What Is This Module About?

When you take a walk in the park, or stroll along a busy street or a lonely road, have you ever noticed the kinds of plants that seem to grow almost anywhere?

Because there are many different kinds of plants, it is helpful to know how to classify them. To classify means to arrange according to class or category. This is usually done based on characteristics shared by certain plants. Classifying helps us put into order the many varieties of plants that exist. It also enables us to identify which group of plants can be used for a certain purpose because of their similar characteristics.

In this module, you will learn how to classify plants according to certain characteristics. You will learn where they live, the kind of stem they have and whether or not they have flowers and bear seeds. You'll also learn the many ways in which plants reproduce.

Before you study this module, you should have read two other modules entitled ***What Would Life Be Without Plants?*** and ***Think Green***.

This module is divided into three lessons:

Lesson 1 – *Simple Classification of Plants*

Lesson 2 – *Major Classifications in the Plant Kingdom*

Lesson 3 – *Classification Based on Means of Reproduction*

What Will You Learn From This Module?

After studying this module, you should be able to:

- describe the purpose of classifying plants;
- classify plants according to their habitat and stem type;
- classify plants based on whether they have flowers and seeds or not; and
- classify plants according to their means of reproduction.

Let's See What You Already Know

Before studying this module, answer the questions below to determine how much you already know about the topic.

Write the letter that corresponds to the correct answer in the blank before each number.

_____ 1. Which of the following is **not** a reason for classifying plants?

a. to give order to the many plant varieties
b. to easily distinguish groups of plants based on certain characteristics
c. to categorize plants into smaller groups so as to easily identify them
d. to find the relationship between plants and animals

_____ 2. Which of the following plants are aquatic?

a. watermelon, mango and *sampaloc*
b. orchids and green ivy
c. lotus, water lily and *kangkong*
d. string beans and cabbage

_____ 3. Plants that have soft, greenish stems are called _____.

a. terrestrial
b. herbaceous
c. aquatic
d. aerial

_____ 4. They are plants that grow upright, but stay close to the ground and do not grow tall.

a. shrubs
b. vines
c. trees
d. flowers

_____ 5. Which of the following is **not** a characteristic of flowering plants?

a. They bear seeds.
b. They have true roots, stems and leaves.
c. They are simple plants that live in water.
d. The flower is their reproductive structure.

_____ 6. What do you call the asexual reproduction in plants?

a. vegetation
b. vegetation propagation
c. fertilization
d. pollination

_____ 7. What do sweet potatoes use to reproduce?

a. tubers
b. leaves
c. rhizomes
d. roots

_____ 8. Which part of the plant produces pollen?

a. anther
b. sepal
c. pistil
d. petal

_____ 9. What is the term for the union of a sperm cell and an egg cell?

a. vegetative propagation
b. pollination
c. vegetation
d. fertilization

_____ 10. What is the process through which the pollen is transferred from the anther to the stigma of a flower?

a. pollination
b. vegetative propagation
c. fertilization
d. asexual reproduction

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on pages 42–43 to find out.

If all your answers are correct, very good! This shows that you already know much about the topic. You may still study the module to review what you already know. Who knows, you might learn a few more new things as well.

If you got a low score, don't feel bad. This means that this module is for you. It will help you understand important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

You may now go to the next page to begin Lesson 1.

LESSON 1

Simple Classification of Plants

If you look closely, you'll find that plants differ in many ways. Yet, some plants also share similar characteristics. Such similarities are used to group plants or classify them. Classifying plants is much like the way we separate clothes that need to be washed – there is always a heap of "whites" and another heap of "coloreds." Of course, since there are so many plants, there are many ways in which we can classify them.

Classifying plants helps to give order to the many plant varieties. It also helps to easily distinguish groups of plants based on certain characteristics and to categorize plants into smaller groups so as to easily identify them.

Plants can be classified according to where they live or what their stem type is. They can also be classified according to how they grow, that is, do they grow tall or stay close to the ground? Do they crawl or creep?

Knowing where plants live makes it easier for us to find certain plants, especially when we need them. The kind of stem they have and how they grow helps us determine which plants can serve a specific purpose. For example, plants with soft stems may be eaten, while those with hard stems may have other uses. Tall trees with hard trunks are good sources of building materials.

At the end of this lesson, you should be able to:

- describe the purpose of classifying plants;
- classify plants based on where they live;
- classify plants according to their stem type; and
- classify plants based on their size and direction of growth.

Let's Try This

Take a close look around your local neighborhood. What plants do you see? Can you name and describe them? Write down your observations in the table on the next page.

Name of Plant	Observations
1.	
2.	
3.	
4.	

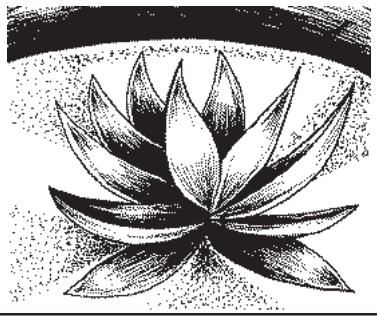
Discuss your answers with your Instructional Manager and your co-learners.

Let's Study and Analyze

Study the following plants.

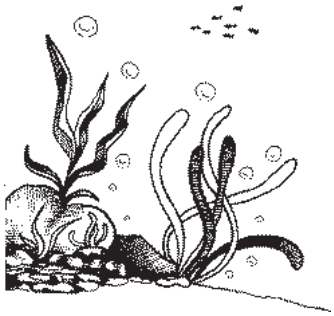
orchid

lotus

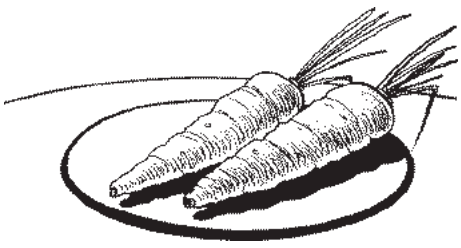


poison ivy

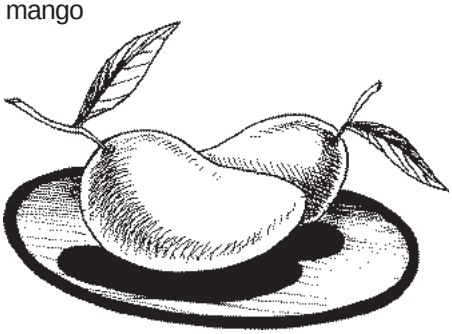
seaweed



carrot

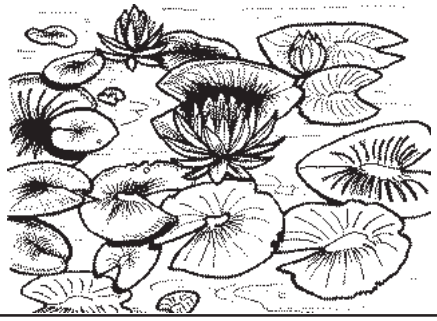


mango



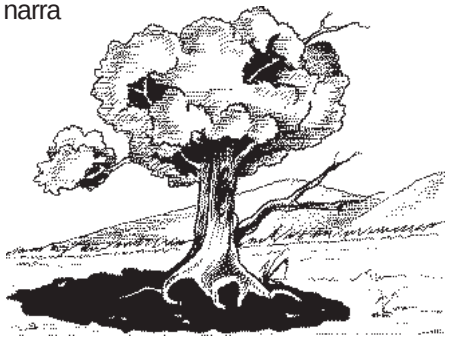
rose

water lily



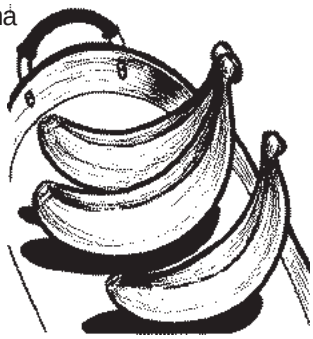
green ivy

narra

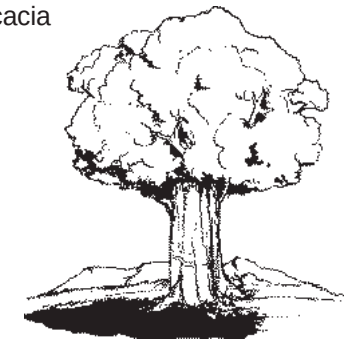


kangkong

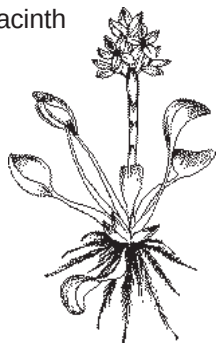
banana



acacia



water hyacinth



Have you observed any of these plants in your community? Where does each plant live? Place each plant in the appropriate box below.

Plants that live on land	1. _____ 4. _____ 2. _____ 5. _____ 3. _____ 6. _____

Plants that live in water	1. _____ 4. _____ 2. _____ 5. _____ 3. _____

Plants that are attached to other plants	1. _____ 3. _____ 2. _____

You have just classified the plants according to where they live. Another word used to identify where organisms or living things, such as plants, live is ***habitat***. It means "home" or "environment".

Compare your answers with those in the *Answer Key* on page 43.

Were you able to group the plants properly? If yes, very good! Now, let's learn more about classifying plants according to their habitat.

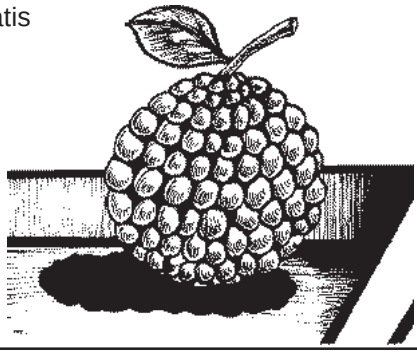
Let's Talk About This

As we have discussed, a plant's habitat can be land, water or air. Plants have special names based on their habitat.

Plants that live on land, like bamboo and atis, are ***terrestrial.***

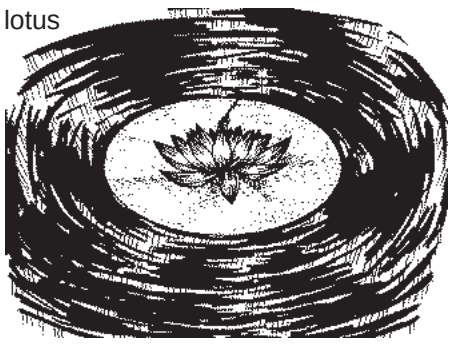
bamboo

atis

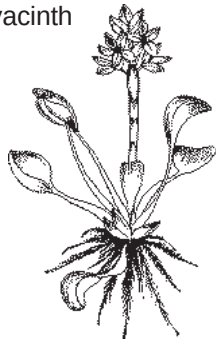


Plants that live in water, such as lotus and water hyacinth, are ***aquatic.***

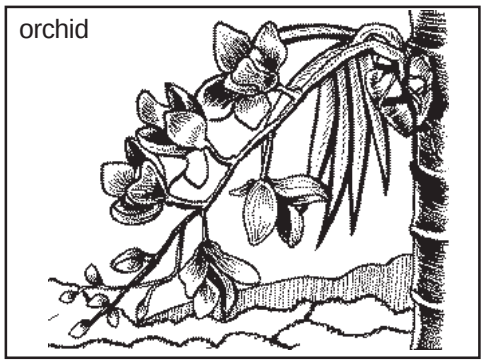
lotus

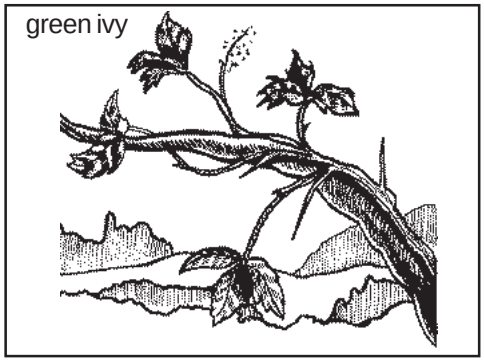


water hyacinth



Plants that live in air, such as orchids, are ***aerial.*** Aerial plants live above the ground, often clinging or attached to other plants.





