March 2026 | 4HPSM11

KIDS GROWING WITH PLANT CONNECTIONS[1]

Florida 4-H Plant Science Youth Workbook

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What Is a Plant?

Did you know... there are over 400,000 different kinds of plants, ranging from microscopic algae to gigantic seaweeds?

Vegetation covers the earth, even open ocean areas contain floating plants called phytoplankton, and from this growth of plants we obtain the food we eat, the clothes we wear, the homes we build, and even the oxygen we breath!

Agriculture is the production and associated science of plants and animals to meet basic human needs. It is the largest industry in the United States. Many people think that agriculture means farming, but the majority of jobs related to agriculture have nothing to do with farming. For example, there are entomologists that study plant-insect relationships.

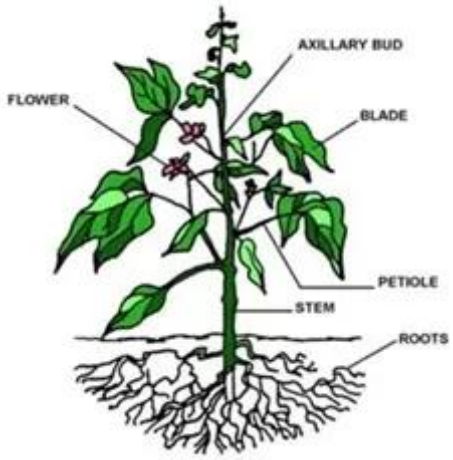

Figure 1. Parts of a plant.

Most plants manufacture their own food through the process of photosynthesis. In contrast, animals require ready-made food in the form of plants or other animals. The principal structures of most plants are the leaves, stems, roots, flowers, and ultimately, fruits and seeds.

Tree Scramble

What kind of tree do I come from?

Unscramble the letters and you will have the answer!

If you need help, refer to the word list at the bottom.

