

2

Plant Connections

PURPOSE:

- To recognize the importance of plants: to humans, animals, and the environment.

OBJECTIVES:

For youth to:

- identify common uses of plants.
- describe ways that plants and animals depend on each other.
- create a landscape.
- list the benefits of composting.
- identify producers, consumers, and decomposers.
- discuss the end products of photosynthesis.

LESSON TIME:

- Lesson time may vary based upon learning activities selected. Most activities are approximately 30 minutes.

ADVANCE PREPARATION:

- Read the BACKGROUND BASICS on Why Are Plants Important?
- Review activities and choose appropriate one(s) to use.
- Collect and prepare materials for appropriate activities.

Why Are Plants Important?

LEARNING ACTIVITIES

1. PLANT GOODIES
2. LET'S GET TOGETHER
3. DRESS ME UP
4. REUSABLE PLANTS
5. THE HEALTHY PROVIDERS
6. EVERY BREATH YOU TAKE

DO

The following are suggestions for using the activities in Lesson 2. The materials needed for each are listed within the activity.

- Give examples of plants and their uses in PLANT GOODIES.
- Describe ways in which plants and animals depend on each other in LET'S GET TOGETHER.
- Explain the importance of landscaping in DRESS ME UP.
- Demonstrate the rate of decomposition of natural products in REUSABLE PLANTS.
- Identify the components of an ecosystem in THE HEALTHY PROVIDERS.
- Discuss the importance of plants in EVERY BREATH YOU TAKE.

REFLECT

After completing the activities in this lesson, help youth reflect on what they have learned with these questions:

What are five common human uses of plants?

food, fiber, shelter, fuel, and medicine

What are some ways that plants and animals depend on each other?

food, shelter, transportation, protection

Why is landscaping important?

appearance, reduce noise, privacy, erosion control

What are the benefits of composting?

reduces yard waste going to the curb for pick-up and handling, saves money, adds nutrients to the soil

What are the four components essential in any ecosystem?

abiotic, biotic, energy, nutrient cycling

What products result from photosynthesis?

carbohydrates, oxygen, water

APPLY

Help youth learn to apply what they have learned.

- Have youth list products made indirectly from plants or plant parts.
- Take a nature walk, turn over a log, look under a pile of leaves and discover plant/animal relationships.
- Have youth design one area of their own home landscape.
- Build a garbage can composter.
- Have youth construct a concept map depicting ideas associated with an ecosystem and its producers, consumers, and decomposers.
- Calculate the amount of oxygen needed by a group of people each day.

BACKGROUND BASICS ... Why Are Plants Important?

Plants provide us with food, fiber, shelter, medicine, and fuel. The basic food for all organisms is produced by green plants. In the process of food production, oxygen is released. This oxygen, which we obtain from the air we breathe, is essential to life. The only source of food and oxygen are plants; no animal alone can supply these. Shelter, in the form of wood for houses; and clothing, in the form of cotton fibers, are obvious uses of plant materials. But we must not forget fuel, furniture, paper products, certain medicines like aspirin, and many other products like perfume and chewing gum. To these tangible aspects of the plant world we must also add the importance of beauty and relaxation derived from plants. Since animals are surrounded by and dependent upon plants, the factors that influence plant growth, structure, and distribution, affect the animal world as well.

Plant - Animal Relationships

Forests, lawns, streams, and marshes are all habitats that are easily recognized as unique biotic communities. A **community** is a naturally occurring, interactive assemblage of plants and animals living in the same environment. The interaction between plants and animals often exists out of the need for food, protection, transportation, and reproduction. The different kinds of interaction possible between organisms are extremely important in determining the abundance of species. If the interaction between species is beneficial, it is described as **mutualism**. Some of the most complex mutualistic relationships evolved between plants and pollinators. If the interaction proves disadvantageous, it is referred to as **competition**. **Commensal** relationships, in which one species benefits and the other is unaffected, are common between plants and animals. For example, when a bird builds a nest in a tree, the bird benefits and the tree is (usually) unharmed. Other relationships may positively affect one population and be detrimental to the other. Such relationships involve **predation** and **parasitism**. In predation, one organism directly kills and consumes its prey. Parasitism differs in that parasites live on or in the prey, but may not kill it outright. A good example of parasitism is mistletoe growing on a tree.

Ecosystems

An **ecosystem** is the **biotic** (living) and **abiotic** (nonliving) factors of an ecological community considered together. Ecosystems contain four components: the physical environment (abiotic), living things (biotic), energy input and use, and nutrients that cycle between the biotic and abiotic components. Based on this definition, ecosystems can vary from large unbroken tracts of forest to small ephemeral ponds to backyards.



1. Abiotic factors include temperature, climate, light, and other nonliving things.
2. The biotic elements can be classified according to their activities: **Producers** include photosynthetic organisms. **Consumers** feed on producers and each other. Consumers are classified as primary, secondary, tertiary, etc., according to their feeding level. For example, primary consumers (herbivores) feed on plants, secondary consumers (carnivores and parasites) feed on primary consumers, and tertiary consumers feed on both primary and secondary consumers. Animals and people who eat BOTH animals and plants are called

omnivores. Then there are **decomposers**, fungi and bacteria that feed on the dead through the breakdown of organic matter and eventual absorption by the decomposer.

In a given ecosystem, the interaction of organisms make up **food chains**. Usually, an organism has more than one source of food and is preyed on by more than one kind of organism. Under these conditions it is more appropriate to speak of a **food web**.

Photosynthesis and Decomposition

The most basic processes in the maintenance of the ecosystem are photosynthesis and decomposition. **Photosynthesis** is the process by which green plants utilize the sun's energy to convert carbon dioxide and water into carbohydrates and oxygen. Photosynthesis that occurs in plants is simplified by the chemical equation:



This equation as interpreted as six molecules of carbon dioxide and twelve molecules of water react in the presence of chlorophyll and light to form one molecule of glucose, and six molecules of oxygen.

Plants are one of the natural carbon “sinks” (natural systems that absorb and store carbon dioxide from the atmosphere). These naturally occurring “sinks” are critical in the effort to soak up some of the greenhouse gas emissions. Researchers are continuing to study the role plants can assist in reducing CO₂ emissions and the relationships of such things as deforestation, reforestation, urbanization impacts on climate changes and global warming. Plants grab carbon dioxide from the atmosphere to use in the photosynthesis process transferring some of this carbon to soil as plants die and decompose.



Involved in the return of nutrients to the ecosystem is the process of **decomposition**. In effect, decomposition is the reversal of photosynthesis - the reduction of organic matter into its inorganic compounds (water, carbon dioxide, and oxygen).