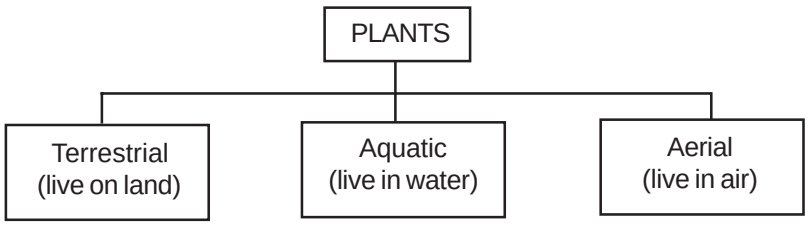
Aside from the examples given, can you name other terrestrial, aquatic and aerial plants? List them below.

Terrestrial	Aquatic	Aerial
1. _____	1. _____	1. _____
2. _____	2. _____	2. _____
3. _____	3. _____	3. _____
4. _____	4. _____	4. _____
5. _____	5. _____	5. _____

You may compare your list of plants with the additional examples found on page 43 of the *Answer Key*. Your list may be slightly different. You may also discuss your list with your co-learners and Instructional Manager.

Let's Remember

- Classifying plants means to group them into categories based on certain similar characteristics.
- Plants can be classified according to their habitat or where they live. Refer to the diagram below:



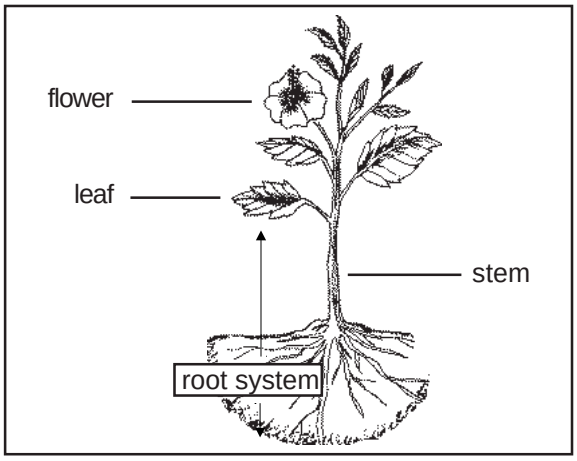
- Classifying plants according to habitat makes it easy for us to know where we can find these plants and in which places they can be grown.

There are other ways of classifying plants. In the next section, you will learn how to classify plants based on the type of stems that they have.

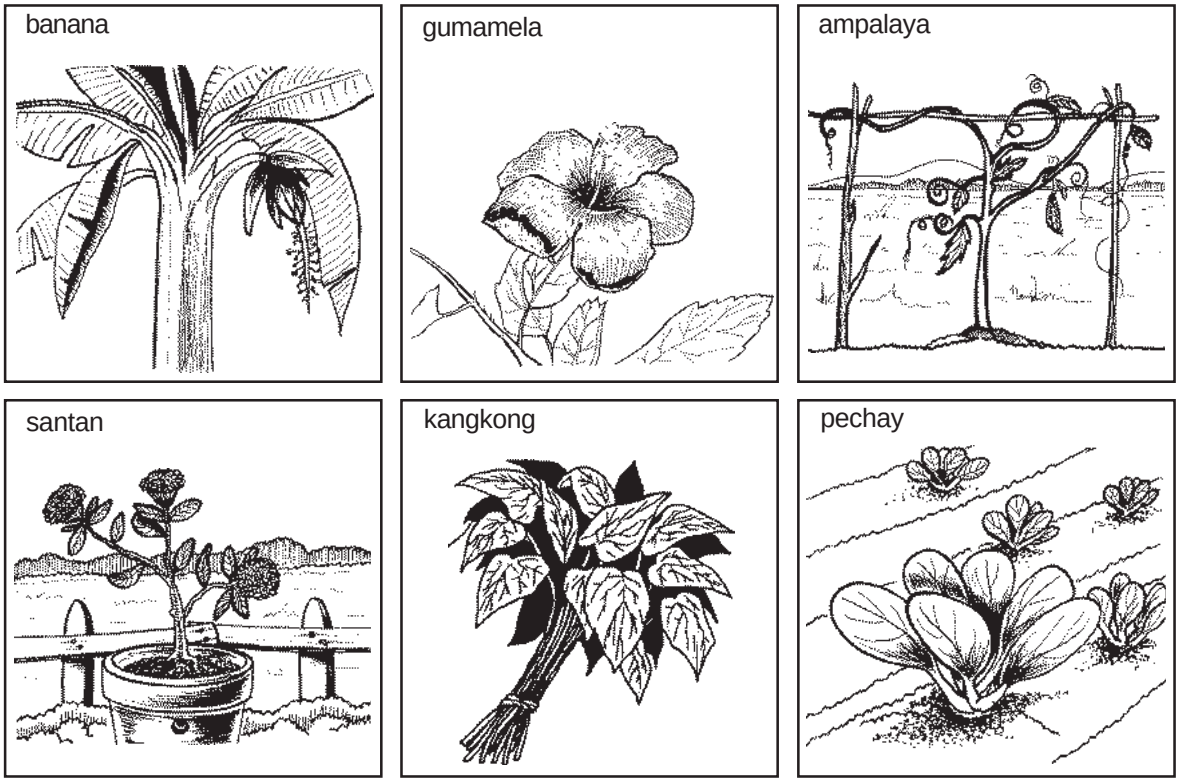
Let's Study and Analyze

Apart from classifying plants by their habitats, we can also classify plants according to the type of their stems.

A **stem** is the part of a plant that transports water and minerals up from the roots and food down from the leaves. It also exposes the leaves of a plant to light. You have already learned in the previous modules that plants need plenty of sunlight to make food and to survive.



Examine closely the stems of the following plants. If possible, try to find samples of actual plants and examine their stems.



What did you observe in the plants? What are the colors of their stems? Are they hard or soft? Are they rough or smooth? Write your observations in the table on the next page.

Plant	Color of Stem	Texture of Stem (Rough or smooth?)	Hardness of Stem (Hard or soft?)
1. rose			
2. gumamela			
3. santan			
4. kangkong			
5. pechay			

Compare your answers with those in the *Answer Key* on page 44.

Let's Learn

When we classify plants according to the characteristics of their stems, we often come up with two groups.

dama de noche

Woody plants are those with stems that are hard and usually brown. Big trees, like acacia and molave, are woody. The wood from these trees are often used to build houses. Other woody plants include *ipil-ipil* and *dama de noche*.

Which of the five plants in the previous activity are woody?

_____

kinchay

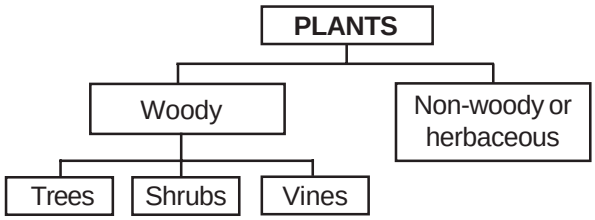
Non-woody plants have stems that are soft, smooth and usually green. These plants are sometimes called *herbaceous*. Green, leafy vegetables, like *alugbati*, *kinchay* and *saluyot*, are non-woody.

Which among the five plants in the previous activity are non-woody?

_____

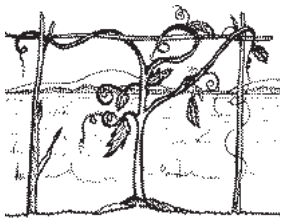
Among the plants in the previous activity, the woody plants are rose, *gumamela* and *santan*. The non-woody plants are *kangkong* and *pechay*.

Woody plants can be divided into three groups: trees, shrubs and vines. Refer to the diagram below to help you understand this better.



Vines are climbing or creeping woody plants. Notice how an *ampalaya* plant supports itself. Vines have stems called *twiners* that entwine themselves or coil around solid support. Also, they have climbing organs called *tendrils*. Other examples of vines are grapes, poison ivy and morning glory.

ampalaya vine

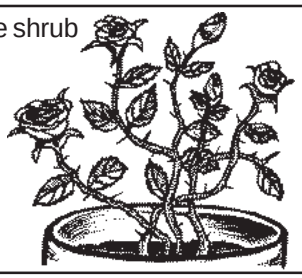


Can you give other examples of vines?

_____

Shrubs have stems that grow upright. However, they do not grow very tall. Examples of shrubs are *sampaguita* and rose. Notice the thorns on rose stems. Some shrubs have thorns to protect them. They need protection from hostile animals because they grow low or near the ground. This is to prevent animals from eating or destroying them.

rose shrub

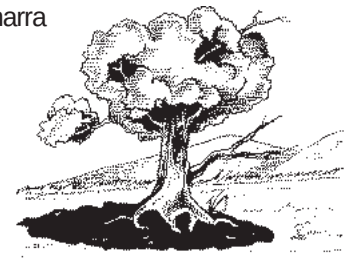


Can you give other examples of shrubs?

_____

Trees are woody plants that often grow big. They often have one very hard and wide stem, called the trunk. You can find many trees in the forests and mountains. Some trees grow along roadsides. Our national tree, the *narra*, is one of the tallest trees in the country.

narra



Can you name other trees?

_____

Turn to page 44 of the *Answer Key* to see other examples of vines, shrubs and trees. You may have listed other examples of woody plants. You may like to discuss your answers with your co-learners or your Instructional Manager.

Classifying plants according to the type of stem they possess helps determine the particular purpose of any particular group of plants.

Most of the non-woody or herbaceous plants may be eaten. Examples of these are found in many Filipino dishes. There's the *kangkong* in *sinigang na baka*, the *alugabati* in *ginisang mongo*, the *malunggay* in *tinola*, and the *talbos ng kamote* in *sinigang na isda*.

Woody plants like trees are mostly sources of building materials. The *narra*, *kamagong* and mahogany make very sturdy pieces of furniture. Some people still like to build houses using these trees. Woody plants also make good shade during hot summer months.

In Lessons 2 and 3, we will look at other ways of classifying plants, based on whether they have flowers and seeds and how they reproduce.

Let's See What You Have Learned

To see how much you have learned about classifying plants according to habitat and type of stem, complete the following lesson review test.

A. Classify the following plants according to their habitat. Write **T** in the blank if the plant is terrestrial, **Aq** if it is aquatic, and **Ae** if it is aerial.

____ 1.	*langka*	____ 6.	*kangkong*
____ 2.	seaweed	____ 7.	green ivy
____ 3.	*chico*	____ 8.	squash
____ 4.	orchid	____ 9.	lotus
____ 5.	*lanzones*	____ 10.	corn

B. Classify the plants below according to their stem type. Write the woody plants in the first box, and the non-woody plants in the second box.

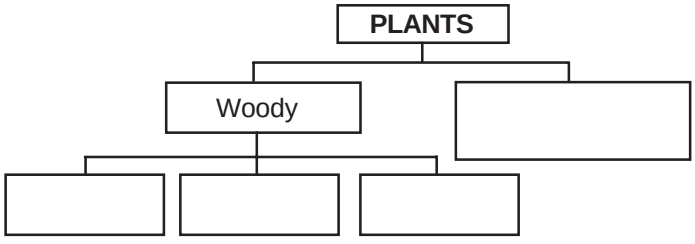
dama de noche	*ilang-ilang*	banana
alugbati	*sampaguita*	*saluyot*
kinchay	*molave*	grapes

Woody	Non-woody
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	

C. Write whether each plant is a **shrub,** a **tree,** or a **vine.**

_____ 1.	rose	_____ 4.	*durian*
_____ 2.	apple	_____ 5.	mango
_____ 3.	*upo*	_____ 6.	*santan*

D. Complete the missing words in the following plant classification chart.



Compare your answers with those in the *Answer Key* on pages 44–45.

Well, how was it? Did you get all the correct answers? If so, very good! If not, review the parts of this lesson that aren't very clear to you.

Let's Remember

- Classifying plants is grouping them under specific categories based on certain similar characteristics.
- Plants can be classified according to their habitat or where they live.
  - **Terrestrial** plants live on land.
  - **Aquatic** plants are found in bodies of water.
  - **Aerial** plants live in air or on the branches of the trees.
- Classifying plants according to their habitat helps us identify what plants can be found in certain areas and where certain plants should be grown.
- Plants can be classified according to the type of stem they have.
  - **Woody** plants have hard, rough and usually brown stems.
  - **Non-woody** or herbaceous plants have soft, usually smooth and greenish stems.
- **Woody** plants are of three kinds.
  - **Vines** are the crawling or creeping plants.
  - **Shrubs** grow very low or close to the ground.
  - **Trees** are usually tall and have one large stem called the trunk.
- Classifying plants according to the type of stems they have helps to identify the uses of certain groups of plants.