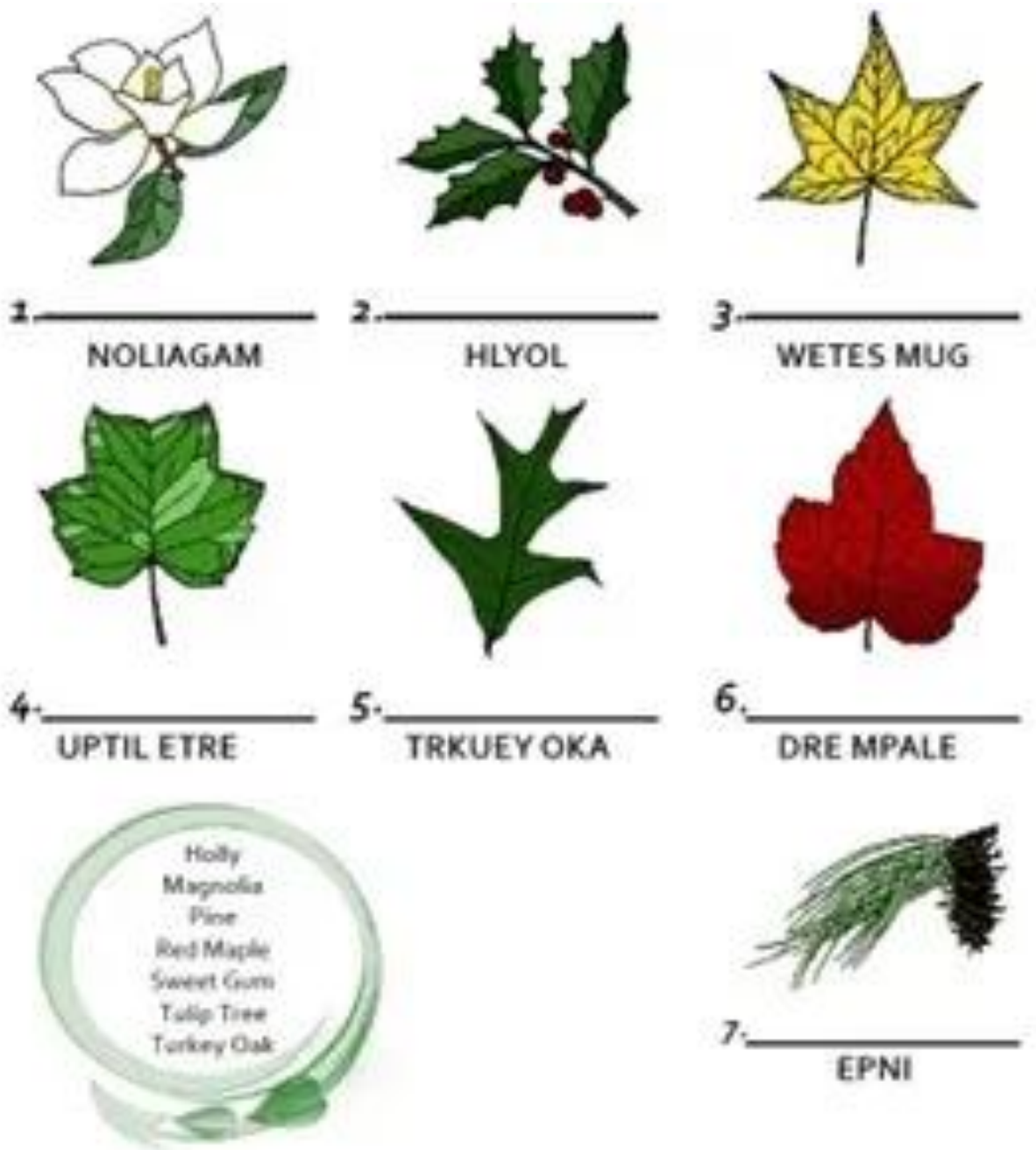

Figure 2. Tree Scramble: What kind of tree do I come from? Unscramble the letters and you will have the answer! If you need help, refer to the word list at the bottom: Holly, Magnolia, Pine, Red Maple, Sweet Gum, Tulip Tree, and Turkey Oak.

My Life

Identify each life cycle diagram below by labeling it Annual, Biennial, or Perennial and explain its characteristics.

