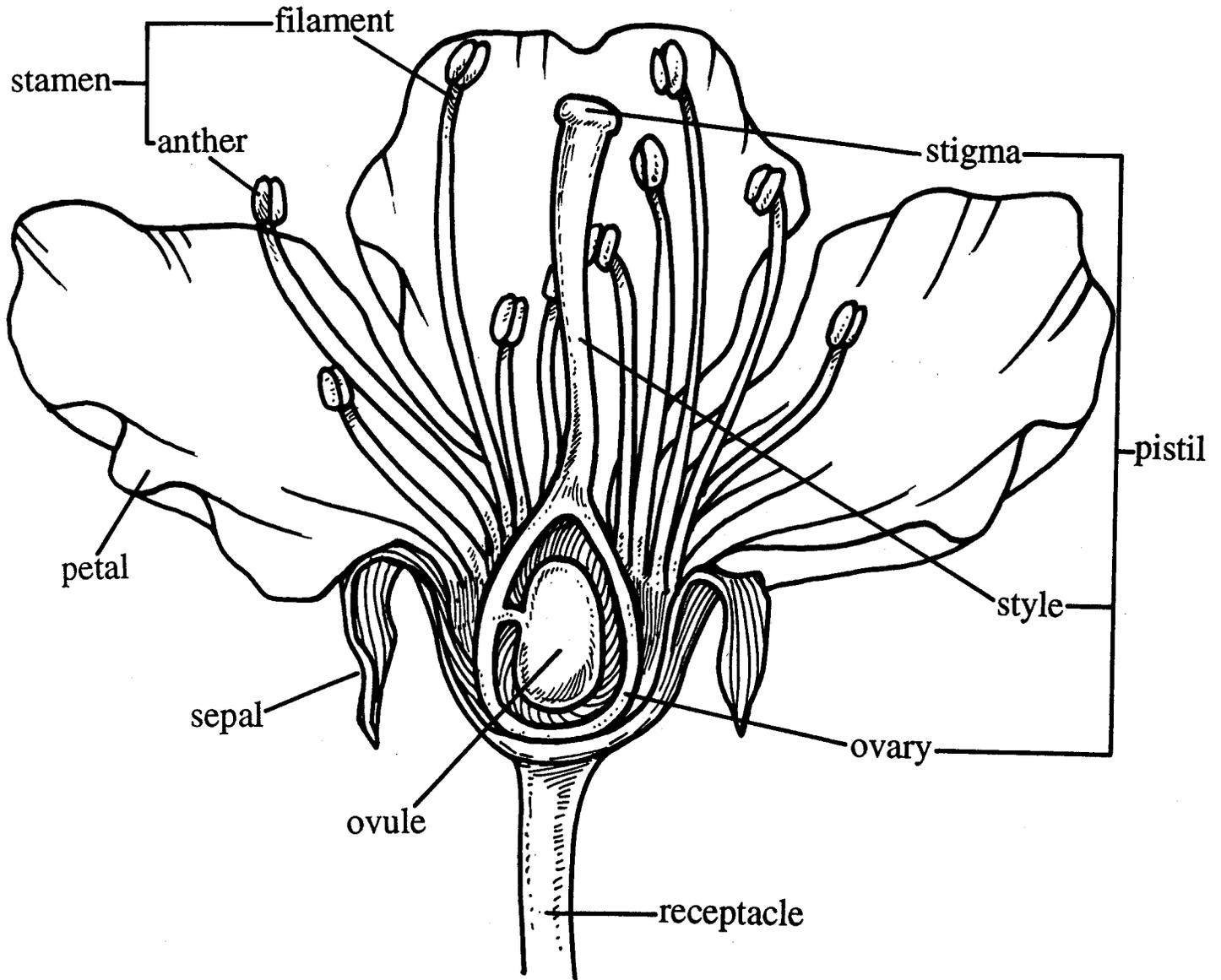


Name _____

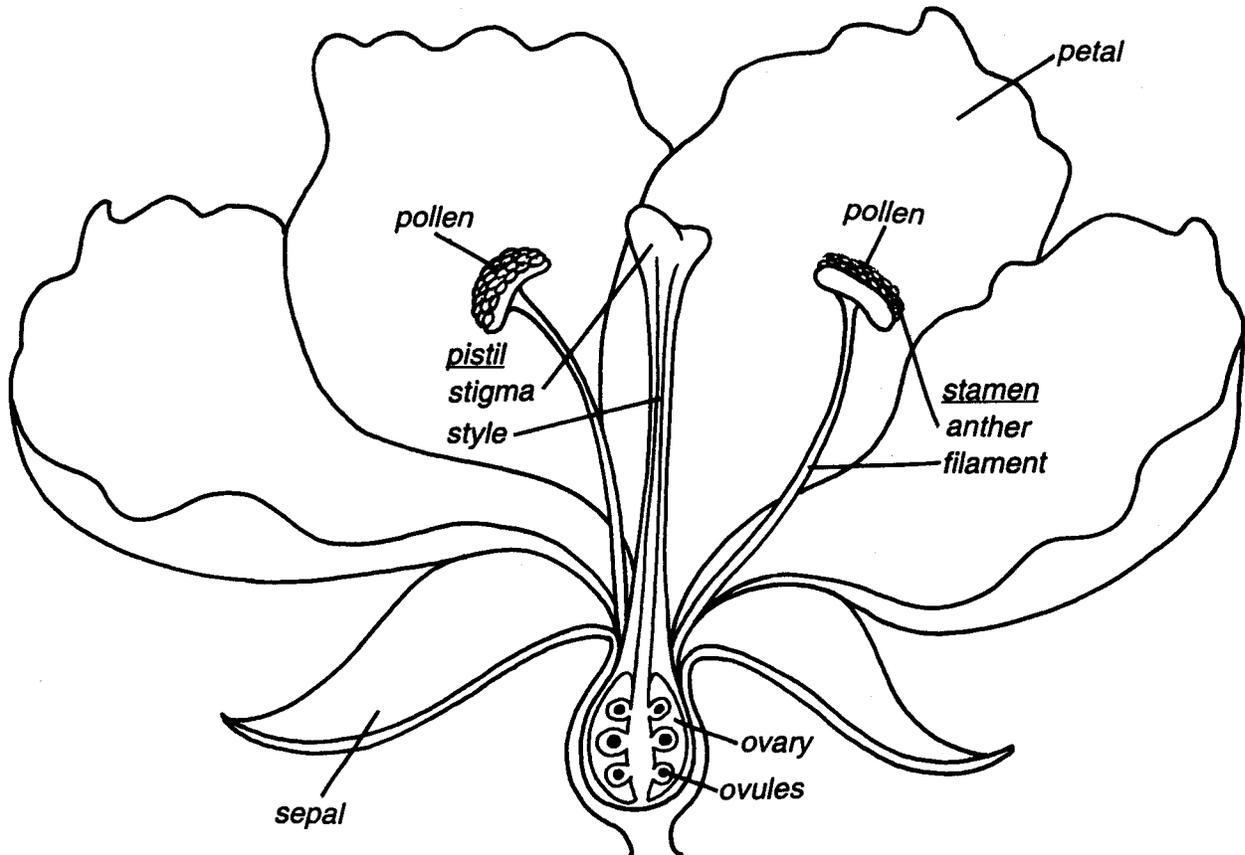
Flower Structure



Bloom Basics

Some plants have flowers. The flower is the part of a flowering plant that helps the plant reproduce, or make new plants. Plants that have flowers are called angiosperms.

Flowers have several parts. Each part has a special name and purpose. Look at this diagram of a flower. Use it to fill in the blanks in the sentences below.