Major Classifications in the Plant Kingdom

In the previous lesson, we discussed classifying plants according to their habitat and stem types. Those are very simple means of classification and are the most convenient to use.

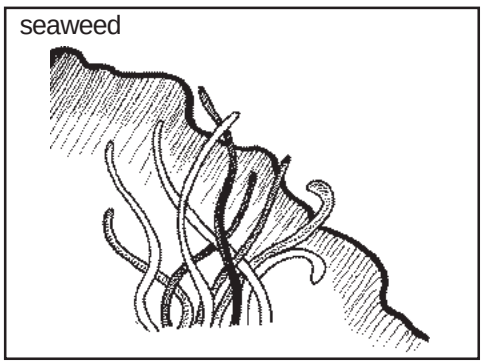
But did you know that whether a plant has flowers and seeds or not is an important characteristic used in classifying plants? Knowing whether a plant has flowers and seeds or not helps farmers know how they should grow certain plants. Also, plants that have flowers are usually more attractive and make better decorating materials. You will know more about the use of classifying plants according to whether they have flowers and seeds or not as you go through the lesson.

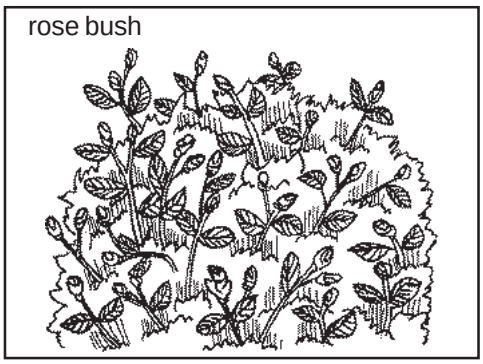
At the end of the lesson, you should be able to:

- identify the characteristics of non-flowering and flowering plants; and
- classify plants into non-flowering and flowering.

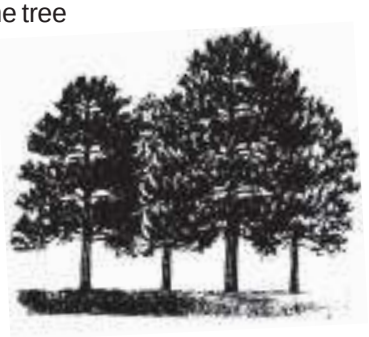
Let's Try This

Look at the pictures of the following plants. If possible, try to find actual samples of these plants in your local neighborhood. Examine closely whether the plants have flowers or not.





pine tree



mushroom

moss

mango tree

What do you notice about the plants? Can you tell which the flowering plants are? Which are the non-flowering plants? Write your answers in the appropriate column below.

Flowering Plants	Non-flowering Plants
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____

Compare your answers with those in the *Answer Key* on page 46.

Let's Learn

The plant kingdom is divided into two main groups: the **non-flowering** plants (such as algae and moss) and the **flowering** plants (such as trees and shrubs).

Non-flowering Plants

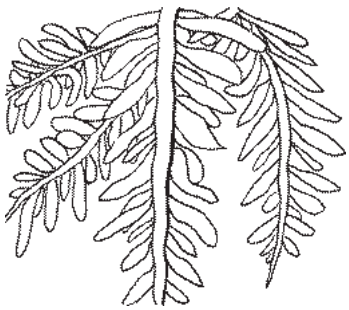
Most non-flowering plants live in water or in moist places. Most of them do not have systems that transport food and water in and around their bodies.

Non-flowering plants do not have flowers or seeds. Examples of non-flowering plants include seaweed, algae, mushrooms, mosses and ferns.

Some non-flowering plants, such as seaweed and algae, have no roots, stems or leaves. Seaweed lives in saltwater and may be found washed up on beaches. Algae are found in water and in moist places. Have you noticed the green growth on damp walls, and on some ponds and pools? These are types of algae.

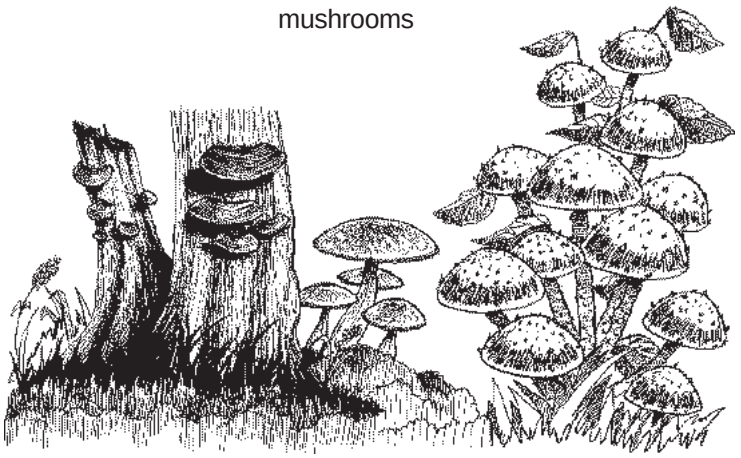
seaweed

green algae



Fungi (singular form: *fungus*) such as mushrooms are also examples of non-flowering plants. They cannot make their own food. They live by feeding on dead materials or on another living organism. What do you call the mushroom you often find in vegetable dishes?

mushrooms



Another group of non-flowering plants are **mosses**. These are simple and primitive land plants. Although they have leaves and stems, they have no true roots and have no means to transport water and nutrients around their bodies.

red moss

ferns

Ferns are also examples of a group of non-flowering plants. They have roots, stems and leaves but no flowers. Unlike many non-flowering plants, they are able to transport water and food into and around their bodies.

Let's Try This

Draw some non-flowering plants that can be found in your neighborhood. Write their names below your drawings.

1. _____

2. _____

3. _____

4. _____

Discuss your work with your Instructional Manager and co-learners.

Let's Remember

These are the characteristics of **non-flowering** plants:

- They do not have flowers or seeds.
- Most of them live in water or in moist places.
- Most of them do not have systems that transport food and water in and around their bodies.
- Some have no roots, stems or leaves.

Let's Learn

Flowering Plants

Look around you. Most of the plants that we are familiar with are flowering plants. Can you identify some of the plants that you see which have flowers? Write down the names of these flowering plants.

_____

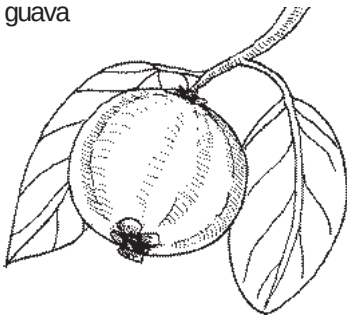
_____

Flowering plants are plants that have flowers. They are also called 'seed-bearing' because they have seeds. Most crop plants (like rice, corn, beans and cereals), trees and ornamental plants belong in this group. Their flowers are not always obvious and some of them are not strictly flowering plants, but they all bear seeds. Most live on dry land.

Some of the oldest living flowering plants are evergreen trees, such as pine and sequoia trees. They have well-developed roots, stems and needle-shaped leaves, and they can grow very tall. Most evergreen trees have their seeds formed in a cone, called *conifers*. Conifers are often used as Christmas decorations. Both pine and sequoia trees bear conifers.

pine tree

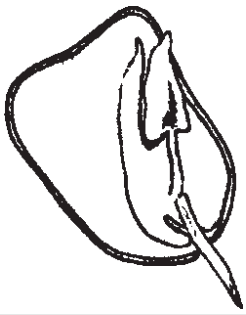
guava



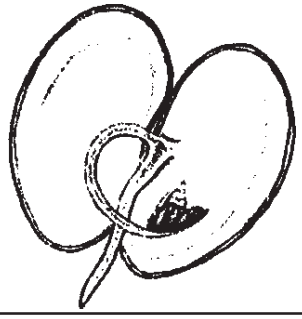
Most flowering plants do not, however, have their seeds formed in a cone. Instead they have blooms that can easily be recognized as flowers and have seeds wrapped in some kind of case. Examples are guava, *papaya* and *santol*.

The seed of a flowering plant usually contains a tiny new plant. Part of this plant consists of seed leaves that help digest and absorb food and transfer it to the developing plant. This can mostly be seen in flowering plants like corn and beans.

corn

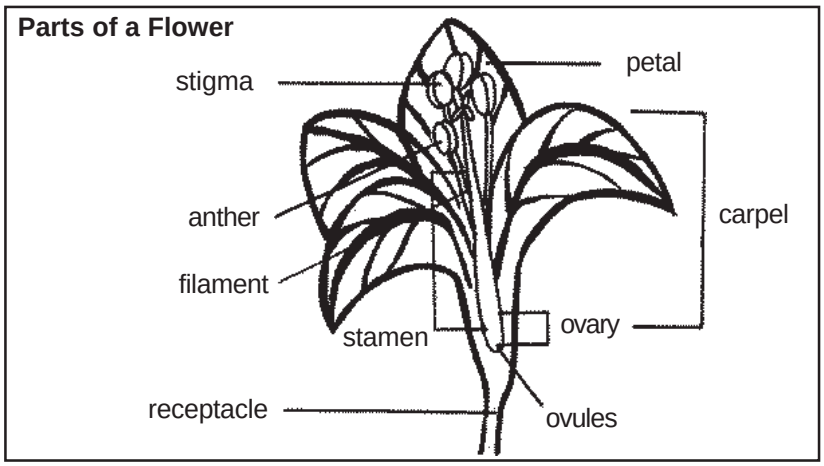


bean plant



Other flowering plants with seed leaves are grass, cereals, palm trees and some ornamental plants like water lilies and irises.

The flower is a very important part of flowering plants. It plays a major role in reproduction. Do you remember the different parts of a flower? You may refer to the module entitled ***Think Green*** for a discussion on the parts of a flower.



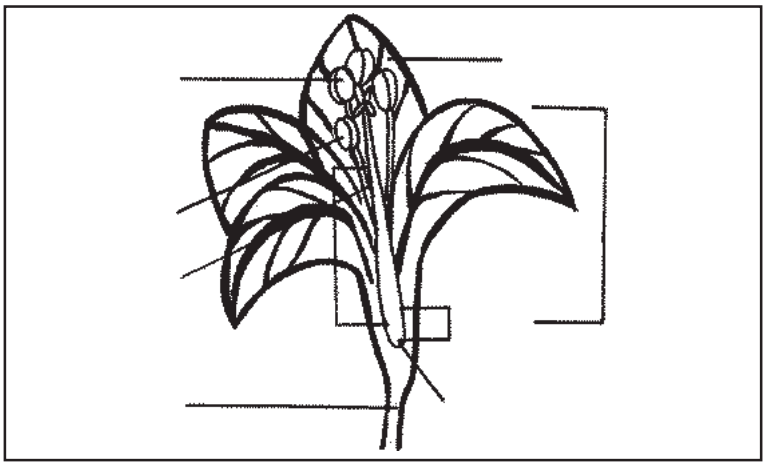
A flower forms at the end of a special branch of a plant. The tip of the branch is called the **receptacle.** Attached to the receptacle are four parts: sepals, petals, stamens and carpels or pistils.

The outermost part of the flower is made of the sepals and petals. Both of them have a leaflike appearance or structure. **Sepals** are usually green while **petals** are usually white or brightly colored. Sepals, being the outermost part of a flower, usually enclose the flower before it opens.

The **stamen** and the **carpels** or **pistils** are the reproductive parts of a flower. You will learn more about them in Lesson 3, where we will discuss different means of plant reproduction.

Let's Try This

A. You will find a picture of a flower on the next page. Try to label its different parts without looking at the picture above. Write your answers in the blanks at the end of the arrows.



B. Draw some flowering plants that may be found in your neighborhood. Try to include the various parts of the flower of each plant in your drawings. Write the name of each plant below your drawing.

1. _____ 2. _____

3. _____ 4. _____

For Part A, compare your answers with those found in the *Answer Key* on page 46.