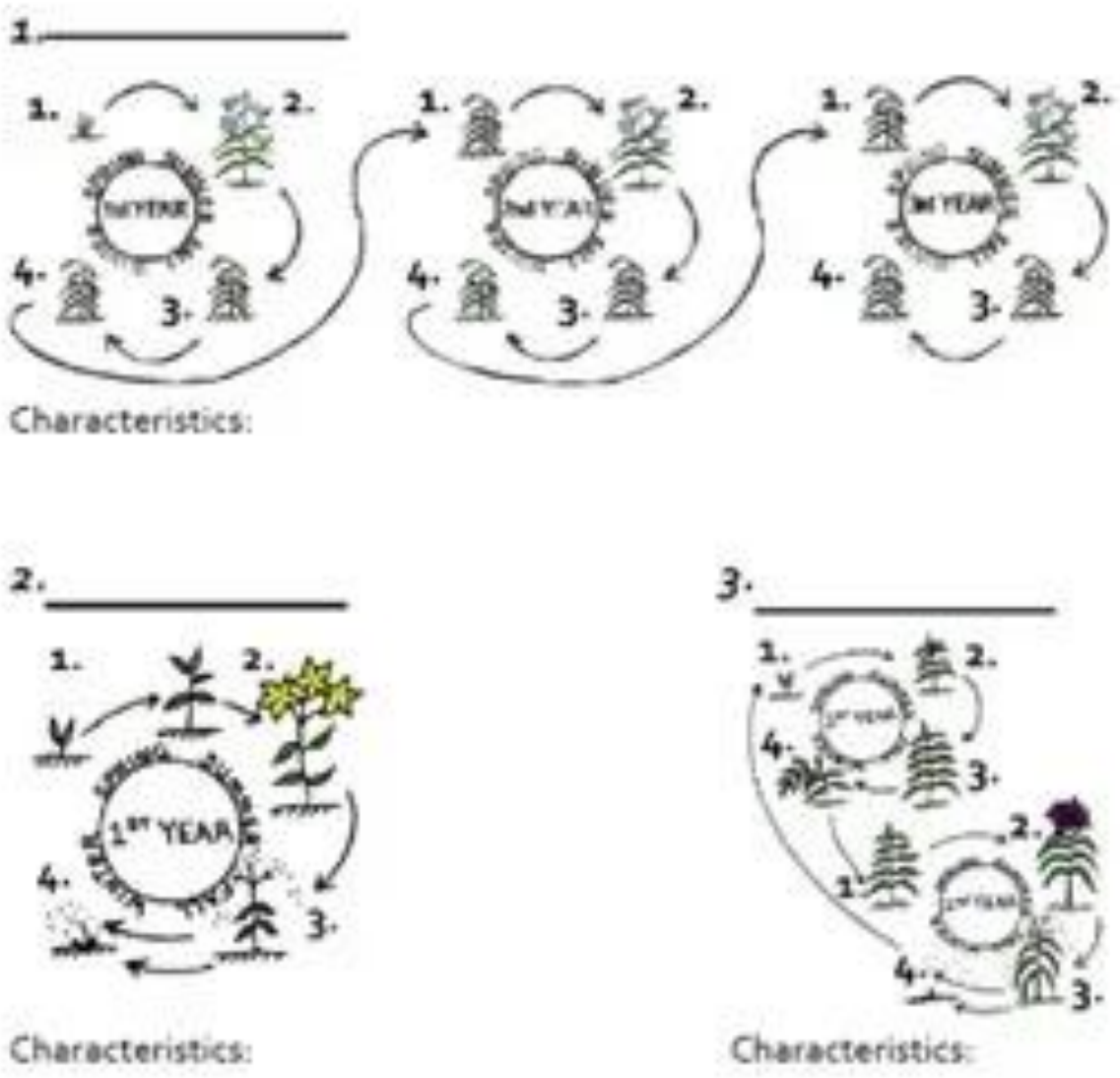

Figure 3. My Life: Identify each life cycle diagram below by labeling it Annual, Biennial, or Perennial and explain it's characteristics.

An **ecosystem** is the biotic (living) and abiotic (nonliving) factors of an ecological community considered together. An ecosystem contains four parts: the physical environment (abiotic); the living things (biotic); energy (input and use); and the nutrients that cycle between biotic and abiotic components. Plants are a very important part of an ecosystem.