Composting

Composting is controlled decomposition that can be used in the garden as mulch or soil. It depends on microorganisms to feed on and break down plant debris. In order to do this the microorganisms also need oxygen and moisture. Microorganisms need a combination of materials rich in carbon (fallen leaves, branches, and twigs) and nitrogen (such as kitchen scraps). Reducing the particle size of the raw materials will increase the speed of the composting process. The proper mix of materials should result in a hot (135-160°F) compost pile which will destroy weeds seeds and diseases. When incorporated back into the soil, compost increases the soil's ability to retain moisture, improves drainage and aeration, supplies small amounts of nutrients, and increases the biological activity of soil organisms.

Beauty and Aesthetics

Plants fill an important psychological need. Plants in a landscape make work and play more enjoyable. A beautiful landscape doesn't just happen, it must be planned!! The first step in designing a landscape is to decide how the landscape is or will be used. Landscapes can screen unsightly views, increase property value, provide privacy and attract birds and other wildlife. The next step is to draw a bird's eye sketch of the area on a piece of paper. Include the location of property lines, structures, and existing plants on the sketch. Use the sketch to record characteristics about the site such as sunlight patterns, soil characteristics, water runoff and utility lines. Once you have prioritized your needs and examined your landscape site, you are ready to create the landscape plan. Draw in lines that separate the lawn from the landscape, then add trees, ground covers, and shrubs. Use colors, textures, and shapes of plants to create interest and draw attention to a particular area in a landscape. Attention must also be given to the proportion or size of a plant in relation to its surroundings .





OBJECTIVES:

For youth to:

- identify common uses for plants.
- match objects with their plant sources.
- give examples of plants and their uses.
- list several uses of trees and their products.

LIFE SKILL:

- Critical thinking

MATERIALS:

- household objects such as tomato sauce, cloth, spices, toilet paper, aspirin, blue jeans,
- *Aloe vera* plant
- knife
- 5 to 7 *Aloe vera* leaves split lengthwise
- colander or strainer
- wooden spoon
- small bowl
- small paper plate for each youth
- unscented lotion
- vanilla extract or food coloring
- copies of THE AMAZING TREE Activity sheet for each youth
- colored pencils or markers

TIME:

- 30 minutes

SETTING:

- A comfortable room with tables and chairs.

Activity 1: Plant Goodies

INTRODUCTION

Plants provide us with food, fiber, shelter, medicine, and fuel. Plants or plant parts are cooked, ground, treated, and processed to create products for our use. The paper you write on doesn't look like a tree, but it was once a part of a tree. A beef hamburger doesn't look like grass, but grass was eaten by a cow which produced the meat. Without plants our world would be a very different place. What would your life be like without paper, pizza, and blue jeans? Can you match the plant used to make these objects? (hold up objects and get responses as to the plant source). Today, we're going to take raw plant ingredients and make something we use. Has anyone ever seen an *Aloe vera* plant?

LEADER INFORMATION

Use the household objects (hold them up) to emphasize the ideas discussed in the Introduction. This will help the youth understand what you are talking about.

DO

- Show youth an *Aloe vera* plant. Cut one of the fleshy leaves from the plant and encourage youth to touch and smell the leaf.
- Ask youth, "Do you know what products the aloe plant is used in?" Answers will include: lotions, shampoos, cream rinse, burn creams.
- Explain to the youth that aloe is used in creams, lotions, and soaps to soften and moisturize the skin.
- Place 5 to 7 (precut) large fleshy leaves into a colander, use a wooden spoon to crush the leaves and extract the juices into a bowl.
- Give each youth a paper plate with 1/2 to 1 teaspoon of unscented lotion on it.
- Place a few drops of the aloe extract on the plate next to the lotion. Using their fingers have youth mix them together.

DO (continued)

- To enhance it's appearance and smell, add a drop of food coloring and vanilla to the lotion.
- Have youth use the new lotion to moisturize their hands.
- Pass out THE AMAZING TREE Activity sheet and colored pencils or markers.
- Have youth draw a picture of a tree and list the products made from that tree.

REFLECT

What are five common human uses of plants?

food, shelter, fuel, medicine, and fiber

How many uses can you name for trees or their parts?

answers will vary

What types of products can Aloe be found in?

lotions, shampoos, cream rinse

Can you buy lotions without Aloe? **Yes** Then what is the advantage of adding Aloe?

lotions that contain Aloe have natural moisturizing properties

What are some other cosmetics or medicines that are manufactured from plants?

perfumes, lotions, make-up, toothpaste, tissue

What other cosmetic or medicinal products do you use that contain plant parts?

answers will vary

What are some of the uses for trees that you drew in your picture?

food, shelter, fuel, medicine, fiber, clothing, aesthetics, oxygen, erosion control, shade, and wildlife habitats

What are some of the tree products that you drew?

lumber, soaps, homes, paper, rubber, syrup

APPLY

- List five products made indirectly from plants or plant parts.
fish, eggs, meat products, poultry, milk
- Name some of the objects in this room that are made from plants. What plants do they come from?
- Let's plant a tree!! Each type of tree is different and requires special care. Directions for tree planting and care are available at your local nursery or Extension Office.



The Amazing Tree



Instructions: Draw a picture of your favorite tree and list the uses and/or products made from that tree.

Uses	Products



OBJECTIVES:

For youth to:

- list ways that plants and animals depend on each other.
- describe mutualistic, commensal, and parasitic plant/plant and plant/animal relationships.
- explain how plant and animal relationships help each other to survive.

LIFE SKILL:

- Critical thinking
- Planning and organizing
- Teamwork

MATERIALS:

- copies of LET'S GET TOGETHER Activity sheets for each youth
- scissors
- yarn cut in 3 inch pieces
- single hole puncher
- colored pencils or markers
- index cards for each youth
- tape
- skein of yarn

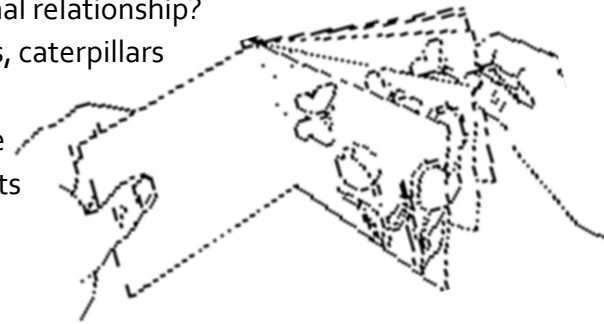
TIME:

- 45 minutes

Activity 2: Let's Get Together

INTRODUCTION

Plants and animals depend on each other for food, protection, transportation, and shelter. Some plants and animals have developed a relationship in which both the plant and animal benefit. This is called a mutualistic relationship. For example, raccoons eat fruit and seeds (which benefit the raccoons) then defecates and disperses the seeds in different locations (which benefit the plants). When one partner benefits from a relationship and the other is not affected it's called a commensal relationship. For example, spanish moss uses a tree's limbs for support but doesn't affect the tree. In other relationships one partner benefits and the other is negatively affected. This is known as a parasitic relationship. Can you think of a parasitic plant/plant or plant/animal relationship? (Mistletoe is parasitic on oak trees, caterpillars in a vegetable garden, and fungi on chestnut trees.) Which of these relationships do humans and plants have? (All three can be found.)



