comparing reproduction in a gymnosperm and angiosperm.
2. Determining male and female plant parts.

VOCABULARY:

angiosperm
cone
gymnosperm
pollen
pollination
seed
sexual



MATERIALS:

different flowers, fruits, seeds, cones
Life Cycle - Plants (5B)

BACKGROUND:

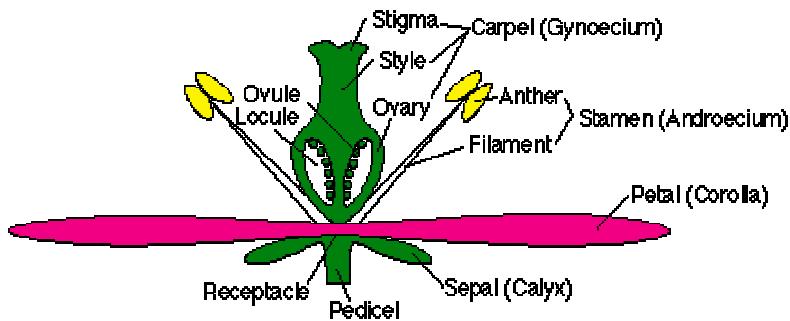
Gymnosperms are the non-flowering seed plants such as cedar, pine, redwood, hemlock, and firs. Gymnosperms are woody plants that bear "naked seeds." They are called naked because their seeds develop exposed on the upper surfaces of cone scales, such as in pine cones. A pollen grain is carried by wind currents to the appropriate "egg" where the growth of the pollen tubes through this tissue brings the sperm to the egg. Gymnosperms are usually of large size with much secondary growth, the leaves are usually evergreen needles or scales.

Angiosperms have flowers and bear seeds enclosed in a protective covering called a fruit. Angiosperms are the dominant types of plants today. Angiosperms are further divided into monocots and dicots. Monocots have one seed leaf. Dicots have two seed leaves. There are at least 250,000 species of angiosperms ranging from small flowers to enormous wood trees. Pollination is accomplished by wind, insects, and other animals. The male part is the pollen grain, and the female part is the ovary. The ovary goes through meiosis to produce an "egg", which is then fertilized by the "sperm" carried by the pollen. The sperm of the male part travels down the pollen tube in the style. Two sperm enter the micropyle of the ovary. After the process of mitosis, it turns into a seed with an embryo. The seed may be inside a fruit.

PROCEDURE:

1. Discuss how angiosperms and gymnosperms reproduce. You may want to review the different parts of the plants.

2. In angiosperms, the pistil is the female reproductive structure found in flowers, and consists of the stigma, style, and ovary. There are two parts to an angiosperm: a male part and a female part. The male gametophyte consists of 2-3 cells contained within a pollen grain; the female gametophyte consists of eight cells contained within an ovule. The stamen is the male reproductive structure of a flower; usually consisting of slender, thread-like filaments topped by anthers, which contain the pollen.



3. In gymnosperms the cone is the female reproductive part and the pollen is the male reproductive part. Pine trees and other gymnosperms produce two types of cones. The male cone is called the pollen cone. The larger female cone is the seed cone. A single tree usually produces both pollen and seed cones. Spore-producing structures are found on the scales of cones.

4. Give students flowers, fruits, seeds, and cones. The kit contains seeds and cones, but you will have to get some flowers and fruit. Have the students dissect the flowers and fruit so they can see the different parts of the fruit. Have reference material available so that students can identify the different parts easily or use the recommended web site. You may want students to identify male and female species.

<http://home.thezone.net/~gosse/asperm.html>

Goes through the life history of angiosperms and gymnosperms.

LIFE CYCLE - PLANTS (5B)

PROBLEM: How do angiosperms and gymnosperms reproduce?

PREDICTION: _____

MATERIALS: different flowers, fruits, seeds, cones

PROCEDURE:

1. You have several flowers, fruit, seeds, and cones at your table. Identify which ones you have and describe them.
2. Draw and label the parts of the plant (be sure to label the parts that are male and female)

SAMPLE	DRAW PARTS OF PLANT THAT ARE USED IN REPRODUCTION

CONCLUSIONS:

1. How do angiosperm plants reproduce? _____
2. How do gymnosperm plants reproduce? _____

LIFE CYCLE - PLANTS (5B)

POST LAB

Students make a sock garden.

OBJECTIVES:

1. Discovering how seeds are dispersed.
2. Finding seeds in a play yard.

VOCABULARY:

dispersal
reproduction

MATERIALS:

old socks
pans



BACKGROUND:

Seeds are a major form of plant reproduction and they have many ways of spreading themselves beyond the area of the mother plant. Dandelion, maple and pine seeds are carried by the wind, coconuts are carried by water, and foxtails and burrs are carried on animal coats and people's clothing. Some seeds, like those of berries, can pass through an animal or bird intact and be spread in droppings. Some pine cones will only open after a fire, ensuring the reseeding of a forest.

Seeds that we eat include nuts, peanuts, sunflower seeds, sesame and poppy seeds and coconuts. The part of the coconut that we eat is a seed, one of the biggest in the world.

PROCEDURE:

You may want the students to do this at home and bring in the sprouting socks.

1. Instruct students to bring in an old sock to school or you may want them to do this at home. Take the students out to a field or play yard that is overgrown and not mowed. Have them slip the socks over their shoes and run around. They will pick up burrs, foxtails and a number of other seeds. Make sure they understand that this is how some seeds travel.
2. Wet one entire sock, place it in a cake pan placed on a slant. Fill the lower part of the pan with water and place the tip of the sock in it. This will keep the sock wet, but

should prevent mold. Place the pan in a warm place and watch the seeds sprout.

3. You may want to pull off some of the seeds before you get them wet. You may need to put some of the seeds in a freezer or refrigerator for two weeks to simulate winter. Then try planting them. Some seeds need to pass through a cold period before they will sprout.

This illustrates to the students that seeds are all over the place, just ready to grow when given the right environment.