This flower has many parts. Its (1) _____ are brightly colored in order to attract insects to the flower. Its (2) _____ are now open, but they used to protect the flower when it was a bud.

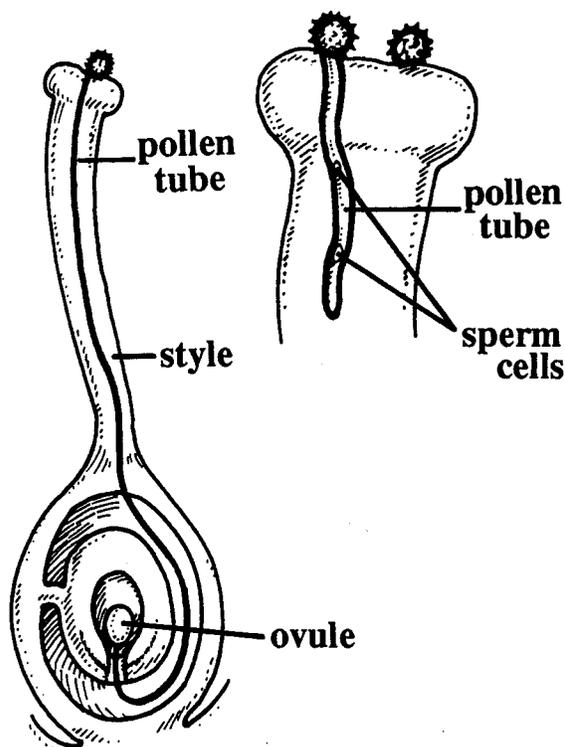
At the center of the flower is the female part called the (3) _____. The top part of this, which is often sticky, is called the (4) _____. The (5) _____ connects the stigma to the (6) _____. Inside the ovary are one or more (7) _____.