DO

- Give each youth(or pairs) a copy of the LET'S GET TOGETHER Activity sheets.
- Have youth create a moving comic strip of a mutualistic, commensal, or parasitic plant/animal relationship.
- Cut the comic strip into frames and stack them in order from 1 to 14.
- Punch a hole in the upper and lower left corners.
- Tie the frames in place with yarn.
- Hold the left edge and flip through the comic strip.

If computers are available, encourage youth to research their information to make their plans for the comic or "mini-movie" frames.

REFLECT

What are some ways that plants and animals depend on each other?

food, shelter, transportation, protection

What types of plant/animal relationships are formed because of a dependance on one another?

mutualistic, commensal, parasitic

Can you give some examples of a mutualistic, commensal, or parasitic relationship?

answers will vary

How do plants depend on animals?

seed dispersal, pollination

Can you think of some plant/animal relationships that could be going on in your backyard?

answers will vary

What are some ways that people and animals depend on their environment?

answers will vary

APPLY

- What kind of a relationship do humans and plants have? Can you give an example?

mutualistic, commensal, parasitic

- Take a nature walk, turn over a log, look under a pile of leaves, and discover plant/animal relationships.
- Share your moving comic strip with others and explain your plant/animal relationship.
- Play the WEB OF LIFE activity.



Web of Life

The WEB OF LIFE game illustrates relationships between organisms and their environment.

Materials:

- index cards
- markers
- ball of yarn



Instructions:

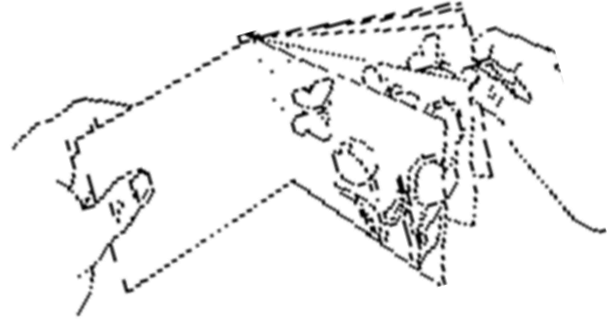
- Have youth volunteer to represent the sun, water, soil, air, and various plants and animals.
- Using an index card write what each youth represents. Have youth tape the card to their shirt front (or tie it to yarn and hang around their neck) so everyone can see who they represent.
- Have youth form a circle.
- The youth representing the sun will start the game by tossing a ball of yarn to someone else in the circle.
- The youth who passes the yarn must describe their relationship to the one receiving the string.
- Connect each plant, animal, or nonliving component with string until an entire ecosystem emerges.

Once the WEB OF LIFE has formed, ask youth the following questions:

1. What is the importance of the sun in this game?
2. What would happen if we cut the connection between a plant and an animal?
3. What role do humans play in the game?
4. Can you identify any parasitic, commensal, or mutualistic relationships among the organisms?

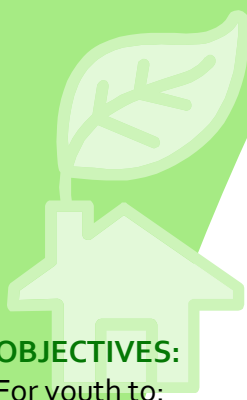
Let's Get Together

To create a moving comic strip: Think of a plant/animal interaction like a bee and flower, a caterpillar and tomato leaf, or a raccoon and grapes. Sketch the interaction frame by frame, then color the frames. Cut each frame and stack them in order (1-14). Punch holes in the upper and lower left corners. Tightly secure the comic strip with yarn. Hold the booklet by the left edge and flip the pages with your right hand.



1	2
3	4
5	6

7	8
9	10
11	12
13	14



OBJECTIVES:

For youth to:

- explain the importance of landscaping.
- create a landscape design.
- select the appropriate plants for their landscape.

LIFE SKILL:

- Planning and organizing
- Analyzing information and decision-making

MATERIALS:

- copies of the LANDSCAPE DESIGN Activity sheet for each youth
- magazines, lists, or catalogues of landscape plants (available from your local County Extension Office)
- rulers
- copies of the HOME LANDSCAPE DESIGN Activity sheet for each youth

TIME:

- 30 minutes

SETTING:

- A comfortable room with tables and chairs

Activity 3: Dress Me Up

INTRODUCTION

Have you ever mowed a lawn or pruned a bush? Why go to all the trouble? One reason why plants are important is because they look nice and they make us happy. Landscaping is using plants to make outdoor areas attractive to people. Can you think of other reasons why landscaping is important?

Landscaping can reduce noise from highways, block unsightly areas, provide privacy, and increase the value of a property. Today, we're going to design our own landscape.

Florida-Friendly
Landscaping™ PROGRAM



Visit the Florida Yards and Neighborhoods web site for information on how to design a Florida-friendly landscape.

http://fyn.ifas.ufl.edu/homeowners/nine_principles.htm

DO

- Give youth copies of the LANDSCAPE DESIGN Activity sheet and pencils.
- Discuss the elements and symbols used by landscape designers with youth.
- Have youth create a landscape plan using the design symbols and selecting the type of plants (shrubs, trees, vines, etc.)
- Have several magazines, lists, and catalogues of plants available for youth to select plants for their landscapes.

REFLECT

Why is landscaping important?

appearance, reduce noise, hide unsightly areas, privacy

What factors were most important to you when you were designing your landscape plan? (busy road, neighbors, power lines)

answers will vary

Why is it important to select the proper plants when landscaping?

selecting plants based on their height, texture, color, and form helps achieve the purpose of the landscape

If the purpose of your landscape is to create an area for wildlife, why not just leave the area in its natural state?

this is done in some landscapes but certain plants will attract wildlife to the area

Once a site has been landscaped, how can the health of the landscape be maintained?

fertilize, water, and control insects

you think of ways that people who live in apartments can landscape?