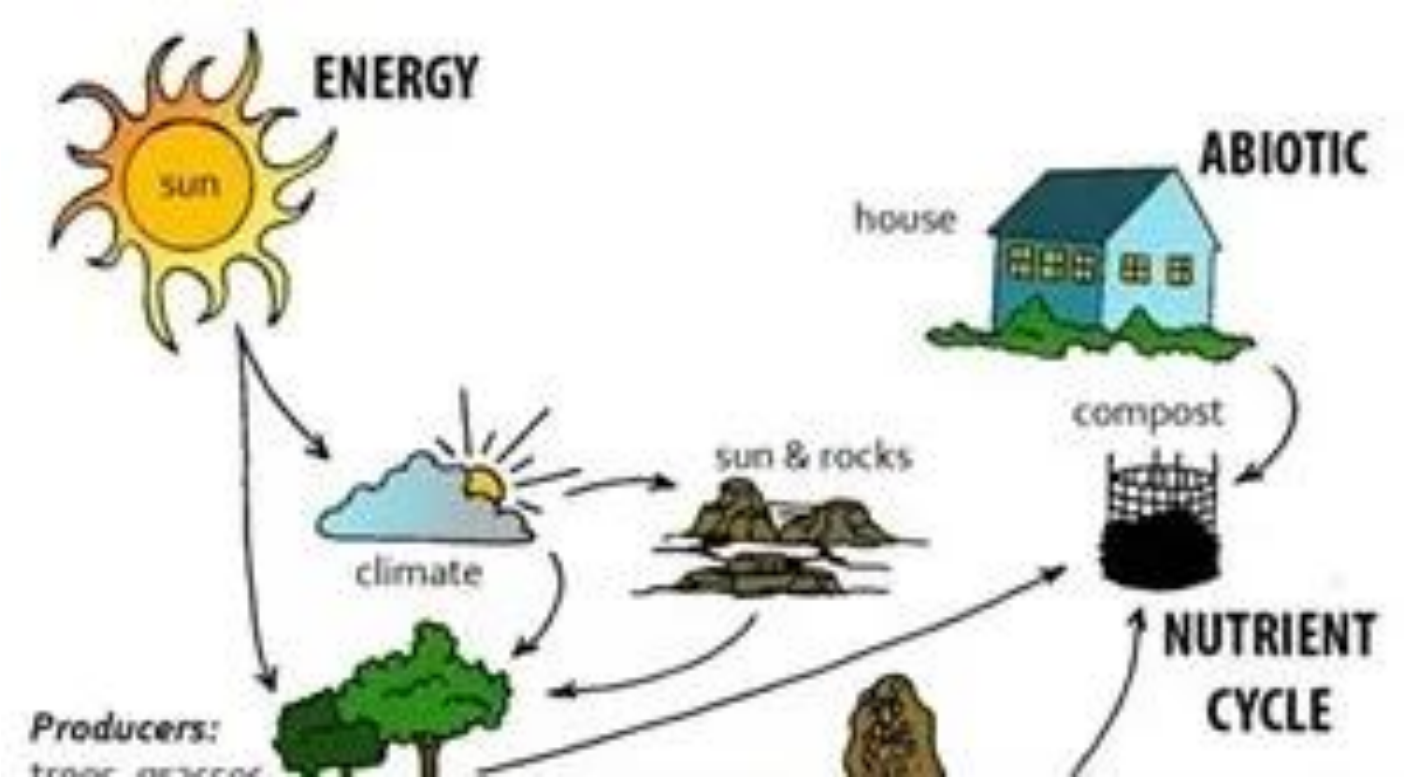

Figure 4. Ecosystem diagram

Why Are Plants Important?

Did you know... plants provide us with food, fiber,

Without plants, our world would be a very different place. What would your life be like without paper, pizza, and blue jeans? 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.

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:

Figure 5. Plant people.

- Place 1 inch of gravel in the bottom of the container.
- Fill the container with potting soil.
- Spread a thick layer of seed on the top of the soil then cover with about ½ inch of soil.
- Pat gently and water.
- Decorate the outside of the container.

In 3 or 4 days your plant person will be ready for a hair cut!

The Lunch Plate

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

Can you identify the producers on this plate?

Can you identify foods that come from consumers on this plate?

What do the consumers eat?

What trophic level are the consumers in?

Are there any decomposers on the plate?

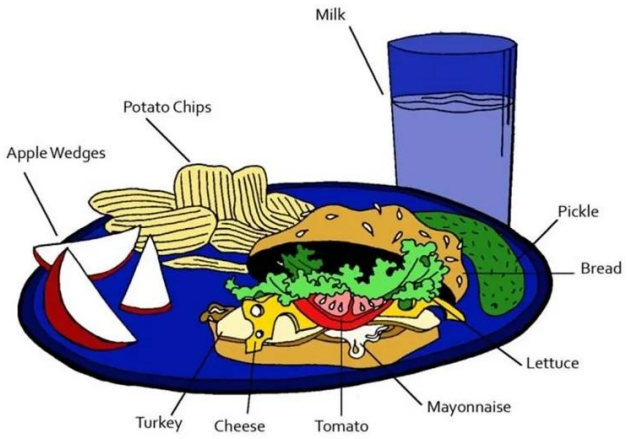

Figure 6. Lunch plate.

What Makes Plants Grow?

Did you know... the vital needs of a plant are very much like our own - light, water, air, nutrients, and a proper temperature! - light, water, air, nutrients, and a proper temperature!

Photosynthesis is the process by which green plants make their own food. Plants manufacture food, mainly sugars, from carbon dioxide and water in the presence of chlorophyll, utilizing light energy and releasing oxygen gas and water. Chlorophyll is the green pigment in the leaves of plants that absorb light energy and enables photosynthesis to take place.

The process of photosynthesis is described as:

$$6CO_2 + 12H_2O \xrightarrow[\text{chlorophyll}]{\text{light}} C_6H_{12}O_6 + 6O_2 + 6H_2O$$

Figure 7. Photosynthesis equation

Plants use a few nutrients from the air, but most of the nutrients that a plant needs must be present in the soil. Soils that lack adequate nutrients and water can limit plant growth. Plants compete for the things they need to survive. Through the years, plants have developed adaptations to ensure their survival. For example, roses have thorns to keep predators away. Plants compete for light, water, nutrients, and space.

Indoor Garden

The object of creating an indoor garden is to create an artificial environment that provides your plants with their basic needs.

To make your indoor garden you will need:

- shallow container (1/2 to 1 foot in diameter)
- soil drainage material like small rocks or gravel
- granular fertilizer (6-6-6 or 8-8-8) or water soluble plant food
- small plants (English Ivy, philodendron, peperomia, hoya)

WHAT YOU DO:

- Place half to one inch layer of the drainage material in the bottom of the container.
- Fertilize according to label instructions.
- Transplant the small plants in the container.
- Water lightly.