In Part B, were you able to identify and draw the receptacle, sepals, petals and other parts of the flower in each of your flowering plants? Show your work to your Instructional Manager for comments. Sometimes, it is difficult to identify the various parts of the flowers of some flowering plants. What is important in plant classification is to distinguish flowering from non-flowering plants.

Let's Remember

These are the characteristics of **flowering** plants:

- They have flowers, which are very important in reproduction.
- They bear seeds, some in the form of cones, others wrapped in a kind of case.
- They have roots, stems and leaves.
- They have systems that transport food and water in and around their bodies.
- Most live on dry land.

Let's See What You Have Learned

A. Study the following characteristics of plants. Write **F** in the blank beside the number of the characteristic that refers to flowering plants. Write **NF** in the blank beside the number of the characteristic that refers to non-flowering plants.

_____ 1. They do not have roots and stems.

_____ 2. They live in water or in moist places.

_____ 3. They bear seeds.

_____ 4. They can transport water and nutrients within their bodies.

_____ 5. Their flowers are important parts in reproduction.

B. Classify the following plants. Place them in the proper column in the table.

mushroom	coconut	mango	seaweed	*sampaguita*
red moss	corn	pine tree	fern	algae

Flowering	Non-flowering
1. _____	1. _____
2. _____	2. _____
3. _____	3. _____
4. _____	4. _____
5. _____	5. _____

Compare your answers with those in the *Answer Key* on pages 46–47.

How did you do? Did you get everything right? If you did, excellent! If not, you may go back to the lesson and try to understand it better.

Let's Remember

- Plants can be grouped according to whether they have flowers and seeds or not.
- **Non-flowering** plants are those that neither have flowers nor bear seeds.
  - Most of them live in water or in moist places.
  - Most of them do not have complete plant parts. Some don't have roots, stems or leaves.
  - Most do not have systems that move or transport food inside their bodies.
- **Flowering** plants have flowers and bear seeds.
  - Most of them live on dry land.
  - They have systems that move or transport food inside their bodies.
  - They have roots, stems and leaves.
  - Their flowers are very important in reproduction.

Classification Based on Means of Reproduction

In Lessons 1 and 2, you learned that plants can be classified according to where they live, their stems, and whether they have flowers and seeds or not.

Plants may also be classified according to the ways in which they reproduce. Have you wondered how plants are able to reproduce themselves? How can you tell if a plant is female or male? What do plants use to be able to reproduce?

Knowing how plants reproduce helps farmers, plant growers and gardeners in tending the plants they grow in their farm, plot or garden. It helps them know which plants can be left to reproduce on their own and which plants need help in reproducing.

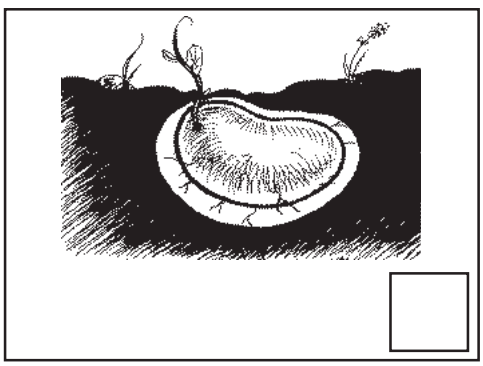
At the end of this lesson, you should be able to:

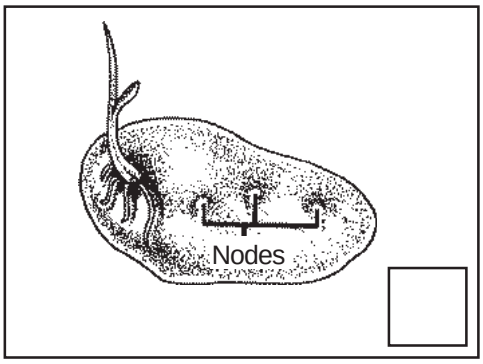
- identify the different kinds of asexual reproduction among plants;
- identify the processes involved in the sexual reproduction of plants;
- differentiate between asexual and sexual reproduction; and
- classify plants according to the ways in which they reproduce.

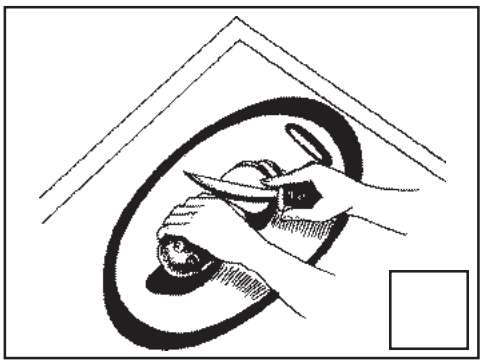
Let's Try This

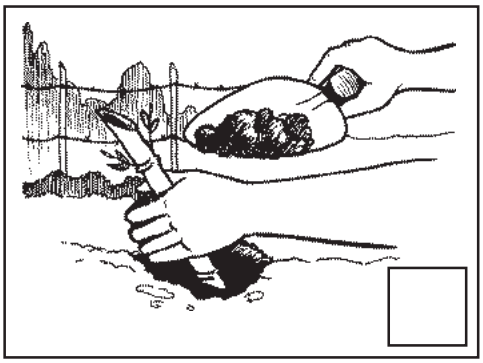
The following are six pictures showing stages of the growth of a potato. Try and arrange the pictures in their proper sequence. Write 1 in the box at the lower right side of the picture that should go first, 2 for the second picture, and so on.

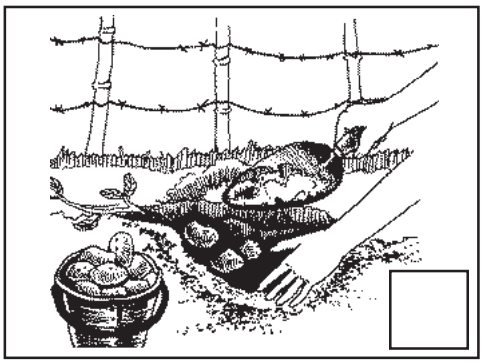
How a Potato Grows

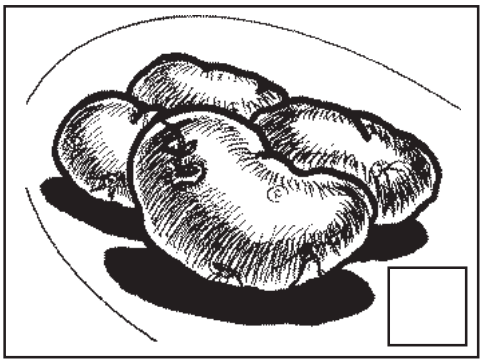












Compare your answers with those in the *Answer Key* on page 47.

What did you notice about the way a potato grows and reproduces? In human reproduction, two parents are needed. Does a potato need another potato to produce new potatoes? Let's find out.

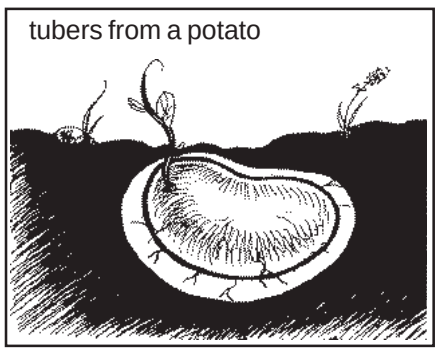
Let's Learn

Asexual Reproduction

There are plants, like potatoes, that do not need another of their kind to reproduce. These plants reproduce *asexually*. This means that, in reproduction, only one parent is involved. This is also called *vegetative propagation*.

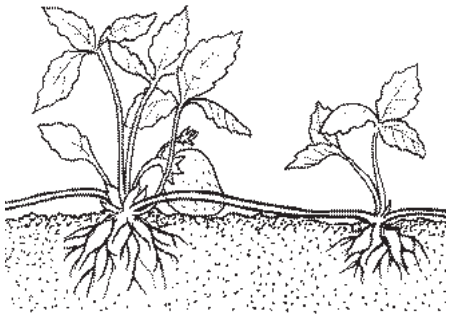
There are many kinds of asexual reproduction in plants.

Some plants reproduce through their roots, stems or leaves. Potatoes reproduce by stems called *tubers*. Leafy shoots develop from these tubers, which eventually grow into new plants.



The strawberry plant also uses its stems to reproduce. It sends out horizontal stems called *stolons*, which grow along the ground. Eventually, roots grow downward from the stolon's tip and into the soil. Shoots develop upward into the air, and a new plant is formed.

stolons from a strawberry plant



Some trees and shrubs reproduce through another kind of horizontal stem called *rhizome*. Ginger reproduces by rhizomes. Its rhizomes grow outwards. After some time, new plants develop from the rhizomes.

rhizomes from ginger

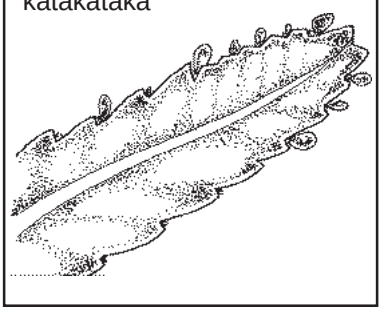
onion bulbs

Onion and garlic are examples of plants that reproduce by *bulbs*. Bulbs are shortened, compressed, underground stems. They have a special way of dividing and forming new bulbs.

roots of a lilac plant

Other plants, such as lilac, reproduce by roots. On the right is a picture of a lilac plant producing new plants.

katakataka



There are few instances in which new plants grow from leaves. An example is the *katakataka* (*Bryophyllum*) plant.

Let's Try This

Classify the following plants according to whether they use their stems, roots or leaves for asexual reproduction. Write **S** for stem, **R** for root, or **L** for leaf.

_____ 1. lilac

_____ 2. garlic

_____ 3. *katakataka*

_____ 4. ginger

_____ 5. strawberry

Compare your answers with those in the *Answer Key* on page 48.

Let's Remember

- Some plants reproduce asexually or by vegetative reproduction. They do this with the use of their stems, roots or leaves, which are their vegetative organs.
- There are plants that reproduce through their stems called *tubers*, *stolons*, *rhizomes* or *bulbs*. Other plants reproduce through their roots. Still others reproduce through their leaves.

Let's Learn

Sexual Reproduction

You have learned that vegetative reproduction or asexual reproduction in plants makes use of plant parts such as the leaves, roots and stems to start new plants. Only a single parent is needed for asexual reproduction. For example, a potato does not need another potato to make new potatoes.

In flowering plants, a male reproductive cell from one flower unites with the female reproductive cell of another flower of the same kind. This is called **sexual reproduction** because *two parents* are needed to produce new plants. In this kind of reproduction, pollination and fertilization should occur to produce fruits containing seeds and give rise to new plants. You will learn more about these processes as we continue with the lesson.

Sexual reproduction is very important in plants, particularly those that have flowers and bear seeds. This is the primary means by which new plants develop and grow.

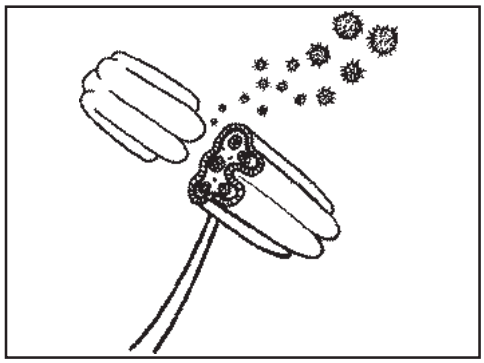
Examples of plants that reproduce sexually are fruit trees, like papaya, mango and guava and ornamental plants.

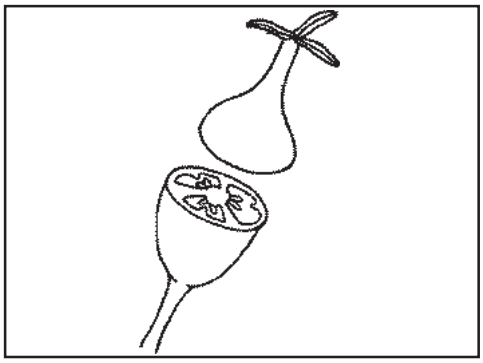
papaya

sampaguita

In Lesson 2, you reviewed the different parts of a flower. There are two parts of a flower that play important roles in sexual reproduction in plants. These are the stamen and the carpel or the pistil.