window boxes, container plantings, common gardens

APPLY

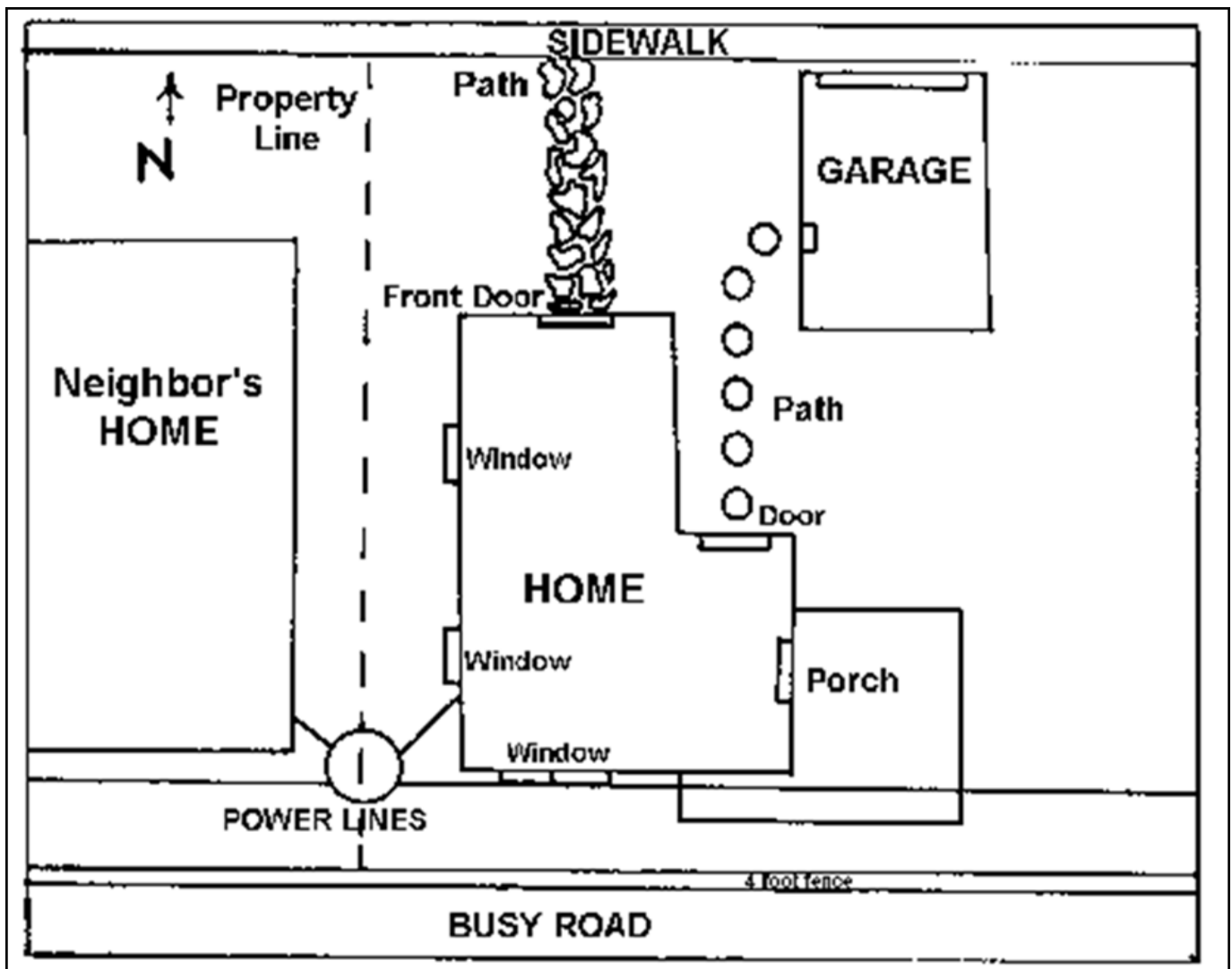
- Visit a professionally landscaped site. Discuss the placement and function of the plants used in the landscape.
- After youth have designed a landscape, have them complete the HOME LANDSCAPE DESIGN for their own yard.

Landscape Design



Landscape designers combine elements of art (color, texture, and shape) and science (proportion and balance) to create functional, pleasing outdoor areas. A landscaper may combine colors, textures, and shapes of individual plants to draw attention to particular areas in the landscape. Designers must also consider the placement of plants in the landscape. Attention must be given to the proportion or size of a plant in relation to its surroundings and the uniform appeal or balance of the landscape (both symmetrical and asymmetric strategies can be used).

Create a landscape plan by drawing the design symbols onto the landscape below. Check out examples of symbols used and create your own symbols representing the types of plants. Here is one site that has different symbols for ideas: <http://www.sustland.umn.edu/design/landscapesym.html>
Use the symbols on the plan below to represent your ideas and the types of plants your would use.



Home Landscape Design

The _____ Residence

Create a landscape plan for your own home!! Draw an aerial view of your home and the surrounding plants in the box below. Can you improve upon the landscape design of your home?



Deciduous Tree

Evergreen Tree

Ground Cover

Deciduous Shrub

Evergreen Shrub

Vine

Grouped Symbols

Plant People

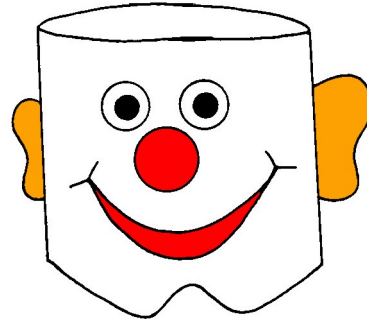
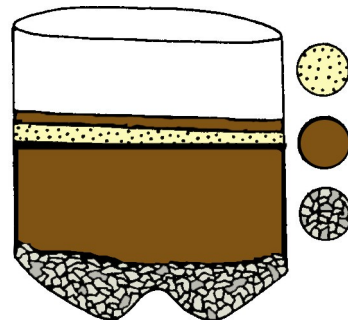
To make a plant person you will need:

bottom of a 1-liter soda bottle (4" tall)
rye grass seed (straight hair)
colored markers
buttons/yarn/ribbon
any other available craft supplies

potting soil
curly cress seed (curly hair)
gravel
construction paper

WHAT YOU DO:

1. Place 1 inch of gravel in the bottom of the container.
2. Fill the container with potting soil.
3. Spread a thick layer of seed on the top of the soil then cover with about 1/8 inch of soil.
4. Pat gently and water.
5. Decorate the outside of the container.



In 3 or 4 days your PLANT PERSON will be ready for a hair cut!



OBJECTIVES:

For youth to:

- demonstrate the rate of decomposition of natural products.
- list the benefits of composting.
- identify other recycling efforts.

LIFE SKILL:

- Acquiring, analyzing and using information

MATERIALS:

- copies of REUSABLE PLANTS Data sheet for each group
- REUSABLE PLANTS recipe cards
- copies of REUSABLE PLANTS Study questions
- 5 large plastic zipper seal bags (1 gallon)
- 2-1/2 cups soil
- hole punch
- 6 cups of brown leaves
- 6 cups of grass clippings
- 4 cups food (vegetable and fruit) scraps and brown pine needles
- water
- measuring devices (cup and tablespoon)
- Fahrenheit thermometer
- gram scale
- pens and pencils
- 20 to 30 gallon bucket
- hammer and nail
- 2 to 4 bricks
- soil or peat moss
- kitchen scraps, grass clippings, and yard waste
- shovel
- newspaper, styrofoam cups, paper plates, coffee filters, and paper towels

TIME:

- 30 minutes
- 15 minutes every 3 or 4 days

SETTING:

A comfortable room with tables and chairs.