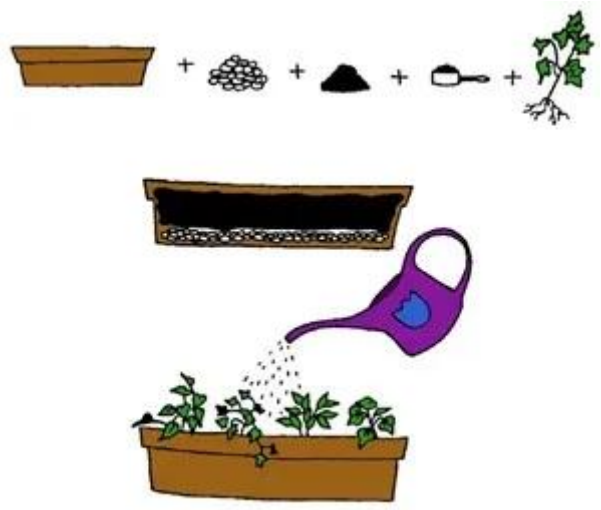

Figure 8. Indoor garden

Composting Makes Sense

- Composting keeps yard waste out of the landfill.
- Composting improves soil and keeps your plants healthy.
- Compost provides food for beneficial soil organisms.
- Can you think of other reasons composting makes sense?

Figure 9. Word Search: Find the compost-related words: compost, decompose, fungi, pile, pitchfork, recycle, reduce, reuse, soil, waste, water, worm.

How To Grow Plants

Did you know... a pest is anything that causes injury or loss to a plant.

Plants live together and with other organisms in the environment. Each part of the natural or artificial environment affects the survival and quality of plants.

Plant growth is regulated by sunlight, water, air, nutrients, and a proper temperature. Complete flowers consist of 4 parts: sepals, petals, stamens, and the pistil. Plant propagation refers to reproduction by asexual (plant cuttings) or sexual means (from seeds). *Asexual propagation* is the production of new plants from the stems, leaves, or roots of a parent plant! The fruit is the seed bearing organ of the plant. Seeds are the mature fertilized eggs of plants that are used to grow additional plants. The five major kinds of pests are: insects, weeds, nematodes, diseases and animals. Pests can be controlled by chemicals, cultural controls, genetics, mechanical control and biological control. We like to refer to all these methods of control as Integrated Pest Management (IPM).

Garden Planner

Make a preliminary list of vegetables, fruits, herbs, and flowers you would like to grow in a garden. Look up available varieties and growing requirements in seed and nursery catalogs, then make a final list of plants based on the information you gathered.

Table 1. Garden Planner

Preliminary Plant List		Final Plant List	

Now, draw a garden plan below including a maintenance schedule.

Garden Plan

Maintenance Schedule

Figure 10. Flower

Parts of a Flower

Label parts of this flower using the following words:

stamen	pistil	nectary	anther
stigma	style	sepal	receptacle
filament	ovule	petal	

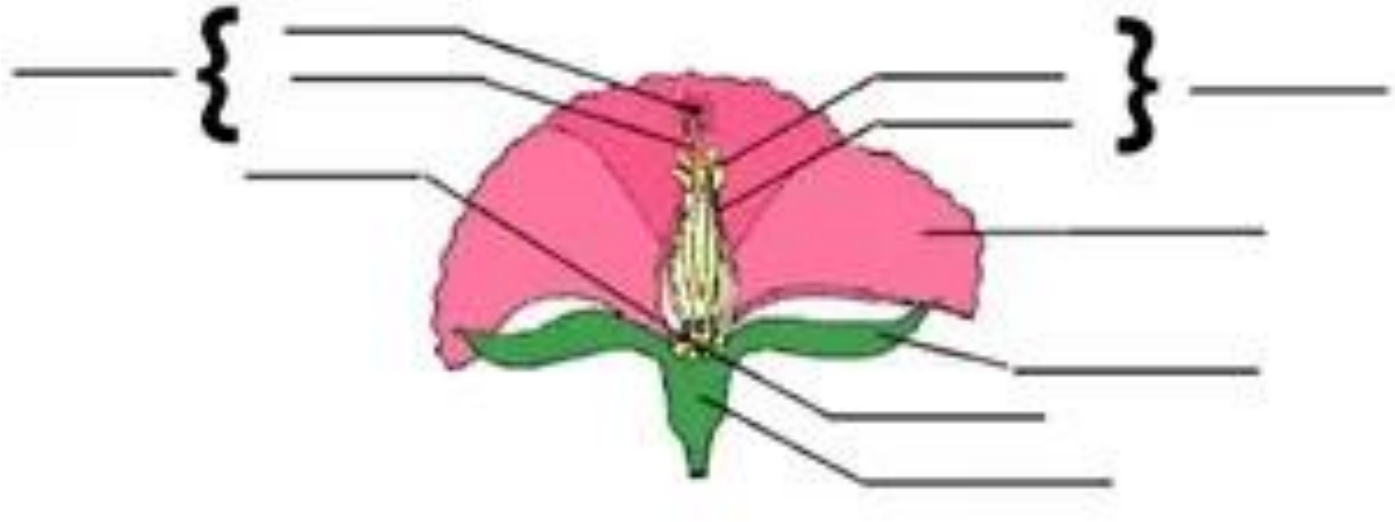

Figure 11. Label parts of this flower using the following words: stamen pistil nectary anther stigma style sepal receptacle filament ovule petal

