

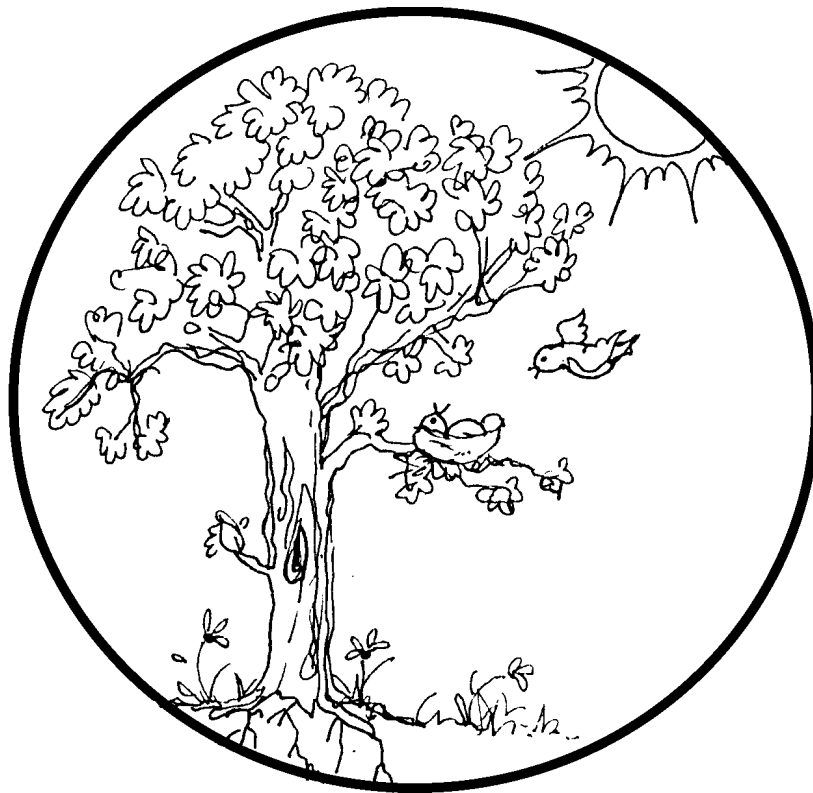


Life Cycle

Diversity in a Balance



SECOND GRADE PLANT LIFE



2 weeks
LESSON PLANS AND
ACTIVITIES

LIFE CYCLE OVERVIEW OF SECOND GRADE

ORGANISMS

WEEK 1.

PRE: *Distinguishing characteristics of vertebrates.*

LAB: *Discovering characteristics of animals.*

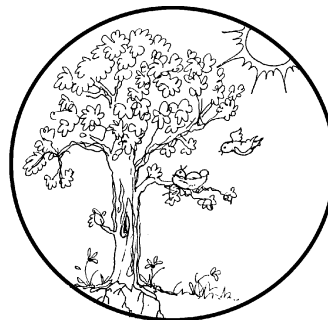
POST: *Identifying animals by the tracks they make.*

WEEK 2.

PRE: *Developing and understanding animal jokes.*

LAB: *Describing local habitats.*

POST: *Comparing land and water organisms.*



HUMAN BIOLOGY

WEEK 3.

PRE: *Charting the growth of humans.*

LAB: *Comparing the growth of hair.*

POST: *Analyzing how babies grow.*

WEEK 4.

PRE: *Investigating growth in humans.*

LAB: *Comparing the positions of human organs with those of other animals.*

POST: *Analyzing fingerprints.*

PLANT LIFE

WEEK 5.

PRE: *Exploring the different types of leaves and roots.*

LAB: *Comparing and contrasting leaves.*

POST: *Exploring the parts of trees and flowers.*

WEEK 6.

PRE: *Discovering the diversity of plants.*

LAB: *Classifying broad and needle leaf trees.*

POST: *Discovering the importance of trees.*

NATURAL ENVIRONMENT

WEEK 7.