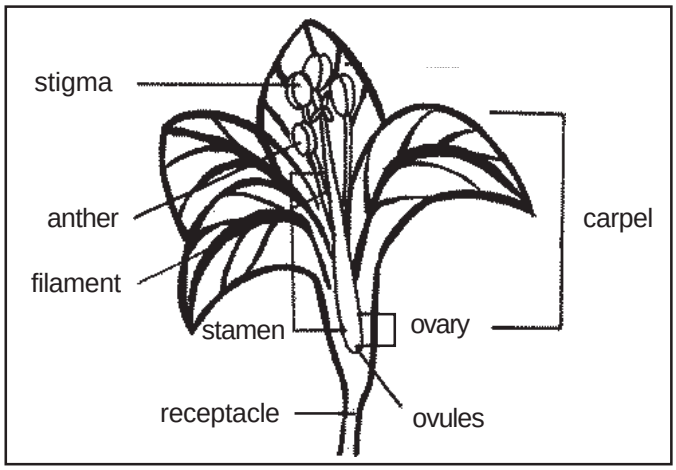
The **stamen** is the male reproductive part of a flower. It is usually made up of a long **filament** topped with an **anther.** Inside the anther are sacs in which pollen grains are produced.





The **carpel** or the **pistil** is the female reproductive structure of a flower. At the base of the carpel is the ovary. The ovary is divided into compartments that contain **ovules.** These are the structures that develop into **seeds.** Above the ovary is a tube-like structure called the **style.** On top of the style is the **stigma,** the place where pollen first collects.

To refresh your memory, below are the parts of a flower. Study the drawing carefully.

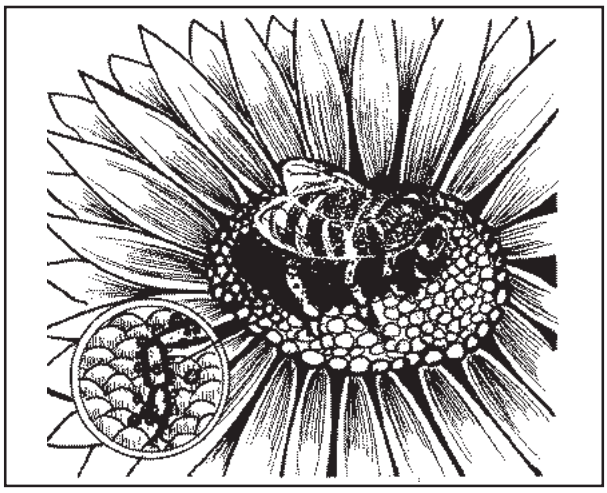


Let's Learn

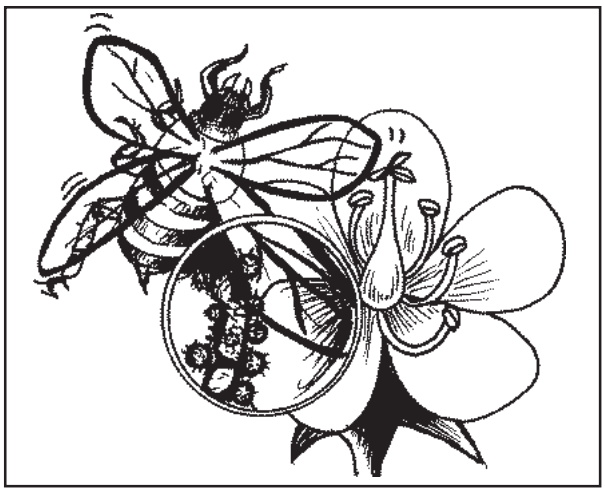
How do plants reproduce sexually?

Unlike animals, plants cannot move from place to place to find food or shelter or to reproduce. To solve this, plants have developed certain "moving" parts. One "moving" part is pollen that produces sperm. The **sperm** is the male reproductive cell that is necessary in the sexual reproduction of plants. Pollen moves from the anther to the stigma in a process called ***pollination.***

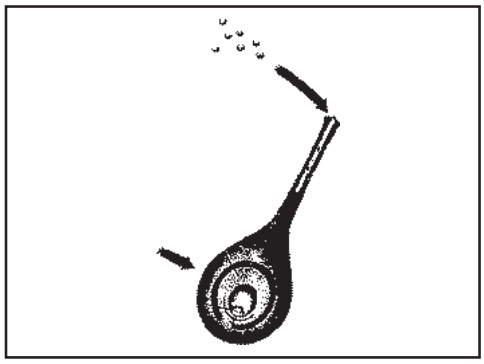
How does pollen "move" from the anther to the stigma?

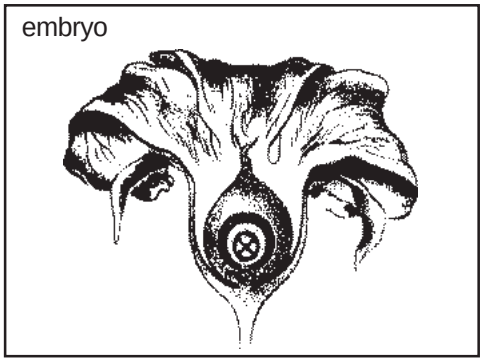


Plants make use of a variety of ***pollinators*** or pollinating agents. Animals such as butterflies, bees and birds pollinate many kinds of plants. When these pollinators eat pollen or a sugary food called *nectar,* some of the pollen grains from the anther stick to their body. When the pollinators move to other flowers, the pollen grains are accidentally transferred to the stigma of those flowers. Almost all pollinators are very specific. They pollinate only certain plants. So, it is more likely that pollen grains from a certain plant will land on the stigma of another plant of the same kind. For example, a kind of bee pollinates only white roses, while a kind of butterfly pollinates only sunflowers.



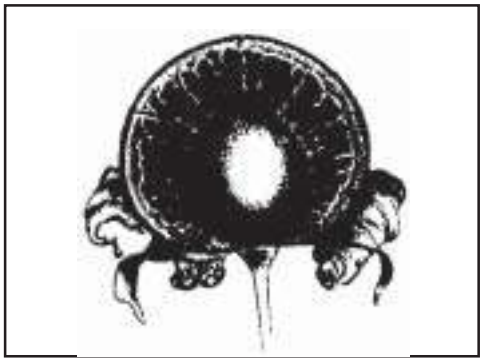
Once the pollen grain lands on the stigma of the same kind of plant, fertilization begins. The sperm cell produced in the pollen grain travels through a pollen tube to reach the egg cell in the ovary.





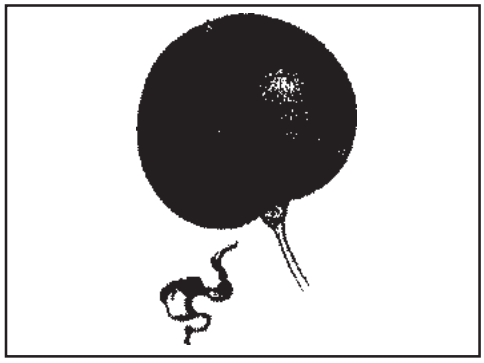
The fertilized egg or zygote eventually develops into an embryo.

The ovule develops into a seed that contains the embryo and its food supply.



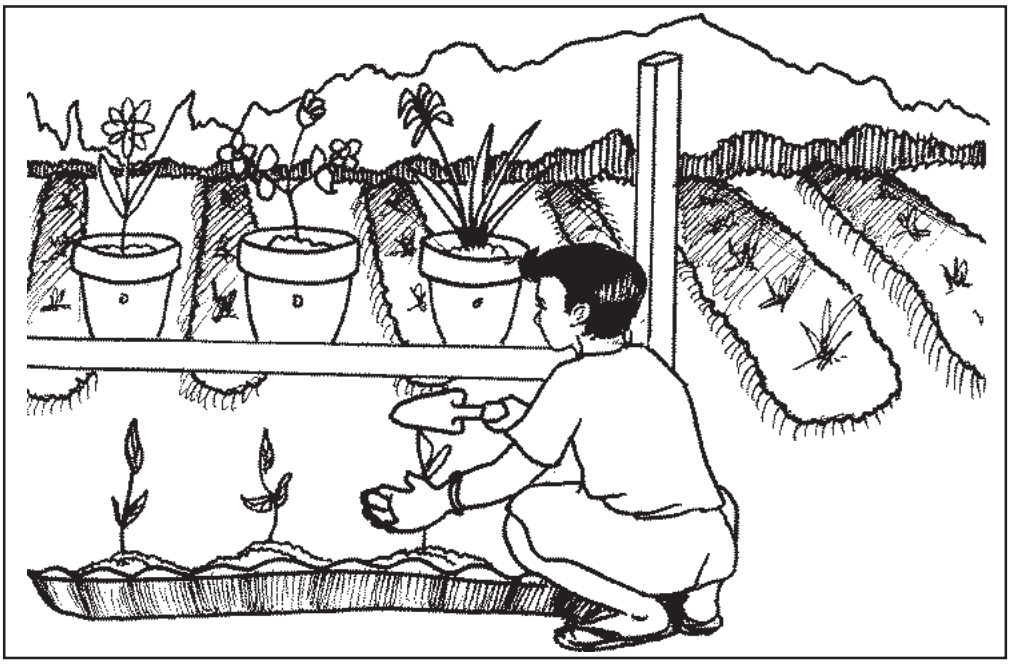
While the seed matures within the ovary, the walls of the ovary change to form a fruit.

When the fruit ripens, the flower parts fall away. The seed in the fruit is now ready to be planted to produce a new plant. New flowers will develop from the new plant and the process of reproduction may begin again.



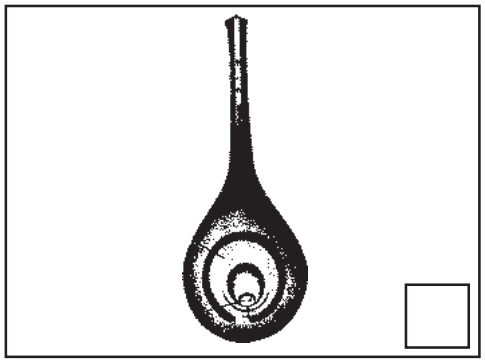
Thus, in sexual reproduction, the male and female parts of a flower are very important. The stamen is the male reproductive part of the flower. It consists of the anther, the filament and the pollen. The carpel or the pistil is the female reproductive structure of the flower, where the ovary, the ovules and the style are located.

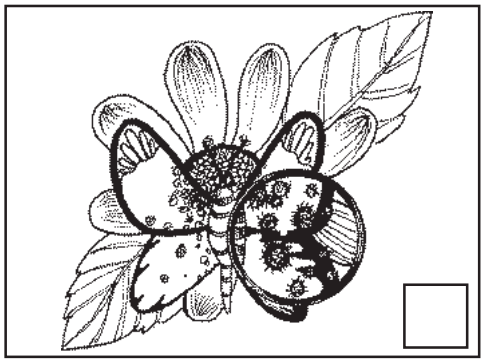
The pollen is transferred from the anther to the stigma of the same flower or another flower. The sperm from the pollen unites with the egg cell in the ovule. Fertilization then occurs and an embryo is developed. The ovule develops into a seed that contains embryo and food supply. The ovary enlarges into a fruit that contains seed. The fruit ripens and the flower parts fall away. The seed may then be planted to produce new plant. Look at the illustration below for a more visual representation of how plants reproduce sexually.