How to Select and Handle Plants

Humans are sensitive to some of these defense mechanisms. For example, have you ever gotten poison ivy? It is a good idea to know the poisonous plants in your house/garden. Know your local poison control center hotline number, just in case you or a friend or pet accidentally eats a poisonous plant.

Microorganisms like bacteria and mold are found naturally all around us. Safe handling, cooking, and serving practices are necessary to prevent bacteria from multiplying and causing food related illnesses. Did you know that just like meats, the United States Department of Agriculture set quality standards for the fruits and vegetables that we buy? For instance, in order for a potato to be considered U.S. #1 it must have the shape and color characteristics of the variety being graded, it must be at least 1 7/8 inches in diameter, and free from defects.

To make your Kimchee you will need these ingredients:

- 1 to 1 1/2 heads of Chinese cabbage (bok choy, napa) cut into chunks
- 1 tsp chili powder
- 2 cloves crushed garlic
- 3 tsp pickling salt (non-iodized)

and you will need these materials:

- 2- liter soda bottle cut below the shoulder
- pH indicator paper (litmus)
- teaspoon for measuring
- room temperature of 68° to 72° F
- large bowl or stock pot
- knife
- wooden spoon
- scissors
- muslin or cheese cloth
- heavy bowl or jar to weight down cabbage

WHAT YOU DO:

1. In a large container, thoroughly mix all ingredients and let stand for 5 minutes.
2. Fill the bottle with the cabbage mixture. Pack the cabbage firmly and evenly into the bottle with a wooden spoon.
3. Using the wooden spoon, press down firmly until juice comes to the surface.
4. Cover the cabbage with a clean, thin, white cloth (muslin or cheese cloth) and tuck the edges down against the inside of the container.
5. Set a clean, heavy bowl or jar on the cloth to keep the cabbage submerged under the juice.
6. Formation of gas bubbles indicates fermentation is taking place. Using a strainer, remove and discard scum formation when needed.
7. Each week take a teaspoon of juice out of the container and check its pH using litmus paper. When the pH drops to about 3.5, your kimchee is done! (5 to 6 weeks)

Figure 12. Illustrated kimchee recipe.

Table 2. Weekly kimchee pH level.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6
pH						

Answer the following questions. You may need to research the pickling process further.

- What stops the cabbage from rotting?
- Lactobacilli are anaerobic bacteria which are found almost everywhere in your environment. What is an anaerobe? What conditions are needed for them to live?
- Why did you measure the pH of your kimchee?

The Future in Plants

Did you know... every local community in North America has plant-related career opportunities?

Hydroponics is a method of growing plants in which the nutrients needed by the plant are supplied by a nutrient solution. A nutrient solution contains water with dissolved nutrient salts. Since roots cannot anchor plants in solution, other methods of anchoring must be used. Placing plants in styrofoam materials which float on the surface is one method of support. The field of hydroponics is rapidly expanding and will continue to grow as scientists look for new ways to grow plants without soil.

Growing foliage plants inside office buildings and shopping malls is big business. **Interiorscaping** uses foliage plants to create attractive interior environments. Plants give people the feeling of the outdoors when inside. Interiorscapers maintain foliage plants under conditions that may not be the best for plant growth.

Horticulture deals with the development, improvement, growth, distribution, and use of fruits, vegetables, and ornamental plants. Many different careers are available in the horticulture industry. Every local community in North America has plant-related career opportunities. Education, experience, and hard work are needed to advance in these careers.

Terrariums

Build your own interiorscape!

To make your interiorscape you will need:

- Newspaper
- Clear container (large enough for 2 or more plants)
- gravel, small rocks, charcoal
- potting soil
- foliage plants (ivy, peperonia, begonias, ferns, etc.)
- clear lid to fit over container opening

With a little care, your terrarium will reward you with natural beauty and hours of enjoyment!!