PRE: *Exploring different eating strategies.*

LAB: *Observing a worm family.*

POST: *Comparing the components of the nutrient cycle.*

WEEK 8.

PRE: *Investigating the life of owls.*

LAB: *Exploring owl pellets.*

POST: *Exploring your local natural environment.*

LIFE CYCLE - PLANTS (2A)

PRE LAB

Students make leaf rubbings.

OBJECTIVES:

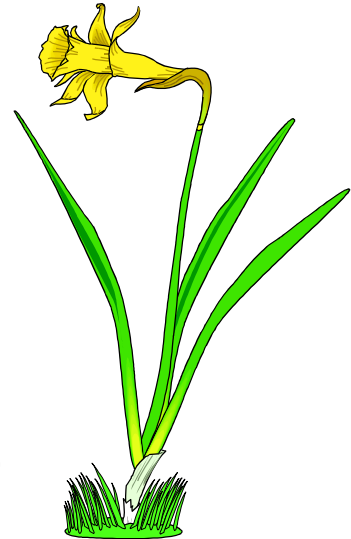
1. Exploring the different types of leaves and roots.
2. Discovering the importance of leaves and roots.

VOCABULARY:

leaf
root

MATERIALS:

a large number of different kinds of leaves for rubbing, news stock paper (thin), pencils or crayons, examples of foods from leaves and roots, pictures of roots or uprooted plants to show the differences between shallow roots and tap roots



BACKGROUND:

The plant kingdom includes seed plants, ferns and mosses. Plants can have one cell or many cells. Plants make their own food by producing simple sugars through a chemical process called photosynthesis. Most of the food produced by plants is made in the leaves. The leaves provide ample surface area for the absorption of light energy and contain many chloroplasts and it is in the chloroplasts where photosynthesis occurs.

Leaves are often modified to help the plant in other ways. Cactus leaves, for example, have spikes to protect the plant, and most of the food production occurs in the stem. Some leaves are waxy to help conserve water, and some are hairy, making them less palatable to animals. Venus fly trap leaves help capture insects, which provide nitrogen to the plant.

Roots help anchor the plant to a substrate and draw water and minerals from the soil. Some roots form a shallow network underneath the soil surface, while others have tap roots that can go quite far down to find water and anchor the plant.

We eat a number of different kinds of leaves and roots. We eat the leaf blades of spinach and lettuce, and the stalks of celery leaves. Onions are layers of leaf bases (the lower part of the blade) that have been modified to store food for the plant. Carrots and radishes are examples of roots we eat.

PROCEDURE:

1. Ask your students why they think plants have roots. Mention the different kinds of roots and discuss why it is so hard to pull up certain plants such as dandelions which are anchored by their roots.

2. Show different kinds of leaves and have the students notice the different patterns of veins, different leaf edges, and overall shapes and sizes.

3. Ask the children why plants have leaves and talk about a plant's ability to make food and how this makes it different from an animal.

4. Show the students how to make a leaf rubbing, by using the broad sides of their pencil leads or crayons. Use news stock, onion skin, or other soft paper. Put the leaf under the paper and softly rub the crayon over the leaf. Have them notice how the veins and leaf edges come through. Let them make rubbings of a number of different leaves. Talk about foods from leaves and roots and show them some examples.

LIFE CYCLE - PLANTS (2A)

LAB

Students measure and describe shape of different leaves.

OBJECTIVES:

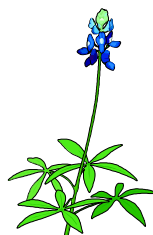
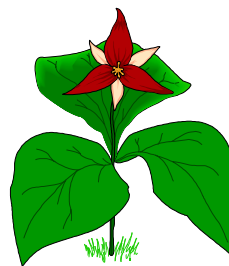
1. Comparing and contrasting leaves.
2. Quantitating leaf description.