The male part of a flower is called the (8) _____. The part of this that looks like a stalk is the (9) _____. The knob at the top is called the (10) _____. This knob contains powdery grains of (11) _____.

POLLINATION AND FERTILIZATION

Background

In order for flowering plants to reproduce, pollination and fertilization must occur. Pollen, which contains sperm cells, develops in the anthers. Egg cells develop in ovules which are found in the ovary of a flower. Pollination involves the transfer of pollen from the *anthers* to the *stigma*. Once the pollen reaches the stigma, it forms a *pollen tube* which grows down through the *style* toward the *ovule*. Two sperm cells mature in the pollen tube as it moves toward the ovule. Once the pollen tube reaches the ovule, fertilization between one of the sperm cells and an egg in the ovule may occur.



Pollen is transferred to the stigma in a variety of ways depending upon the species. Some plants require wind to blow the pollen grains to appropriate stigmas, others require birds, insects, bats, or simply gravity to transfer pollen.

Animal-pollinated flowers have special features to attract pollinators. Nectar glands produce a sugar-water solution which attracts not only bees but also birds, moths, butterflies, and bats. Flowers, such as violets, possess nectar guides (colors and scents that alert pollinators to the presence of nectar) to encourage pollinators to crawl into the depths of the flower, picking up or transferring pollen along their way. Columbine and larkspur have spurred petals which collect nectar. Insects with *proboscises*, (long mouth parts for sucking and piercing) such as moths and butterflies, or birds with long beaks, such as hummingbirds, are able to draw the nectar from spurred flowers and serve as pollinators for the plants.

Many flowers are wind-pollinated. Examples include grasses, cattails, maple, oak, and pine trees. These flowers lack showy petals or sepals. The anthers and stigmas are elevated, allowing air currents to blow across them. Species which require wind as a means of pollination produce abundant amounts of pollen. Once pollination is complete then fertilization may occur. Without pollination and fertilization, seeds cannot develop.

Plants and Pollen

Plants can produce new plants in several ways. One way is through pollination. Pollen is a yellow, powdery material found on the stamen of a flower. When pollen moves from the stamen to the pistil of a flower, the pollen goes down into the flower's ovules where there are undeveloped seeds. When the pollen joins with the ovule, a seed is created. This is called fertilization.



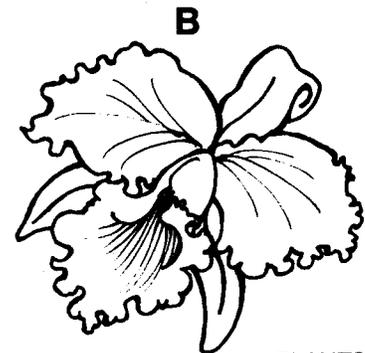
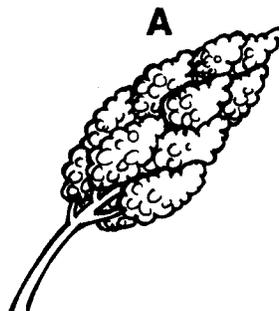
Most flowering plants have flowers that contain both the stamen and the pistil, so pollination can take place within the flower. In some types of plants, however, one plant grows flowers with stamens and another plant grows flowers with pistils. In other types of plants, one flower contains the stamen and another flower on the same plant contains the pistil. In order for pollination to occur in such plants, the pollen must move from one flower to another.

Pollen can travel in several ways. Sometimes it is carried by wind. Plants pollinated by the wind tend to have drab, feathery flowers with dry, dusty pollen. The wind carries the pollen from plant to plant.