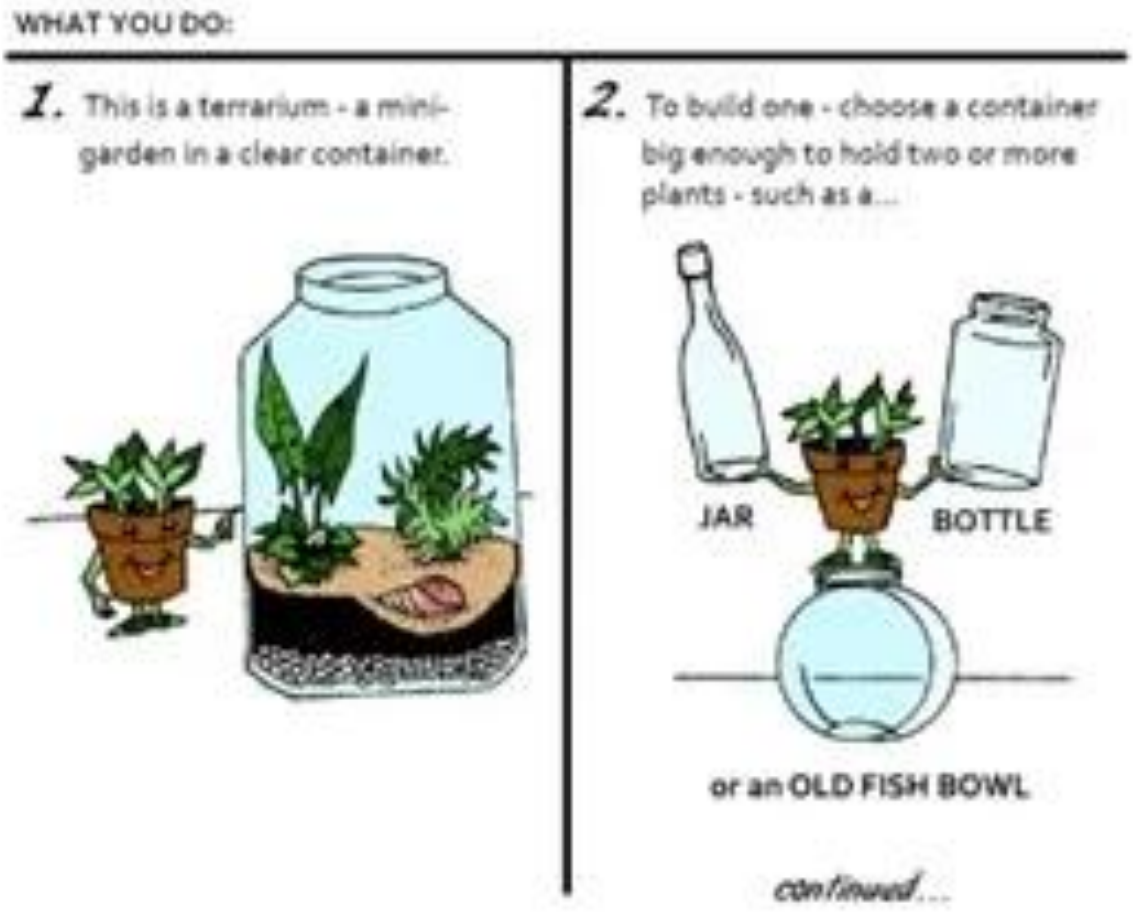

Figure 13. Terrarium steps 1 and 2.

Figure 14. Terrarium steps 3-6.