Activity 4: Reusable Plants

INTRODUCTION

What would happen if plant leaves, twigs, branches, flowers, and grass clippings didn't decompose? Fortunately, nature has a continuous recycling system. Right now, in forests, prairies, swamps, and your backyard, plant and animal remains are being decomposed with the help of fungi, bacteria, insects, and other organisms. But if you've ever raked a pile of leaves or had a fallen log in your backyard you would know that it can take years for organisms to decompose some plant materials. Today, we're going to see what kinds of materials break down the fastest.

DO

- Separate youth into five groups.
- Give each group a copy of the REUSABLE PLANTS Data sheet, a large zipper seal bag, and a recipe card.
- Have groups read and follow the recipe card instructions.
- Close the bag and punch four holes along the top seam of the bag.
- Have groups label their bags with their group number.
- Have groups fill in their REUSABLE PLANTS data sheet with today's information and answer the hypotheses questions using the REUSABLE PLANTS Study questions.
- Place the bag in a shady place either in the room or outside under a tree.
- Every 3 to 4 days: open, mix, and water (if dry to the touch) the material in the bags. Record observations on the data sheets and share the information with the other groups.
- After 3 weeks, have youth conduct their final observations and present their findings to the class.

REFLECT

Which compost bag mixture decomposed the fastest?

decomposition rates may vary but groups 5, 4, and 1 should have decomposed the fastest

Why was it important to add soil to your compost bag?

the soil is where the organisms that do the composting live

What happens during composting?

micro-organisms break down the organic matter

What are some examples of compost materials?

weeds without seeds, grass clippings, leaves, kitchen vegetable and fruit waste, garden clippings

What would happen if you put weeds with seeds in your compost pile?

if the seeds survive and the compost is incorporated into the soil, the weed seeds will grow

Does size play a factor in the rate of decomposition?

small, finely ground material decomposes faster

What are the benefits of composting?

reduces waste, saves money, adds nutrients to the soil

Composting is recycling, what other things do you recycle?

answers will vary

What would happen if you put diseased plants into your compost pile?



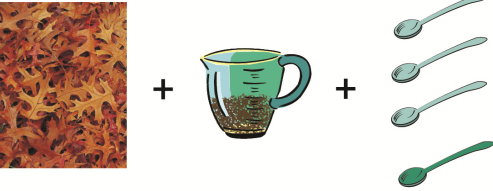

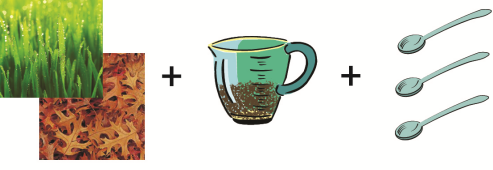
if the disease organism survives and the compost is incorporated into the soil, the disease could spread

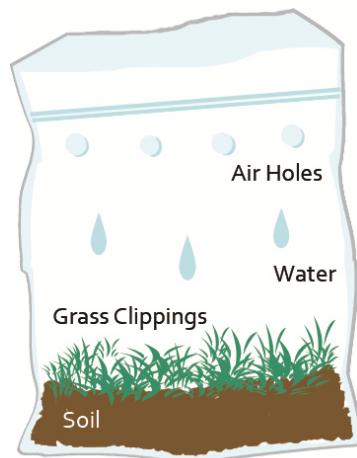


APPLY

- Create a garbage can composter and have youth add their bag compost.
Garbage compost can be produced easily and tucked out of the way in the corner of a yard or garden. Buy a 20 or 30 gallon can and punch several holes in the bottom with a hammer and a large nail. Put the can on a few bricks to let excess moisture drain from the can. Add 4 to 6 inches of kitchen scraps, grass clippings, shredded newspaper, and leaves. Keep a lid on the can. Every few days add more kitchen scraps and yard wastes. Turn and water the compost every other week. The compost should be ready in about 2 or 3 months. When your garbage can compost is finished, incorporate it into a garden or landscape.
- Repeat the composting experiment and add newspaper, paper plates, coffee filters, and paper towels to the bags.
- Composting is a type of recycling and it shows that you care about the environment. Can you think of other ways you recycle?
- How has this lesson helped you become more environmentally conscious?

Composting Recipes

<p>Group 1: Add these ingredients to your bag and mix.</p> <p>4 cups vegetable and fruit scraps</p> <p>1/2 cup soil</p> <p>3 tablespoons water</p>	
<p>Group 2: Add these ingredients to your bag and mix.</p> <p>4 cups brown pine needles (whole)</p> <p>1/2 cup soil</p> <p>3 tablespoons water</p>	
<p>Group 3: Add these ingredients to your bag and mix.</p> <p>4 cups brown leaves (whole)</p> <p>1/2 cup soil</p> <p>3 tablespoons water</p> <p>1 teaspoon mixed water and soluble plant food</p>	
<p>Group 4: Add these ingredients to your bag and mix.</p> <p>4 cups grass clippings</p> <p>1/2 cup soil</p> <p>3 tablespoons water</p>	
<p>Group 5: Add these ingredients to your bag and mix.</p> <p>2 cups grass clippings</p> <p>2 cups brown leaves (crushed)</p> <p>1/2 cup soil</p> <p>3 tablespoons water</p>	





Reusable Plants

Data Sheet

Composting is the controlled decomposition of organic. Microorganisms (such as bacteria and fungi), worms and other organisms decompose the material, but we can speed up the process by providing oxygen (turning the compost) and keeping it moist. As these organisms eat or decompose organic material they generate heat. The higher temperatures destroy weed seeds and kill disease causing organisms. **The temperature in your bag should reach 110° to 120°F in about 3 days.** Remember that organisms are actually doing the work of composting, so don't forget to give them some air and water once in awhile.

Group	Compost Appearance	Temperature (F)	Weight (grams)
Date:			
Date:			
Date:			
Date:			
Date:			

Reusable Plants

Study Questions



What's your hypothesis? Try and answer the following questions before starting the experiment. What do you think will happen? At the end of the experiment check your answers was your hypothesis correct?

1. Which bag do you think will decompose the fastest? Why?
2. Do you think the weight of your bag will change over time? What about the size of the plant material?
3. Do you think some bags will get hotter than others? Which ones? Why?
4. What would have happened to the compost if you forget to mix and add water?

CHECK IT OUT!

Check out how long each of these products take to decompose in the environment...