VOCABULARY:

blade
leaf
petiole
vein

MATERIALS:

metric rulers
4 leaves
worksheet (angiosperms/gymnosperms and leaf shape)



BACKGROUND:

A leaf can be considered a plant organ, since it is made up of different tissue layers. The main function of a leaf is to produce food for the plant. The leaves are the sites where photosynthesis mainly takes place.

All LAB spring and summer the leaves manufacture the food needed for plant growth, especially in trees. This food-making process takes place in the leaf in numerous cells containing the pigment chlorophyll, which gives the leaf its green color. Along with the green pigment leaves also contain yellow or orange carotenoids which, for example, give the carrot its familiar color. Most of the year these yellowish colors are masked by the greater amount of green coloring. But in the fall, partly because of changes in the period of daylight and changes in temperature, the leaves stop their food-making process. The chlorophyll breaks down. The green color disappears, and the yellowish colors become visible and give the leaves their changing color.

PROCEDURE:

1. In this lab, students are to bring in 4 different types of leaves to class. They must be relatively fresh in order for students to make their observations. Leaves vary in their arrangements on the stem, their form, their distribution of veins (venation), their structure, and many other characteristics. This lab will focus on 2 leaf categories.

2. First, students will have to determine if the leaves come from angiosperm (broad leaf) or gymnosperm (needle leaf) trees. Most students will bring in broad leaves, as they will probably not recognize pine tree needles as leaves. Under the "broad leaf" category, your students may bring in either dicot or monocot leaves. However, most students will not realize that grasses (monocots) are leaves and will probably not bring them, so most of the students will bring in dicot leaves.

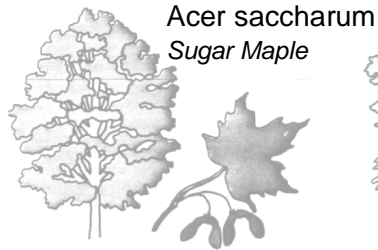
3. The guide sheet points out the characteristics of the leaves that the students should observe. A typical dicot leaf consists of two principal parts, the blade and the petiole or stalk. The blade is thin and expanded, the petiole is slender. The thin blade is supported by a distinct network of veins.

4. The leaves of a plant can be one of two types: simple or compound. A simple leaf is one in which the blade is all one piece. A compound leaf is one in which the blade is composed of a number of separate leaf-like parts called the leaflets.

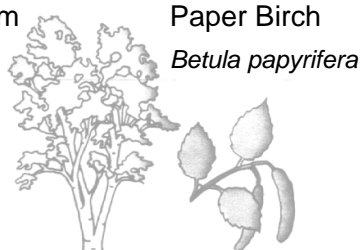
5. The shape of the blade can be long and slender, or oval, or heart-shaped or triangular. The top of a leaf may be pointed, rounded or flattened. The margin may have no indentations, or may be toothed, scalloped, wavy or cut into a number of lobes.

6. The veins in plant and tree leaves have two major purposes. First, they strengthen and help maintain the shape of the leaf and just as our bones in our bodies keep us straight and erect, so do the veins of a leaf. Secondly, veins transport or carry water which contains all the essential minerals and food the plant needs to live. The arrangement of the veins of a leaf can be parallel or netted.