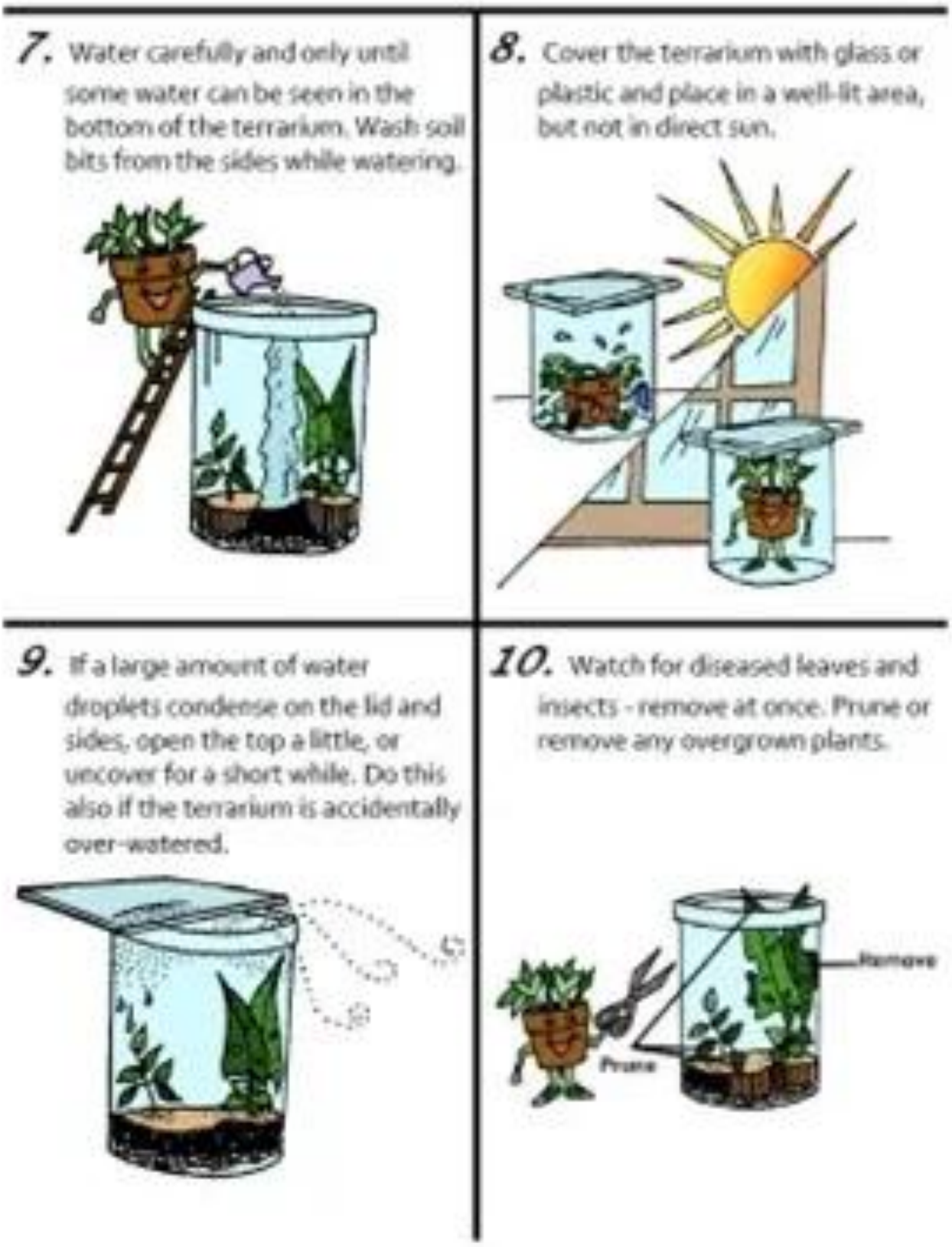

Figure 15. Terrarium steps 7-10.

Cookie Factory

To make your cookies you will need these ingredients:

- 1 cup butter
- 1 tsp. baking soda
- 3/4 cup packed light brown sugar
- 3/4 cup granulated sugar
- 2 pkg. semi- sweet chocolate
- 2 1/4 cups all- purpose flour
- 2 eggs beaten
- 1 tsp. salt
- 1 tsp. hot water
- 1 tsp. vanilla extract
- 1 cup chopped nuts

and you will need these materials:

- oven (preheated to 375° F)
- 2 large bowls
- flour sifter
- cookie sheet

WHAT YOU DO:

1. Preheat oven to 375 F.
2. Mix eggs, butter, sugar, vanilla, walnuts and chocolate in a large bowl.
3. In another bowl sift flour and salt.
4. Dissolve baking soda in hot water and add to flour mixture.
5. Add flour to butter mixture.
6. Place teaspoon sized balls on greased cookie sheet, cook 10 to 12 minutes.

Questions:

Which ingredients come directly from plants?

Which ingredients come indirectly from plants?

What plants do the ingredients come from?

What people are involved with growing these plants?

How are these plants processed to form the ingredients?

Where are the ingredients sold?

How do they get to the stores?

Feeling Good about Plants

List the activities completed or things you learned while participating in this project.

- Why are plants important?
- What makes plants grow?
- How to grow plants
- How to select and handle plants.
- The future in plants.
- What is a plant?

Acknowledgements

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