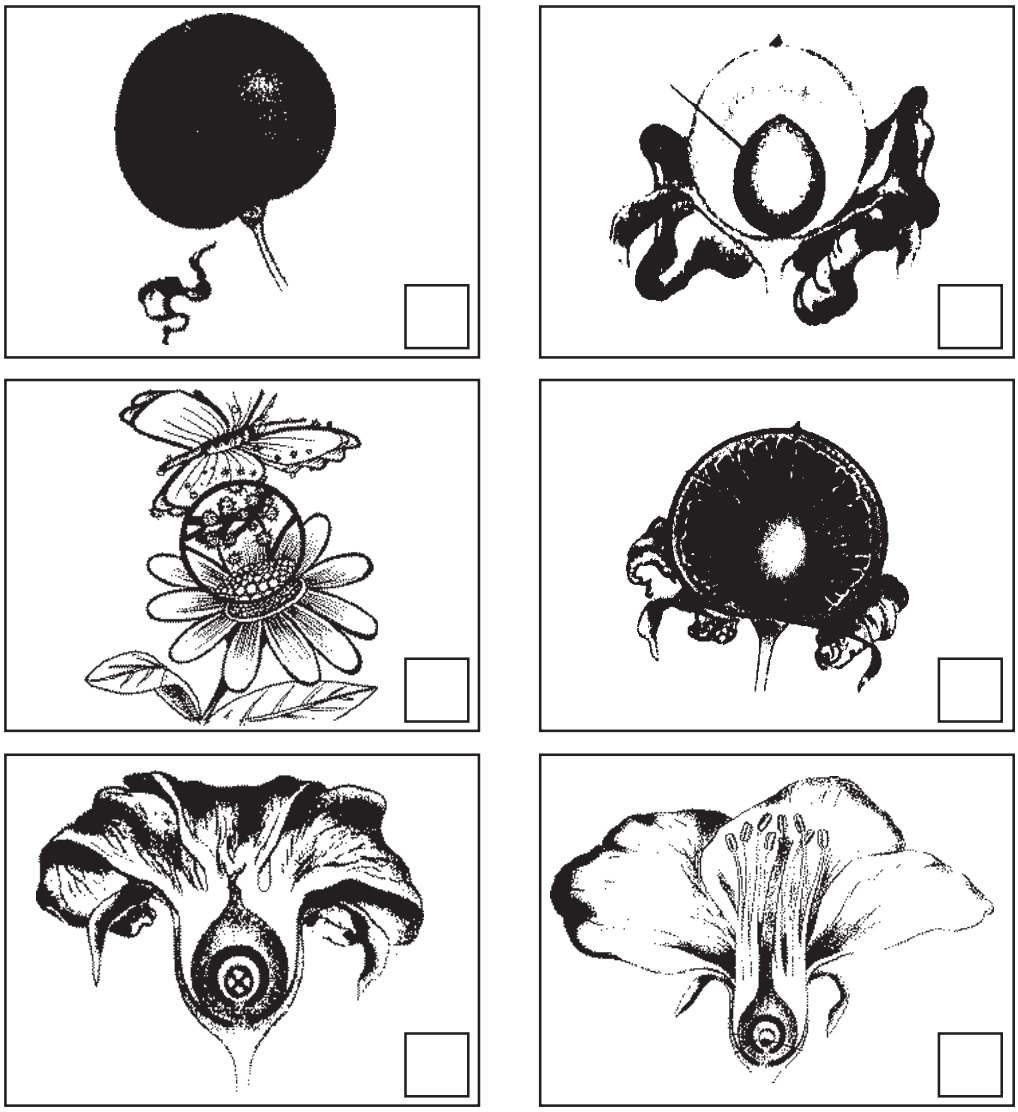


Let's Try This

The following eight pictures illustrate the different stages of sexual reproduction in plants. Arrange them in the proper order. Write 1 in the box of the picture that should go first, 2 for the second picture, and so on.







Compare your answers with those in the *Answer Key* on page 48.

Let's Remember

- Most flowering plants produce sexually.
- **Sexual reproduction** in plants involves two parents to produce new plants. In this process, a male reproductive cell unites with and fertilizes a female reproductive cell.
- The **flower** is the most important part of a plant in sexual reproduction. It contains the male and female reproductive cells needed for reproduction.

Let's Read

Asexual and Sexual Means of Reproduction in Plants

Plants can be classified according to how they reproduce.

Some plants reproduce asexually or through vegetative propagation. These plants don't need another plant to produce new plants. They reproduce using their stems, roots or leaves, which are called their vegetative organs. New plants develop from these organs.

Other plants, particularly flowering plants, reproduce sexually. In this process, two parents are needed to produce new plants. The flower is the most important part of the plant in this mode of reproduction. Through pollination, the sperm cell of a flower fertilizes the egg cell of another flower of the same kind. After some time, a seed develops, which can be planted to produce a new plant.

Knowing how plants reproduce enables people, especially farmers and gardeners, to know how to reproduce different kinds of plants. Through this knowledge, they are able to develop methods on how to tend their plants properly and to use tools that will help in the reproduction of certain plants. For example, farmers know that new potatoes develop from tubers. They will choose potatoes that have already developed these special stems and plant these in a way that there will be room for new plants to grow.

Knowing how plants reproduce makes us aware of how to help in the growth and development of plants. After all, plants are very important to man.

For example, you have learned that flowering plants need bees, butterflies and other insects for pollination to occur. You become more aware of how important these insects are and decide against killing these insects – directly or as a result of neglecting the environment. Pollution kills most of these insects. If people continue to pollute the environment, these pollinators will die and fewer plants will be reproduced. Would you like that to happen?

Lets See What You Have Learned

To see how much you have learned about the different ways plants reproduce, complete the following lesson review test.

A. Match the statements in Column A with the terms they describe in Column B. Write the letter of the correct answer in the blanks provided.

	A	B
____ 1.	It is the asexual reproduction in plants.	a. flowering plants
____ 2.	These are parts used by plants in producing asexually.	b. *katakataka*
		c. ovule

_____ 3. These are special stems in potatoes that reproduce plants.

_____ 4. This is an example of a plant that reproduces through its leaves.

_____ 5. It is a kind of reproduction that involves a sperm cell and an egg cell.

_____ 6. Plants that usually reproduce sexually.

_____ 7. It is the part of the flower that produces pollen.

_____ 8. They aid in the pollination of plants. Examples are butterflies and bees.

_____ 9. It is the part of the flower that contains the egg cells.

_____ 10. It is the result of the union of a sperm cell and an egg cell.

d. vegetative propagation

e. tubers

f. sexual reproduction

g. zygote

h. stems, roots or leaves

i. anther

j. pollinators

B. Answer this question:

What are the differences between asexual and sexual reproduction in plants?

_____

_____

_____

_____

_____

_____

Compare your answers with those in the *Answer Key* on page 49.

How did you do? Did you get everything right? If you did, excellent! If not, you may go back to the lesson and try to understand it better.

Let's Try This

As an assignment, try and complete the following activity.

Visit your local neighborhood. Find at least five different plants and classify them according to the categories discussed in this module. Give your reasons for your classification. Use the chart on the next page to record your data. Refer to the examples below.

Name of Plant	***Classification According to***			
	Habitat	***Stem***	***Flowering/ Non-flowering***	***Means of Reproduction***
1. mango	terrestrial It lives on land.	woody Its main stem or trunk is hard, rough and brown.	flowering It has flowers and bears seeds.	sexual It has flowers and bears seeds, thus, it undergoes pollination and fertilization.

Discuss your work with your co-learners and Instructional Manager.

Name of Plant	*Classification According to*			
	Habitat	*Stem*	*Flowering/ Non-flowering*	*Means of Reproduction*
1.				
2.				
3.				
4.				
5.				

Let's Remember

In this lesson, you have learned that:

- Vegetative propagation is the asexual reproduction in plants.
  - Plants that reproduce through vegetative propagation make use of their leaves, stems or roots to reproduce.
  - Only one parent is needed for asexual reproduction.
- In sexual reproduction, it is the flower that plays an important role in reproduction.
  - Sexual reproduction involves the union of a sperm cell and an egg cell. This is called fertilization.
  - The sperm cell is found in the pollen, which is produced in the stamen or the male part of the flower.
  - The egg cell is produced in the ovule, which is part of the pistil or carpel of the female part of the plant.
  - Pollinators aid in transferring pollen from the anther to the stigma of a flower.
- Classifying plants according to their means of reproduction is very useful to man.
  - It helps farmers, plant growers and gardeners develop methods on how to reproduce plants successfully.
  - It makes people aware of the plants' need to reproduce. It makes them more conscious of their role in helping plants reproduce.

Let's Sum Up

In this module, you learned about the ways of classifying plants.

- Plants can be classified based on their habitat.
  - Terrestrial plants live on land.
  - Aquatic plants live in water.
  - Aerial plants live above the ground, usually attached to other plants.
- Plants can also be classified according to the type of stem they have.
  - Woody plants have hard, rough, and brown stems. Further, woody plants are of different kinds: shrub, tree, and vine.
  - Non-woody or herbaceous plants have soft, usually smooth, and green stems.
- Plants are also classified according to whether they have flowers and bear seeds or not.
  - Non-flowering plants are those that do not have flowers and do not bear seeds. Most of them live in water or in moist places. They do not have systems that transport nutrients and water throughout their bodies.
  - Flowering plants are those that have flowers and bear seeds. Most of them live on dry land. They have systems that transport food and water throughout their bodies.
- Plants can also be classified according to their means of reproduction.
  - There are plants that reproduce asexually or through vegetative propagation. They make use of their stems, roots or leaves.
  - Other plants, especially flowering plants, reproduce sexually. Pollination and fertilization occur in sexual reproduction among these plants, which result in seeds.

What Have You Learned?

Choose the correct answer for each item below. Write the letter of the item of your choice in the blank before the number.

_____ 1. Plants are classified based on their _____.

a. differences with each other
b. similarities with animals
c. similarities with each other
d. differences with animals

_____ 2. The place where a plant lives is called its _____.

a. vegetation
b. reproduction
c. vegetative organ
d. habitat

_____ 3. Terrestrial plants are plants that _____.

a. live in water
b. live on land
c. live in air
d. live in moist places

_____ 4. Which of the following plants are aquatic?

a. water lily
b. mango tree
c. green ivy
d. rose bush

_____ 5. What do you call plants that live in air?

a. aquatic
b. herbaceous
c. aerial
d. terrestrial

_____ 6. Which is a characteristic of the stems of non-woody or herbaceous plants?

a. green
b. hard
c. rough
d. brown

_____ 7. What kind of stem does *kangkong* have?

a. woody
b. aquatic
c. aerial
d. herbaceous

_____ 8. What kind of a woody plant is *narra*?

a. shrub
b. tree
c. herbaceous
d. vine

_____ 9. Which of the following is **not** a characteristic of flowering plants?

a. They bear seeds.
b. Most live on land.
c. They have roots, stems and leaves.
d. They do not have systems that transport food around their bodies.

_____ 10. Which of the following are examples of non-flowering plants?

a. *narra* and mango
b. rose and *sampaguita*
c. mushroom and algae
d. *ampalaya* and *sitaw*

_____ 11. What do you call asexual reproduction in plants?

a. vegetative propagation
b. pollination
c. fertilization
d. sexual reproduction

_____ 12. Which is true about asexual reproduction?

a. Pollinators help transfer pollen from one flower to another.
b. A plant uses its leaf, stem or root to reproduce.
c. Sperm cells from the pollen fertilize egg cells in the ovule.
d. The flower is the most important part of the plant in reproduction

_____ 13. Which of the following plants undergo asexual reproduction?

a. mango
b. tomato
c. papaya
d. garlic

_____ 14. What do strawberry plants use to reproduce?

a. rhizomes
b. bulbs
c. stolons
d. tubers

_____ 15. Which of the following plants reproduce through their leaves?

a. onion
b. *katakataka*
c. camote
d. strawberry

_____ 16. Sexual reproduction in plants makes use of their _____.

a. leaves
b. roots
c. stems
d. flowers

_____ 17. Which part of the flower produces sperm?

a. petal
b. pollen
c. ovary
d. ovule

_____ 18. What is pollination?

a. It is the asexual reproduction in plants.
b. It is the union of the sperm cell and the egg cell.
c. It is the process through which pollen moves from the anther to the stigma.
d. It is the use of stems, leaves or roots in producing new plants.

_____ 19. When does fertilization occur?

a. when a sperm cell unites with the egg cell
b. when pollen moves from the anther to the stigma
c. when the horizontal stems of a plant give rise to new plants
d. when the ovary enlarges into a fruit

_____ 20. Which of the following plants does **not** reproduce sexually?

a. mango
b. papaya
c. *gumamela*
d. onion

Were you able to get all the correct answers? Compare your answers with those in the *Answer Key* on pages 49–51.