ANGIOSPERMS



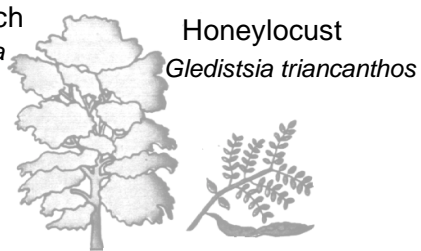
Acer saccharum
Sugar Maple



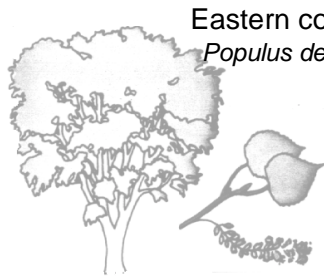
Paper Birch
Betula papyrifera



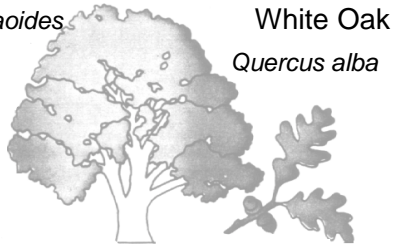
American beech
Fagus grandifolia



Honeylocust
Gleditsia triacanthos



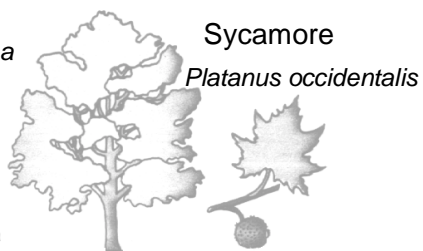
Eastern cottonwood
Populus deltoides



White Oak
Quercus alba

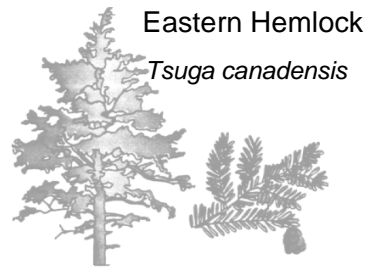


American Elm
Ulmus americana



Sycamore
Platanus occidentalis

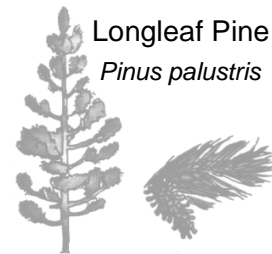
GYMNOSPERMS



Eastern Hemlock
Tsuga canadensis



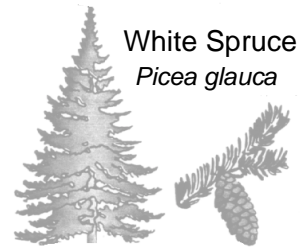
Douglas Fir
Pseudotsuga menziesii



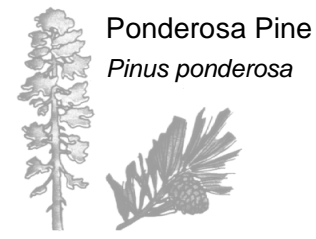
Longleaf Pine
Pinus palustris



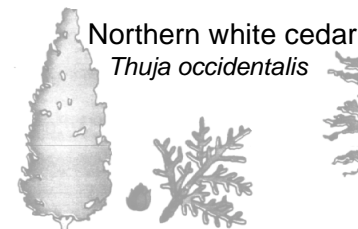
Balsam Fir
Abies balsamea



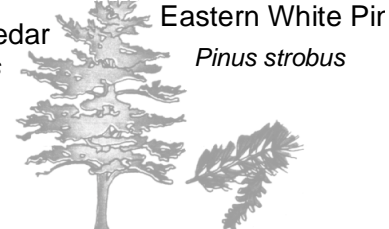
White Spruce
Picea glauca



Ponderosa Pine
Pinus ponderosa



Northern white cedar
Thuja occidentalis



Eastern White Pine
Pinus strobus

LIFE CYCLE - PLANTS (2A)

LAB

Leaf Description



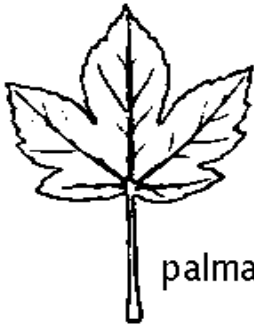
lance-shaped



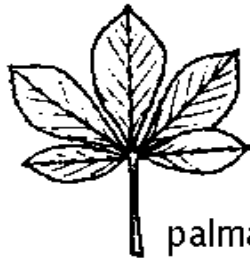
oblong



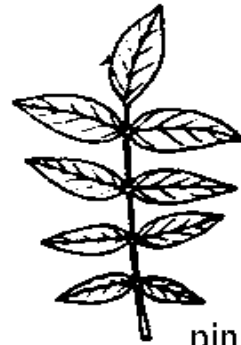
ovall



palmate



palmate
(complex)



pinnate



scales



needles
in
bundles



simple

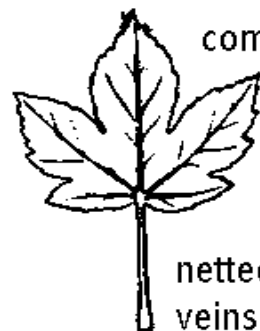
parallel
veins



elliptical



lobed



compound

netted
veins

LIFE CYCLE - PLANTS (2A)