- Banana Peel: 3-4 weeks
- Paper Bag: 1 month
- Cardboard: 2 months
- Wool Sock : 1 year
- Tinned Steel Can: 50 years
- Aluminum Can: 200-500 years (But if recycled, it can be reused within 6 weeks!)
- Disposable Diapers: 550 years
- Plastic Bags : 20-1000 years
- Plastic Jug: 1 million years
- Glass : 1-2 million years
- Styrofoam: 1+ million years

Source: Joe Fier, How Long Does It Take to Decompose? Nov. 8, 2007

<http://behealthyandrelax.com/2007/11/how-long-does-it-take-to-decompose/>



OBJECTIVES:

For youth to:

- identify the components of an ecosystem.
- identify producers, consumers, and decomposers.
- explain relationships between the biotic and abiotic factors in an ecosystem.

LIFE SKILL:

- Problem solving and decision making

MATERIALS:

- Copies of THE LUNCH PLATE Activity
- copies of the HEALTHY PROVIDERS Activity sheet for each youth
- magazines of plants and animals for youth to cut
- poster board
- scissors
- tape
- pushpins
- yarn
- pens and pencils

TIME:

- 30 minutes

SETTING:

- A comfortable room with tables and chairs

Activity 5: The Healthy Providers

INTRODUCTION

What is an ecosystem? An ecosystem is simply the biotic (living) and abiotic (nonliving) factors of an ecological community considered together. In order to say something is an ecosystem it has to contain four components: the physical environment (abiotic); living things (biotic); energy (input and use); and the nutrients that cycle between the biotic and abiotic components. Based on this definition, an ecosystem can refer to the entire earth or a puddle in your back yard. Today, we're going to look at the biotic or living component of the ecosystem. The biotic component is divided into: producers, consumers, and decomposers. Have you heard of these terms? Can you tell me what a producer is or give me an example? (Producers produce their own food, green plants.) What about a consumer? (Consumers eat producers and each other.) Consumers are subdivided according to their position in the food chain, also called their trophic level. For instance, herbivores are primary consumers, while carnivores, which feed on herbivores, are secondary consumers. Carnivores that eat other carnivores are called tertiary consumers. What trophic level are humans in? (*humans, omnivores, are consumers within the earth's ecosystem*) Finally, decomposers, like bacteria and fungi, are a type of consumer that consume dead material. We can illustrate the different biotic factors of an ecosystem by looking at our lunch.

DO

- Give each youth a copy of THE LUNCH PLATE Activity and a pencil.
- Allow approximately 15 minutes for youth to complete the activity then discuss their answers.
- To develop a broader concept of the food chain, discuss the following questions with youth:
 - ◇ Who is eating water? (**raw fruit or vegetable**)
 - ◇ Who is eating sun? (**trapped light, e.g. in green leaves**)
 - ◇ Who is eating minerals? (**nutrients in foods**)

DO (continued)

- Give each youth a copy of the HEALTHY PROVIDERS Activity sheet.
- Allow approximately 15 minutes for youth to complete the activity then discuss their answers.

REFLECT

What is an ecosystem?

interactions between the living and non-living components in an area

Using the four components essential in any ecosystem (abiotic, biotic, energy, nutrient cycling) describe how the entire earth can be considered an ecosystem? Your back yard?

**Abiotic—the physical environment;
Biotic—plants, animals, people;
Energy—sun, food intake, energy expended during activities;
Nutrient cycling—plant and animal waste recycled into nutrients**

What are some examples of producers? consumers? decomposers?

answers will vary

If you drew a pyramid and placed all the biotic components (producers, herbivores, omnivores, carnivores, and decomposers) into the pyramid, which component would be at the bottom? Hint: Which component is most abundant?

producers - green plants

Who would be at the top of the pyramid?

top carnivores - humans, lions, tigers, birds of prey

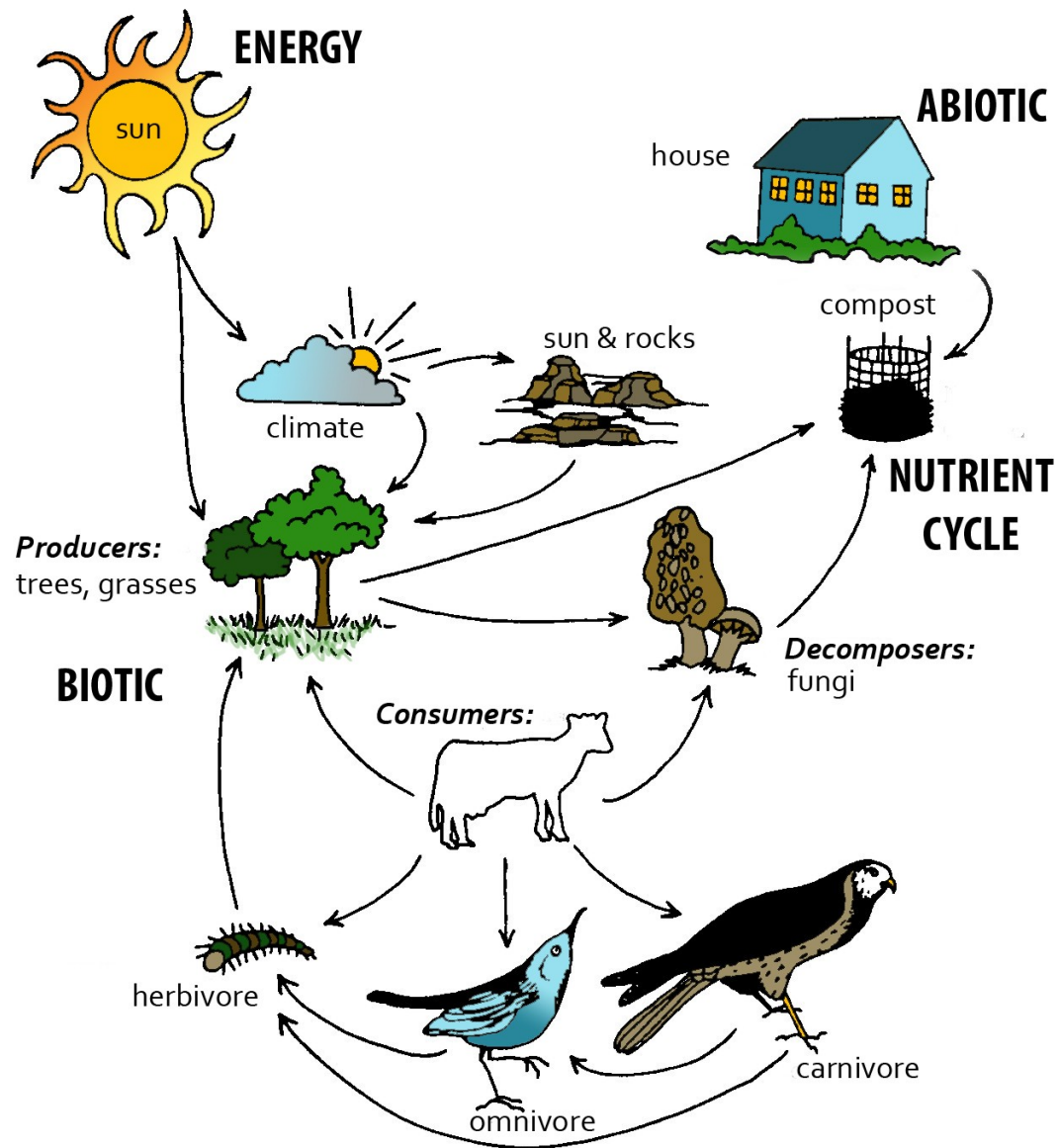
APPLY

- Make a food web poster. Tape pictures of plants and animals on a piece of poster board. Insert a pushpin by each picture and use yarn to connect the plants and animals that eat each other. Identify them as producers, consumers, and decomposers.
- Investigate additional foods that come from decomposers.
- Have youth construct a concept map depicting ideas associated with an ecosystem and its producers, consumers, and decomposers. Have youth share their concept maps with the class.