If the number of correct answers you got is:

18	–	20	Very good! You have learned a lot from this module.
15	–	17	Good! Just go back and review the items that you answered incorrectly.
12	–	14	Satisfactory. You need to review the important points that you did not understand.
0	–	11	You have to review the whole module again.

Answer Key

A. Let's See What You Already Know *(pages 2–3)*

1. **(d)**. The main reasons for classifying plants are: to give order to the many plant varieties, to easily distinguish groups of plants based on certain characteristics and to categorize plants into smaller groups so as to easily identify them. Plant classification **does not involve finding the relationship between plants and animals.**

2. **(c)**. **Lotus, water lily** and ***kangkong*** are aquatic plants because they live in the water. Watermelon, mango and sampaloc (a) and string beans and cabbage (d) are terrestrial plants because they live on land. Orchids and green ivy (b) are aerial plants because they live above the ground, usually attached to other plants.

3. **(b)**. Plants that have soft, greenish stems are called **herbaceous** or non-woody. Herbaceous refers to the type of stem a plant has. Terrestrial, aquatic and aerial are words used to classify a plant according to its habitat.

4. **(a)**. **Shrubs** are plants that grow upright, but stay close to the ground and do not grow tall. Vines (b) are plants that creep or crawl. Trees (c) usually grow very tall. Flowers (d) are parts of a plant.

5. **(c)**. Flowering plants are **not simple plants that live in water.** Most of them live on land. They also bear seeds, have true roots, stems and leaves, and the flower is their reproductive structure.

6. **(b)**. **Vegetative propagation** is the asexual reproduction in plants. Vegetation (a) refers to the plants growing in a place. Fertilization (c) means the union of a sperm cell and an egg cell. Pollination (d) means the transfer of pollen to the stigma of a flower.

7. **(a)**. Sweet potatoes produce new plants by **tubers,** which are specialized stems. Other plants use leaves, rhizomes or roots to reproduce.

8. **(a)**. The **anther** is the male part of a flower where sperm-producing pollen grains are produced. The sepal (b) is not a reproductive part of a flower. It only serves as a special kind of leaf that covers the flower before it opens. The pistil (c) is the female reproductive part of a flower. The petals (d) surrounds the reproductive parts of a flower.

9. **(d)**. **Fertilization** is the union of an egg cell and a sperm cell. Vegetative propagation (a) is the asexual reproduction in plants. Pollination (b) is the transfer of pollen from the anther to the female reproductive part of a flower. Vegetation (c) refers to the plants that grow in a certain area.

10. **(a)**. Pollination is the process through which pollen is transferred from the anther to the stigma of a flower. Vegetative propagation (b) refers to the asexual reproduction in plants. Fertilization (c) is a part of sexual reproduction in which a sperm cell from the pollen unites with an egg cell in the ovule. Asexual reproduction (d) does not involve pollination.

B. Lesson 1

Let's Study and Analyze (pages 5–7)

Plants that live on land	1. carrot 2. mango 3. rose	4. banana 5. *narra* 6. *acacia*

Plants that live in water	1. lotus 2. seaweed 3. water lily	4. *kangkong* 5. water hyacinth

Plants that are attached to other plants	1. orchid 2. poison ivy	3. green ivy

Let's Talk About This (pages 7–8)

Here are other examples of terrestrial, aquatic and aerial plants. There are many others.

A. Terrestrial

1. pine tree
2. *kamagong*
3. *molave*
4. guava
5. *papaya*
6. coconut
7. *sambong*
8. *Ilang-ilang*
9. bermuda grass
10. *calamansi*

B. Aquatic

1. red algae
2. green algae
3. seaweed
4. duckweed
5. pondweed
6. yellow iris
7. water lettuce
8. waterweed
9. water spinach
10. watergrass

C. Aerial

1. bromeliads
2. lichens
3. passion flower
4. begonia
5. lianas

Let's Study and Analyze (pages 9–10)

Plant	Color of Stem	Texture of Stem (rough or smooth)	Hardness of Stem (hard or soft)
1. rose	brown	rough	hard
2. gumamela	brown	rough	hard
3. santan	brown	rough	hard
4. kangkong	green	smooth	soft
5. pechay	green	smooth	soft

Let's Learn (pages 10–11)

Here are other examples of vines, shrubs and trees.

A. Vines

1. *upo*
2. *bougainvillea*
3. purple *allamanda*
4. black pepper
5. jade vine

B. Shrubs

1. *santan*
2. *camia*
3. *camellia*
4. white *campanulas*
5. Philippine violet

C. Trees

1. *ipil-ipil*
2. palm
3. mahogany
4. *guyabano*
5. *balete*

Let's See What You Have Learned (page 12)

A. 1. **T.** *Langka* is a terrestrial plant because it lives on land.

2. **Aq.** Seaweed is an aquatic plant because it lives in water.

3. **T.** *Chico* is a terrestrial plant because it lives on land.

4. **Ae.** An orchid is an aerial plant because it lives in air, clinging onto other plants.

5. **T.** *Lanzones* is a terrestrial plant because it lives on land.

6. **Aq.** *Kangkong* is an aquatic plant because it lives in water.

7. **Ae.** Green ivy is an aerial plant because it lives in air.

8. **T.** Squash is a terrestrial plant because it lives on land.

9. **Aq.** Lotus is an aquatic plant because it lives in water.

10. **T.** Corn is a terrestrial plant because it lives on land.

B. The following plants are **woody** because their stems are hard, rough and brown in color.

1. *dama de noche*
2. *ilang-ilang*
3. *sampaguita*
4. *molave*
5. grapes

The following plants are **non-woody** or herbaceous because their stems are soft, usually smooth and greenish in color.

1. *alugbati*
2. *kinchay*
3. banana
4. *saluyot*

C. 1. **Shrub.** The rose plant is a shrub. It has woody stems that grow upright, but it does not grow very tall. It has thorns to protect it from animals that may eat or destroy it.

2. **Tree.** The apple is a tree. It is a woody plant that grows big. It has one very hard and wide trunk.

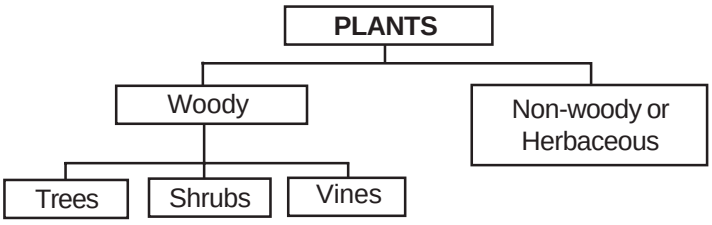
3. **Vine.** Upo is a vine. It is a creeping woody plant. It has twiners and tendrils that enable it to wrap itself around a solid support.

4. **Tree.** Durian is a tree. It is a woody plant that grows big. It has a hard, wide and brownish trunk.

5. **Tree.** The mango is a tree. It has a very hard, wide and brownish trunk. It usually grows very tall.

6. **Shrub.** Santan is a shrub. It grows low or very close to the ground. Its stems grow upright.

D.



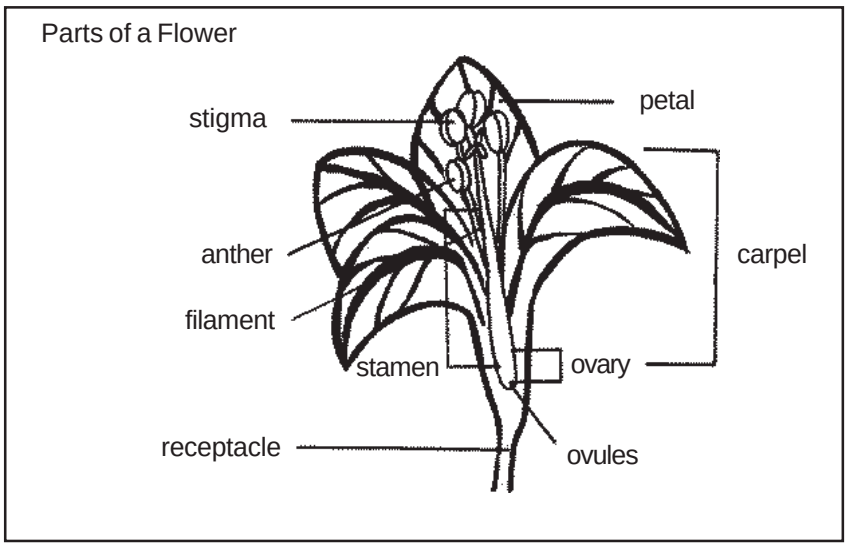
C. Lesson 2

Let's Try This (pages 14–15)

Flowering Plants	Non-flowering Plants
1. seaweed	1. pine tree
2. mushroom	2. rose bush
3. moss	3. bougainvillea
4. fern	4. mango tree

Let's Try This (pages 19–20)

A.



Let's See What You Have Learned (page 21)

A. 1. **NF.** Non-flowering plants usually do not have roots and stems.

2. **NF.** Non-flowering plants are usually found living in water or in moist places.

3. **F.** Flowering plants bear seeds.

4. **F.** Flowering plants have systems that enable them to transport nutrients and water into and around their bodies.

5. **F.** For flowering plants, flowers are important parts in their reproduction.

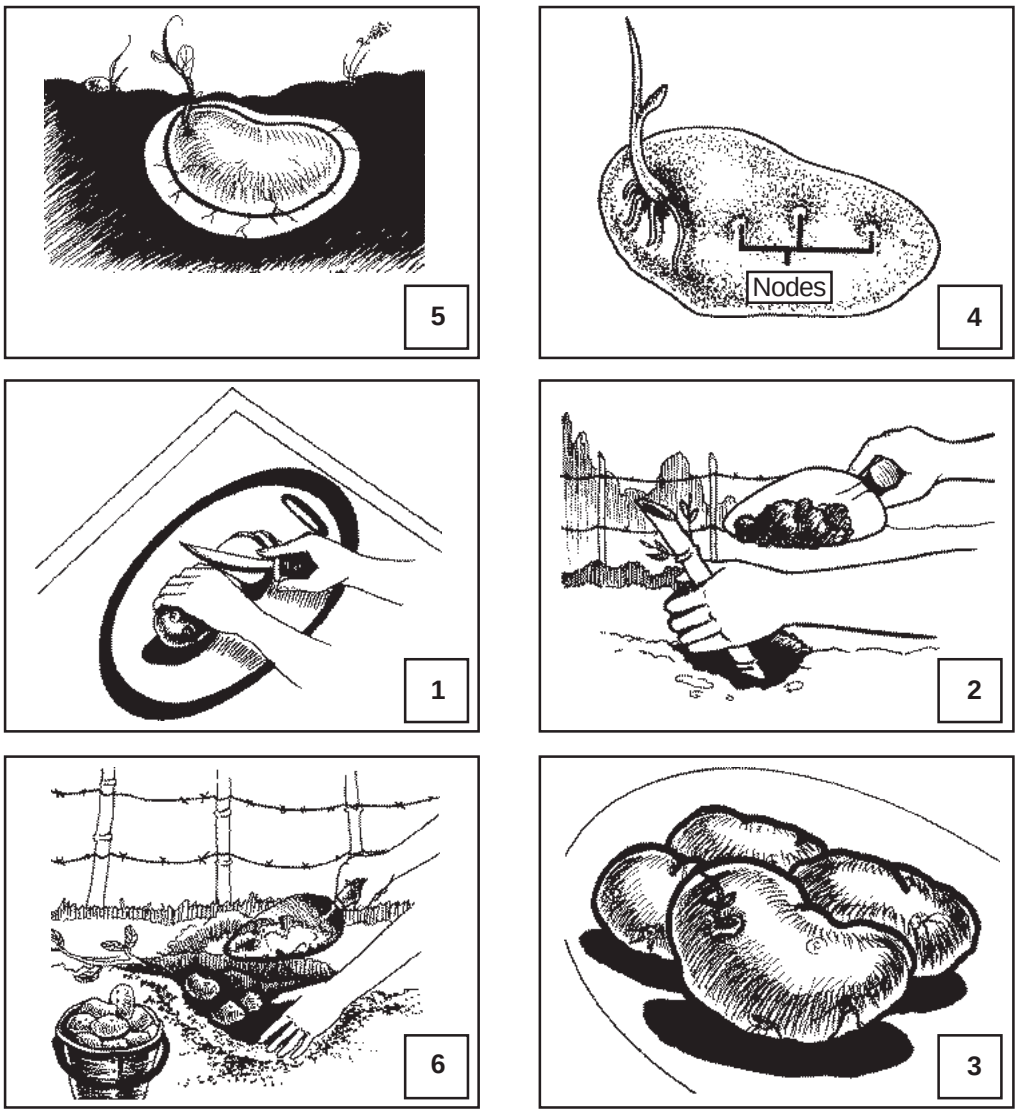
B.