POST LAB

OBJECTIVES:

1. Distinguishing a tree from a flower.
2. Exploring the parts of trees and flowers.

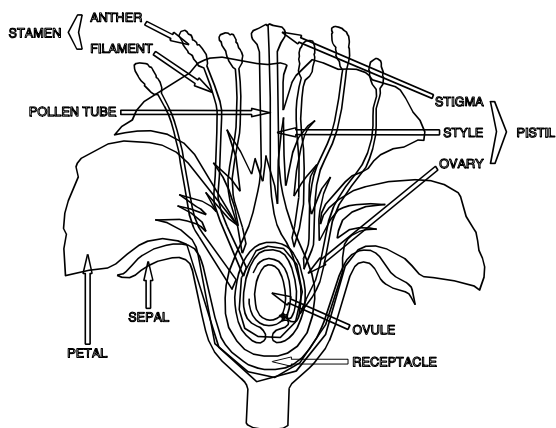
VOCABULARY:

flower
organ
plant
tree

MATERIALS:

worksheet
flower and tree cross sections (optional)

Students use a worksheet to determine the difference between a tree and flower.



BACKGROUND:

A tree and a flower are totally different. The word tree refers to the complete plant whereas a flower is only an organ of a plant. Some trees produce flowers (angiosperms) and some do not (gymnosperms). Flowers are usually grouped together on a stem and are adapted for sexual reproduction. The flower is not a plant but a structure formed by some plants for reproductive purposes.

PROCEDURE:

1. Go over the parts of a flower.
 - a. stamen = the pollen producing organ of a flower consisting of a long filament and an anther
 - b. petal = usually brightly colored with a distinct odor which serves to attract insects for cross-pollination (the transfer of pollen from one plant to another of the same type)
 - c. pistil = the seed-bearing female reproductive organ
 - d. sepal = one of the green segments forming the outer protective covering of a flower
2. Go over the parts of a tree, which is a complete plant with many specialized organs and tissues. The picture on the worksheet represents a cross section of the woody tissue.

- a. bark = the wood covering of roots, stems and main trunks of trees and other wood plants
- b. phloem = the pathways through which food material is conducted throughout the plant (moves food)
- c. pith = the soft central portion of the branches and stems of plants
- d. annual growth rings = alternative light and dark concentric rings in tree branches and stems due to periods of growth between summer and winter
- e. xylem = the pathways through which water is conducted throughout the plant

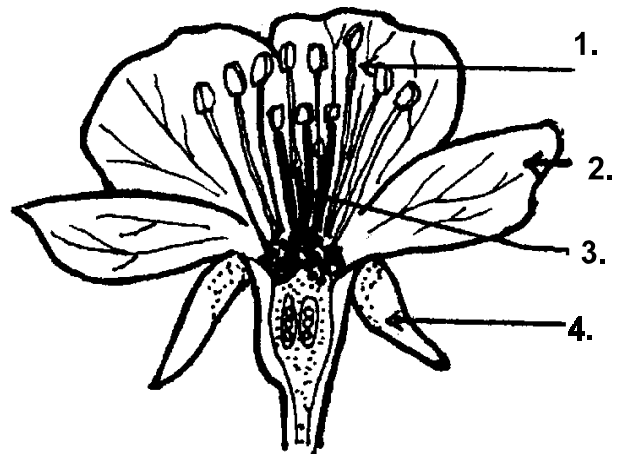
3. Go outside or bring flowers and parts of trees inside and have the students determine parts of a tree and flower.