APPLY (continued)

- A *concept map* is a way of organizing and graphically displaying ideas relevant to a given concept or topic, so that the relationships among ideas are clarified.

EXAMPLE BACKYARD ECOSYSTEM

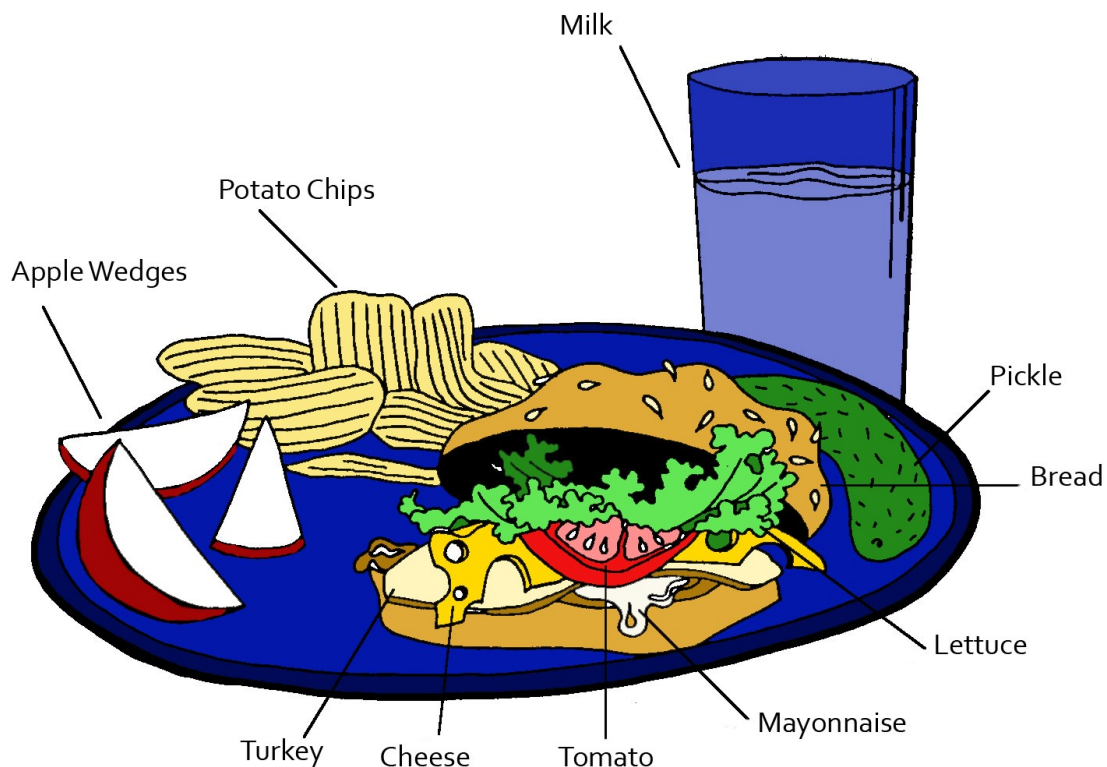


THE LUNCH PLATE

Answer Key

Look at this lunch plate and answer the following questions:

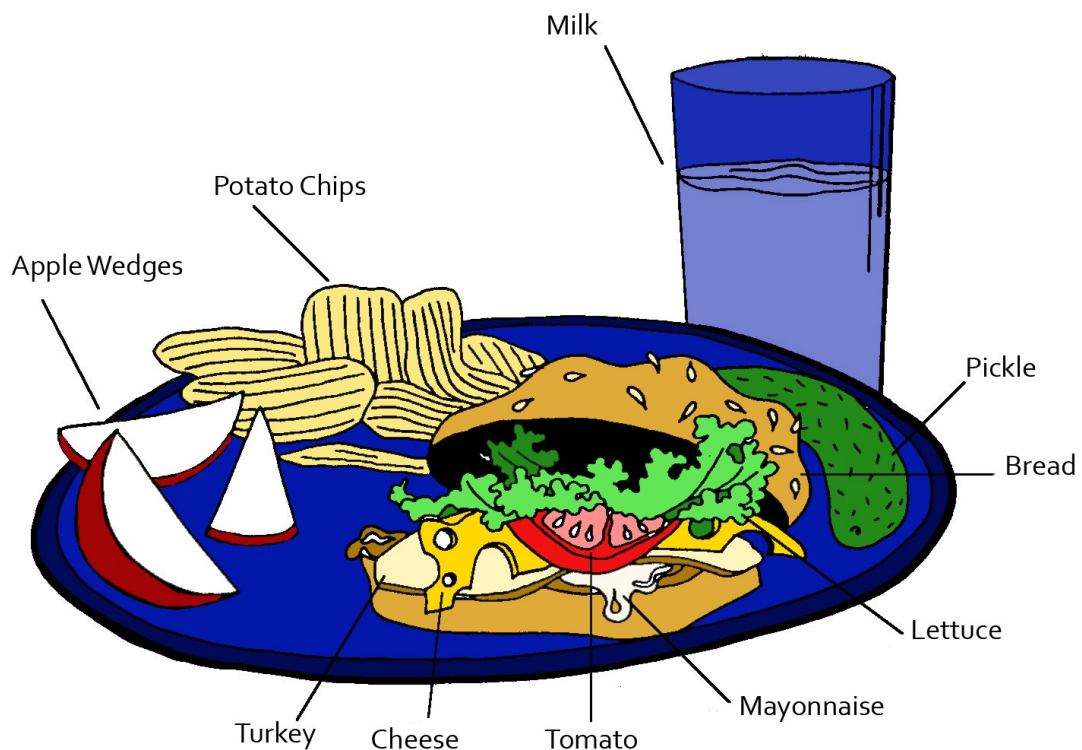
1. Can you identify the producers on this plate?
pickle, apple, potato chips, bread, lettuce, tomato
2. Can you identify foods that come from consumers on this plate?
turkey, cow, mayonnaise (eggs)
3. What do the consumers eat?
grass, seeds
4. What trophic level are the consumers in?
primary
5. Are there any decomposers on the plate?
no



The LUNCH Plate

Look at the lunch plate below and answer the following questions:

1. Can you identify the producers on this plate?
2. Can you identify foods that come from consumers on this plate?
3. What do the consumers eat?
4. What trophic level are the consumers in?
5. Are there any decomposers on the plate?