Flowering	Non-flowering
1. coconut	1. mushroom
2. corn	2. red moss
3. mango	3. seaweed
4. pine tree	4. fern
5. *sampaguita*	5. algae

D. Lesson 3

Let's Try This (pages 23–24)

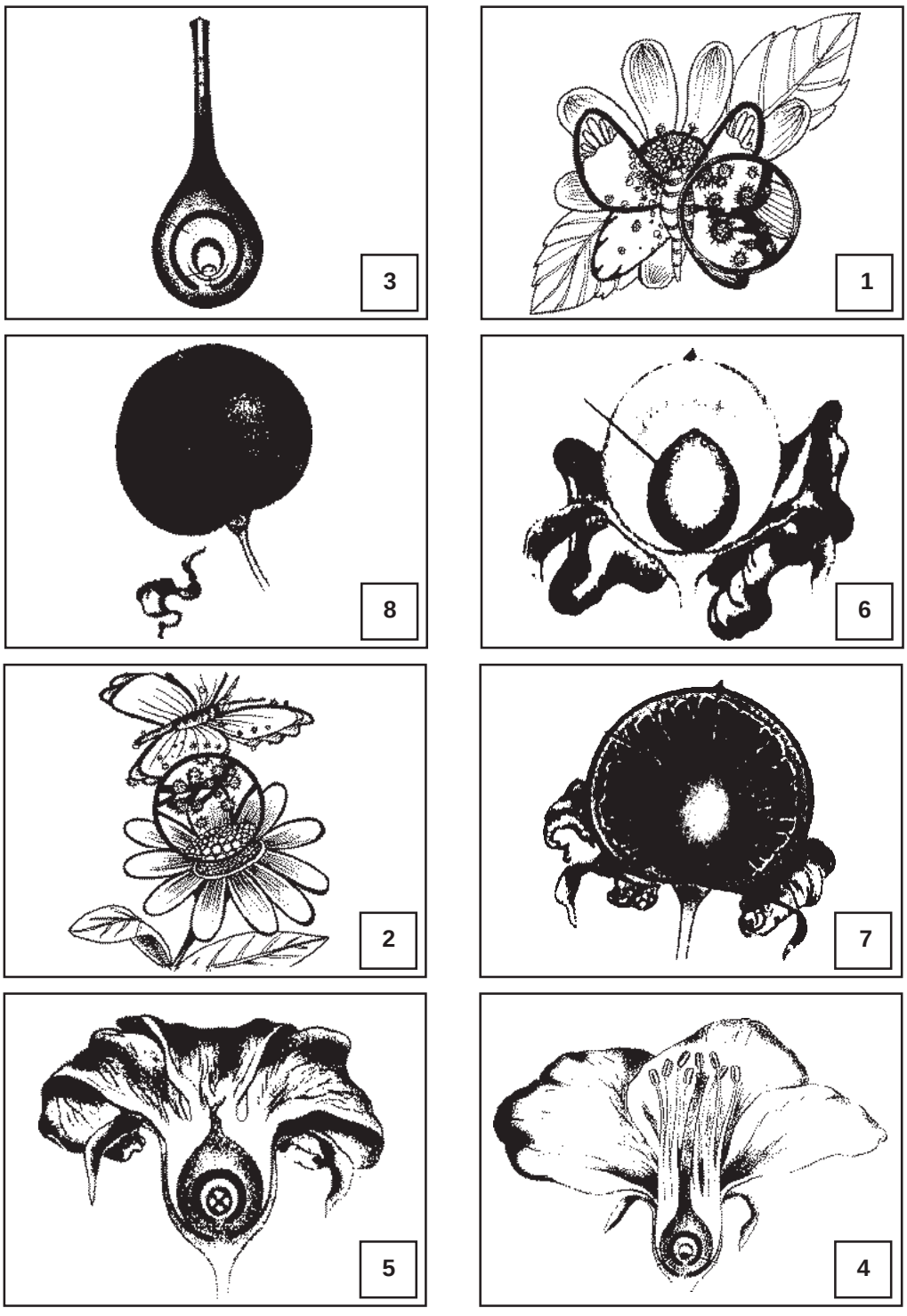
How a Potato Grows



Let's Try This (page 26)

1. **R.** Lilac reproduces asexually using its roots.
2. **S.** Garlic uses special stems, called bulbs, to reproduce.
3. **L.** The *katakataka* plant reproduces by its leaves.
4. **S.** Ginger uses special stems, called rhizomes, to reproduce asexually.
5. **S.** The strawberry plant reproduces using special stems called stolons.

Let's Try This (pages 30–31)



Let's See What You Have Learned (pages 32–33)

A. 1. **(d)**. **Vegetative propagation** is the asexual reproduction in plants.

2. **(h)**. Plants that reproduce asexually use their **stems,** roots or leaves.

3. **(e)**. Potatoes use **tubers** to reproduce.

4. **(b)**. **Katakataka** is an example of a plant that reproduces by leaves.

5. **(f)**. **Sexual reproduction** involves a sperm cell and an egg cell. The union of these cells is called fertilization.

6. **(a)**. **Flowering plants** usually reproduce sexually. Their flowers play a major role in reproduction.

7. **(i)**. Pollen is produced in the **anther** of the plant. Pollen contains the sperm cells that are important in sexual reproduction.

8. **(j)**. **Pollinators** like butterflies and bees aid in the pollination of plants. Pollination is the transfer of pollen from the anther to the stigma of a plant.

9. **(c)**. The **ovule** contains the egg cells. These egg cells will unite with the sperm cells from the pollen.

10. **(g)**. A **zygote** results from the union of a sperm cell and an egg cell in a process called fertilization.

B. One difference between sexual and asexual reproduction is the plant part used to produce new plants. Sexual reproduction depends on a plant's flowers, while plants that undergo asexual reproduction make use of stems, leaves or roots, which are called vegetative organs.

Another difference is that only one parent is involved in asexual reproduction. A plant that reproduces asexually or through vegetative propagation does not need another plant to produce new plants. While, in sexual reproduction, two parents are involved. The sperm cell of a flower must fertilize the egg cell of another flower of the same kind for fertilization to occur, which will eventually lead to reproduction of new plants.

E. What Have You Learned? *(pages 38–40)*

1. **(c)**. Plants are classified based on their **similarities with each other,** not on their differences (s). Their similarities (b) or differences (d) with animals are not considered.

2. **(d)**. The place where a plant lives is called its **habitat.** Vegetation (a) refers to the plants that grow in a certain area. Reproduction (b) refers to the process by which new plants are produced. A vegetative organ (c) is the part of the plant used in asexual reproduction. It may be the plant's stem, root or leaf.

3. **(b)**. Terrestrial plants **live on land.** Plants that live in water (a) and in moist places (d) are aquatic plants. Plants that live in air (c) are aerial plants.

4. **(a)**. **Water lily** is the aquatic plant among the choices. The mango tree (b) and the rose bush (d) are terrestrial plants, while the green ivy (c) is an aerial plant.

5. **(c)**. Plants that live in air or on the branches of trees are called **aerial** plants. Aquatic (a) plants live in water. Terrestrial (d) plants live on land. Herbacious (b) refers to the type of stem a plant has and not where a plant lives.

6. **(a)**. Non-woody or herbaceous plants usually have **green stems.** The stems of woody plants are hard, rough and brown.

7. **(d)**. *Kangkong* is a **herbaceous** plant because its stems are green, soft and smooth. Woody plants (a) are plants with stems that are hard, rough and brownish. The words 'aquatic' (b) and 'aerial' (c) refer to plant classification based on habitat and not on stem type.

8. **(b)**. *Narra* is a **tree.** It grows very tall and has a hard, wide and brown trunk. Shrubs (a) are woody plants that grow close to the ground and have many stems. Vines (d) are woody plants that creep or crawl and wrap themselves around solid supports. Herbaceous (c) plants are non-woody plants.

9. **(d)**. Flowering plants do have systems that transport food around their bodies. They bear seeds and most of them live on land. They also have roots, stems and leaves.

10. **(c)**. **Mushroom** and **algae** are examples of non-flowering plants. They have no flowers and do not bear seeds. Most of them live in water or in moist places. *Narra* and mango (a), rose and *sampaguita* (b) and *ampalaya* and *sitaw* (d) are all flowering plants. They have flowers and bear seeds.

11. **(a)**. **Vegetative propagation** is the asexual reproduction in plants. Here, plants use their stems, roots or leaves to reproduce. Pollination (b) refers to the transfer of pollen from the anther to the stigma of a flower. Fertilization (c) is the union of a sperm cell and an egg cell. Sexual reproduction (a) involves the fertilization of an egg cell in a flower's ovule by a sperm cell from a pollen grain. Unlike vegetative propagation or asexual reproduction, it is the flowers that are important in sexual reproduction.

12. **(b)**. In asexual reproduction or vegetative propagation, **a plant uses its stems, roots or leaves to reproduce.** It does not use pollen, sperm cells, egg cells or its flower to produce new plants.

13. **(d)**. **Garlic** undergoes asexual reproduction. It uses special stems called bulbs to reproduce new plants. Mango (a), tomato (b) and *papaya* (c) reproduce sexually. Their flowers play the most important role in reproducing new plants.

14. **(c)**. Strawberry plants use special stems called **stolons** to reproduce. Ginger uses rhizomes (a). Onion and garlic use bulbs (b). Potatoes use tubers (d).

15. **(b)**. Among the choices, ***katakataka*** is the plant that reproduces by leaves. Onion (a) reproduces by bulbs. Camote (c) uses tubers. Strawberry (d) reproduces using stolons.

16. **(d)**. In sexual reproduction, plants make use of their **flowers.** Plants that reproduce asexually use their leaves (a), roots (b) or stems (c).

17. **(b)**. **Pollen** produces sperm cells. They are found in the anther or the male part of a flower. Petals (a) do not play a role in reproduction. The ovary (c) and ovule (d) are part of the female reproductive system of a flower.

18. **(c)**. Pollination is the **process through which pollen moves from the anther to the stigma** of a flower. Asexual reproduction (a) in plants is called vegetative propagation, where stems, leaves or roots are used to produce new plants (d). Fertilization is the union of a sperm cell and an egg cell (b).

19. **(a)**. Fertilization occurs **when a sperm cell from the pollen unites with the egg cell in the ovule.** Pollination occurs when pollen moves from the anther to the stigma (b). Vegetative propagation may involve horizontal stems giving rise to new plants (c). Although the ovary of a flower enlarges into a fruit in sexual reproduction, this process occurs after fertilization (d).

20. **(d)**. Among the four plants in the choices, the **onion** is the plant that does not reproduce sexually. It reproduces by bulbs in a process called vegetative propagation

Glossary

Aerial Growing or living in the air or above the ground

Anther The male part of the flower that produces pollen

Aquatic Growing or living in water

Asexual reproduction Reproduction that involves only one parent

Embryo The early stage of development of a plant (or an individual)

Fertilization The union of an egg cell and a sperm cell

Herbaceous Non-woody; having the characteristics of an herb

Ovary Female reproductive organ

Ovule A structure in the ovary of a flower that becomes a seed after fertilization

Pollen The sperm-producing, "moving" part of a plant

Pollination The transfer of pollen to the stigma of a flower

Pollinator That which aids the pollination process by transferring pollen from one flower to another

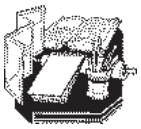
Stigma The female reproductive part of a flower

Terrestrial Growing or living on land

Vegetative organs The parts a plant uses to reproduce asexually. These may be stems, roots or leaves.

Vegetative propagation Asexual reproduction in plants, using vegetative organs (such as stems, leaves and roots)

Zygote Fertilized egg



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