LIFE CYCLE - PLANTS (2A)

POST

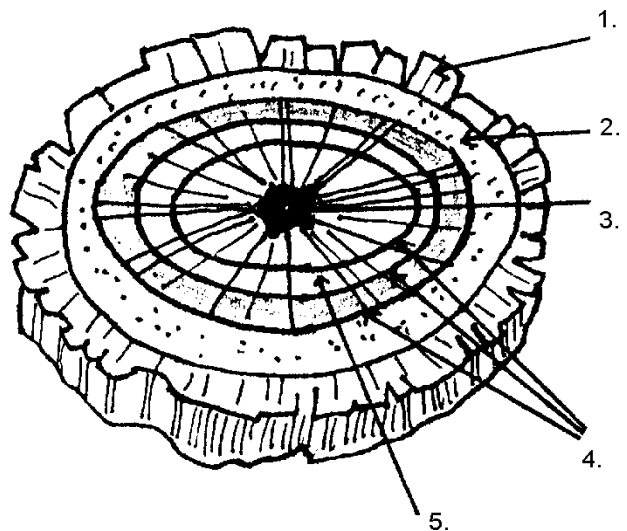
THE FLOWER

1. _____
2. _____
3. _____
4. _____



THE TREE

1. _____
2. _____
3. _____
4. _____
5. _____



LIFE CYCLE - PLANTS (2B)

PRE LAB

Students use a worksheet to begin understanding plant classification.

OBJECTIVES:

1. Discovering the diversity of plants.
2. Classifying different plants.

VOCABULARY:

classification
plant

MATERIALS:

worksheet
crayons



BACKGROUND:

There are over 300,000 types of plants in several large groups. There are slightly different classification systems for plants, but most recognize two basic groups, the nonvascular plants, and the vascular plants. The vascular plants are distinguished by conducting tissues called xylem and phloem tissues. Xylem tissue transports water and phloem tissue transports food products. These tissues are absent in nonvascular plants. Nonvascular plants in the classification used in this curriculum include brown-green algae (including diatoms), brown-red algae, mosses, and liverworts. Vascular plants include ferns (filicopsids), sphenopsids (horse tails), gymnosperms (pine trees), and angiosperms (flowering plants). Nonvascular plants are sometimes referred to as thallus.

Brown-green algae refers to mainly one celled plants called diatoms. Diatoms are a major component of the oceans. Diatoms are important because they are at the bottom on the food chain. Brown-red algae refers to large plants of the sea, including kelp and seaweed. Plants in the marine environment do not need the elaborate system of getting nutrients to all parts of their bodies, because the marine environment has all these nutrients available. However, marine plants must develop a way to rid themselves of salt.

Bryophyta which includes mosses and liverworts are mainly inconspicuous plants growing in moist habitats. They are not fully adapted to life on land because they need water to reproduce. Bryophytes do not get very large.

Sphenophyta or horsetails are easily recognized by their jointed stems and rough, ribbed texture. Early settlers used horsetails to help clean pots and pans because of their rough texture. These plants are vascular and may be found in wet environments.

Ferns (filicopsids) are familiar vascular land plants that reproduce by using spores rather than seeds. Ferns prefer wet, moist climates.

Gymnosperms (which include Ginkgoes) or conifers (just the pine-like trees) are mainly cone-bearing plants. There are only about 550 species of living conifers. They dominate the forests of the Northern Hemisphere, but are known in the tropics and Southern Hemisphere. The leaves of most conifers are needle-shaped and are all simple.

Angiosperms (flowering plants) produce a seed cover for reproduction and are the most common small plants and trees. They are divided into groups monocots (grasses) and dicots (larger flowering plants).