HEALTHY PROVIDERS

What did you eat for lunch yesterday? List the contents of yesterday's lunch then answer the following questions.

I ate:

List the producers you ate for lunch.



Does your producer grow locally?

Could your producer have been transported from another state or country?

If your producer was not fresh, how was it stored?

☐ Dried

☐ Canned

☐ Bottled

☐ Frozen

☐ Pickled

Were any changes made to your producer before it was sold for consumption?

What would happen if we didn't have the ability to store foods?

Did you eat a consumer for lunch?

What kinds of producers did your consumer eat when it was alive?

When was the last time you ate a decomposer?



OBJECTIVES:

For youth to:

- discuss the importance of plants.
- discuss the end products of photosynthesis.
- demonstrate the importance of plants in providing oxygen.

LIFE SKILL:

- Communicating and relating to others.

MATERIALS:

- large, clear bowl for each group
- clear baby food jar for each group
- 6 to 8 inch sprig of *Elodea* or *Hydrilla* for each group
- baking soda
- table lamp or portable light
- microscopes
- leaves
- pens or pencils

TIME:

- 30 minutes

SETTING:

A comfortable room with tables and chairs.

Activity 6: Every Breath You Take

INTRODUCTION

Did you know that plants play a part in every breath you take? Green plants make their own food in a process called **photosynthesis**. Plants use energy from the sun to convert carbon dioxide and water into simple sugars. This process takes place in the presence of **chlorophyll**, a pigment which enables plants to absorb the sun's energy. One of the end products of photosynthesis is oxygen. Plants release the oxygen through small openings on the underside of the leaves called **stomata**. Today we're going to watch a plant make oxygen.



DO

- Divide youth into two or three groups.
- Give each group a large bowl, a jar, and a 6 to 8 inch section of a freshwater plant obtained from a pet store or lake (eg. *Elodea*, *Hydrilla*). If available, give each group a different type of plant.
- Have each group fill their bowl with tap water.
- Mix 1 or 2 teaspoons baking soda in the water. This provides the plants with carbon dioxide needed for photosynthesis.
- Have groups place their plants into the jars.
- Lower the jar sideways into the bowl until it fills with water and no air bubbles are left in the jar. Turn the jar upside down in the bowl without letting air in the jar.
- Aim a light at one side of the bowl. Let stand for approximately 20 minutes.
- Have youth hypothesize about what is happening in the jar.
- After 20 minutes, observe the plants. A large bubble should have formed at the top of the jar and small bubbles should form on the leaves. Most bubbles will come from the area nearest the light. The bubbles contain the oxygen being given off by the plant.

REFLECT

Did what you hypothesized happen? Why or why not?

What caused the bubbles to appear? Where did they occur?

**the bubbles contain the oxygen being given off by the plant;
most bubbles will come from the area nearest the light**

What products result from photosynthesis?

carbohydrates (simple sugars), oxygen, water

Why did we add baking soda to the water?

**increase the CO₂ content in the water and enhance
photosynthesis**

How do water plants naturally obtain carbon dioxide?

**diffusion of CO₂ at the waters surface and mixing by wind
and wave action**

Can you guess which organisms carry out 80 to 90% of the photosynthesis that takes place on earth?

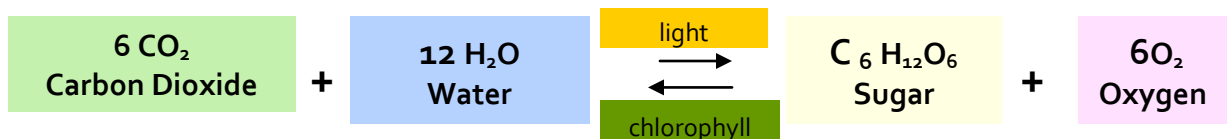
phytoplankton

Why are plants important?

provide us with oxygen, food, fiber, shelter, aesthetics

APPLY

- Write the equation for photosynthesis on the board. Have youth draw the photosynthesis process without using words. Encourage youth to be creative.



- Scientists have calculated that an average person uses 360 liters of oxygen per day and it takes a 25 square foot plot of grass or an average size tree to produce enough oxygen for one person each day. How many liters of oxygen are needed by the entire class each day? Are there enough trees in the neighborhood or schoolyard to meet the oxygen need?
- Leave the experiment as is for several days. Have youth observe the size of the air bubble over a period of days.
- Contact your local Extension office or nursery, ask for a volunteer to come speak about the importance of trees.
- Have youth look at several different leaves under a microscope and draw what they see. Be sure to look for the stomata.

CREDITS AND ACKNOWLEDGMENTS

4-H PLANT CONNECTIONS was developed through a team effort of the Department of Family, Youth and Community Sciences, Institute of Food and Agricultural Sciences, The Florida 4-H Youth Development Office and the Departments of Horticultural Sciences and Environmental Horticulture, University of Florida. Original publication date May 1997. Revised January 2015.

The curriculum package was originally created by Janice Easton, Alachua County Extension Service, and Deborah J. Glauer, Extension Youth Development Specialist and Plant Science Design Team Leader, Department of Family, Youth and Community Sciences. Additional assistance was provided by Christy Poole and Lynne Schreiber, project assistants. Technical review and assistance was provided by the following members of the Cooperative Extension Service Plant Science Curriculum Design Team (FL 712): Dr. Robert Black, Associate Professor, Department of Environmental Horticulture; Dr. Jeffery Williamson, Associate Professor, Department of Horticultural Sciences; Mr. Jim Stephens, Professor, Department of Horticultural Sciences; Dr. Joy Cantrell Jordan, Associate Professor and 4-H Youth Development Curriculum Specialist; Ray Zerba, Clay County Extension Horticulture Agent; Linda Landrum, Volusia County Extension Horticulture Agent; Charles Fedunak, Lake County Extension Horticulture Agent; Bob Renner, Marion County Extension 4-H Agent; Cindy Higgins, Columbia County Extension 4-H Agent; and David Dinkens, Bradford County Extension Director.

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Special thanks to reviewers: Dana Venrick, Extension Horticulture Agent, Volusia County; Heather Kent, NW Regional Specialized 4-H Agent; John Lily, 4-H Agent, Jefferson County; Janet Psikogios, 4-H/OMK Regional Coordinator, Bay County; and Jean Rogalsky, 4-H Agent, Pinellas County.

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