PROCEDURE:

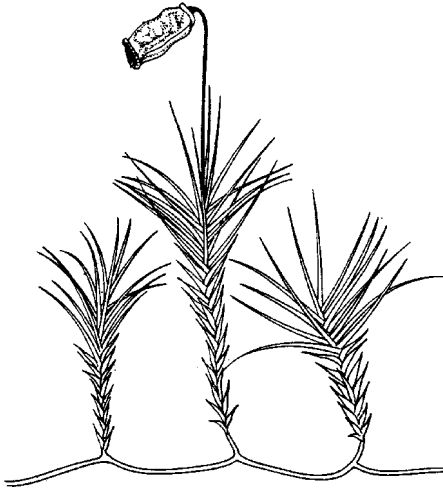
1. Give students worksheet and go over the different groups using the information provided above.

2. You may want to go outside and see what major groups you can find. Most of them will be angiosperms or gymnosperms. Some ferns may be around, and if you live in a rural, wet area you may have sphenopsids or horsetails. Emphasis with students that plants have a more complicated division, but this is to get them to think about how we should classify plants.

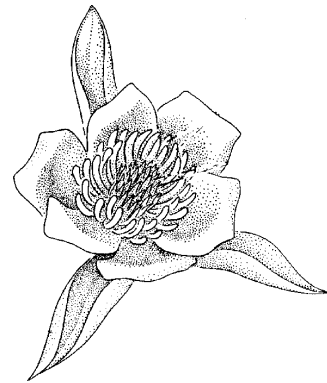
LIFE CYCLE - PLANTS (2B)

PRE

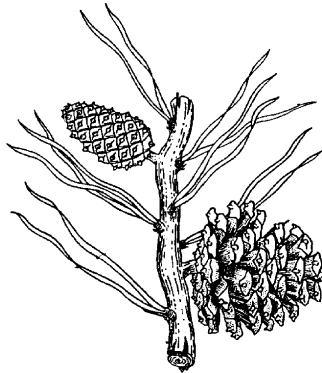
BRYOPHYTA



ANGIOSPERMS

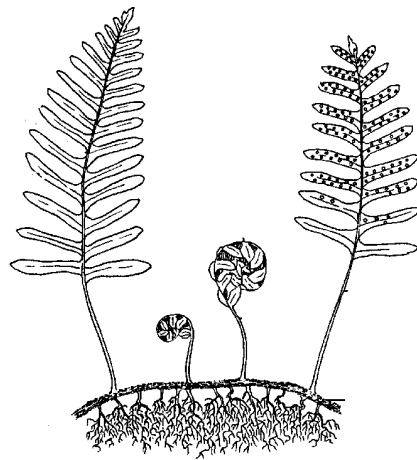
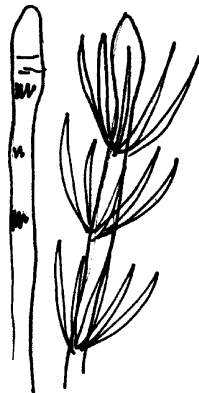


GYMNOSPERMS



FERNS

HORSETAILS



LIFE CYCLE - PLANTS (2B)

LAB

Students classify specimens.

OBJECTIVES:

1. Classifying broad and needle leaf trees.
2. Comparing and contrasting gymnosperms and angiosperms.

VOCABULARY:

angiosperm
flower
gymnosperm
pine cone
pollen



MATERIALS:

Life Cycle - Plants (2B)
angiosperms/gymnosperms guide
Wildflowers of North America Placemats, or other reference materials like *Familiar Trees of North America* (Audubon Pocket Guides)

BACKGROUND:

Angiosperms produce specialized structures called flowers in which seeds develop. Angiosperms are the dominant members of the world's flora. Angiosperms are flowering and fruit producing plants. The angiosperms may be divided into the monocots and the dicots. Seeds and fruits may be variously modified, a factor that frequently assists in seed dispersal. Wind, animals, (including humans), and water are the most important agents of dispersal.

Gymnosperms produce unenclosed seeds located on the upper surface of scales, which are usually parts of cones. Most conifers are woody plants and are usually large with leaves that are usually evergreen needles or scales. Conifers are the most abundant gymnosperm today. Pines, spruce, fir, cedars, sequoias, redwoods, and yews are all conifers. Conifers cover large areas of North America, China, Europe, and Australia. The leaves of conifers are long and thin, and are often called needles. Even though the name evergreen is commonly used for these plants, it isn't accurate because needles don't remain on conifers forever.

Conifers have male and female reproductive structures called scales. Scales are grouped into larger structures called male and female cones. Male cones make male gametophytes called pollen. Female cones make female gametophytes called eggs. Later, the female cones hold seeds that develop on their scales. Each seed is covered by a seed coat, but the seed isn't protected by the cone. Since the seeds sit "naked," or on the

outside of the scales, conifers are called naked seed plants, or gymnosperms (gymno-means naked; -sperm means seed).

PROCEDURE:

Most students are familiar with angiosperms and gymnosperms. In this lab, the students will take a closer look at the different organs and tissues of each by trying to identify them.

1. Students should look at their specimens and try to identify the parts of the trees and identify whether the specimen is a seed, fruit, flower, bark, cone, or any other part of the tree. They will then refer to the angiosperm/gymnosperm guide and try to identify the types of trees, and decide whether or not the tree is an angiosperm or gymnosperm.

2. Instruct students to draw their specimens on the lab sheet. If you have reference material on identifying trees this would help guide the students to do a little research. The individual type of tree is identified in the module. This lab should be customized to the local area.

LIFE CYCLE - PLANTS (2B)

PROBLEM: How can you distinguish gymnosperms from angiosperms?

PREDICTION: _____

MATERIALS: plant specimens, angiosperms/gymnosperms guide

PROCEDURE: Draw and try to identify the part your specimen is from. Decide whether they are angiosperms or gymnosperms.

1. TYPE PART	2. TYPE PART
3. TYPE PART	4. TYPE PART
5. TYPE PART	6. TYPE PART
7. TYPE PART	8. TYPE PART

CONCLUSIONS: What are some differences between angiosperms and gymnosperms?

LIFE CYCLE - PLANTS (2B)

POST LAB

Students use the Internet to classify trees in the community.

OBJECTIVES:

1. Exploring the natural environment of trees.
2. Discovering the importance of trees.

VOCABULARY:

environment
tree

MATERIALS:

Internet
Tree by D. Bernie (Eyewitness Book - Knopf), other reference material
angiosperms/gymnosperm guide



BACKGROUND:

If the students enjoyed the previous labs, they will be thinking about how to classify every tree and flower that they see around. The local environment will become their classroom if you can continue to help them discover the trees and flowers.

There are many publications to help you identify your local trees and flowers, but the Internet may make it easier. There are many sites and new ones develop every day.

PROCEDURE:

1. Students should be constantly bringing in different trees parts for you to identify. The Audubon Pocket Series is ideal for keying out the different species.

You can increase your own collections, especially with pieces of branches and cones by asking the students that if they see good specimens to bring one to the classroom. Branches can be easily sawed and the ends sandpapered. If you have trouble identifying the plants consult your local nursery, they will be glad to help.

2. The Eyewitness book on *Trees* is also an excellent book, not only for the pictures but the information that it can provide the teacher. This book is recommended as a picture book.

3. If you would like to extend the previous lab, have the students identify the trees in their community, you may want to use the following web sites to help make identification

easier. We recommend that you do a search on the web to see if your local trees may be listed.

<http://osu.orst.edu/instruct/for241/>

Dichotomous key of conifers in the Pacific northwest. Well designed and easy to use.

<http://www.uah.edu/admin/Fac/grounds/choice.htm>

University of Alabama has about 200 ornamental trees in this informational guide. May help to determine type of tree.

<http://www.hcs.ohio-state.edu/hort/plants.html>

Ohio State list of about 1500 plants with images.

<http://selecttree.calpoly.edu/>

Site on California trees, but without many images.

<http://nature.snr.uvm.edu/www/mac/plant-id/>

University of Vermont, School of Natural Resources. Site has both angiosperms and gymnosperms.