Pollen can also be moved by animals such as bees, moths, or birds. The bright color, the scent, or the shape of a flower can attract animals that will help to carry pollen. Often the flowers we consider to be the most beautiful are the ones that require the help of animals for pollination to take place.

Number the steps below to show the order in which they would occur. The first step has been labeled for you.

1. ____ The seed falls to the ground.
2. ____ Soon the bee flies to another flower and brushes against the pistil, depositing pollen on it.
3. ____ The pollen travels to the ovules.
4. ____ A seed develops.
5. ____ A new plant begins to grow.
6. 1 A bee flies to a flower to taste its nectar, a sweet liquid inside the flower.
7. ____ The bee brushes against the flower's stamens, and some of the pollen sticks to its body.
8. Color these two flowers with colors that are appropriate for the way the flowers are pollinated. Flower A is pollinated by the wind. Flower B attracts bees in order for pollination to occur.



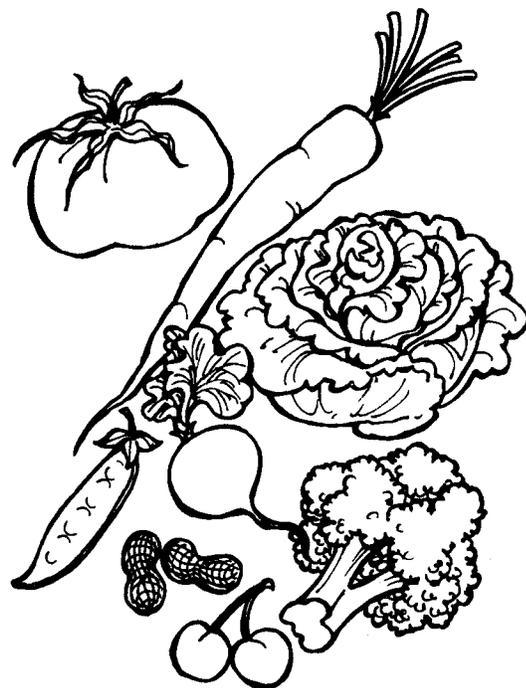
Yum! Yum!

Have you eaten a plant part today? Chances are, the answer is yes. Most people eat plant parts at every meal.

Many of the foods you see at the supermarket are plant parts. People eat the roots, leaves, seeds, flowers, fruits, and stems of different plants. Complete this page to find out what plant parts you often eat.

Identify what plant part(s) each fresh food below is. Choose from the following list: root, stem, leaf, fruit, flower, seed.

1. carrot _____
2. celery _____
3. spinach _____
4. tomato _____
5. broccoli _____
6. pea _____
7. lettuce _____
8. bean _____
9. orange _____
10. peanut _____
11. radish _____
12. cauliflower _____
13. cherry _____
14. cabbage _____



15. Take an imaginary trip to the supermarket. Imagine walking up and down the aisles. List ten items you might find outside of the fresh fruits and vegetables section that contain plant parts.

_____	_____
_____	_____
_____	_____
_____	_____

16. Now list four supermarket foods that do not contain plant parts.

_____	_____
_____	_____

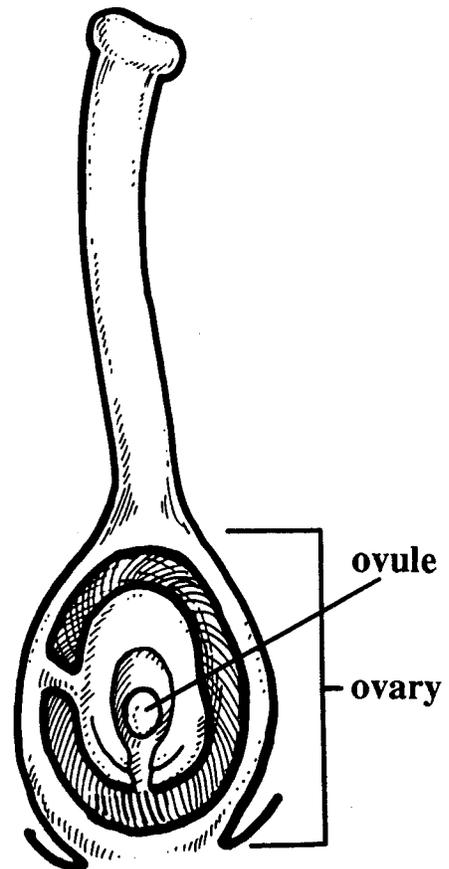
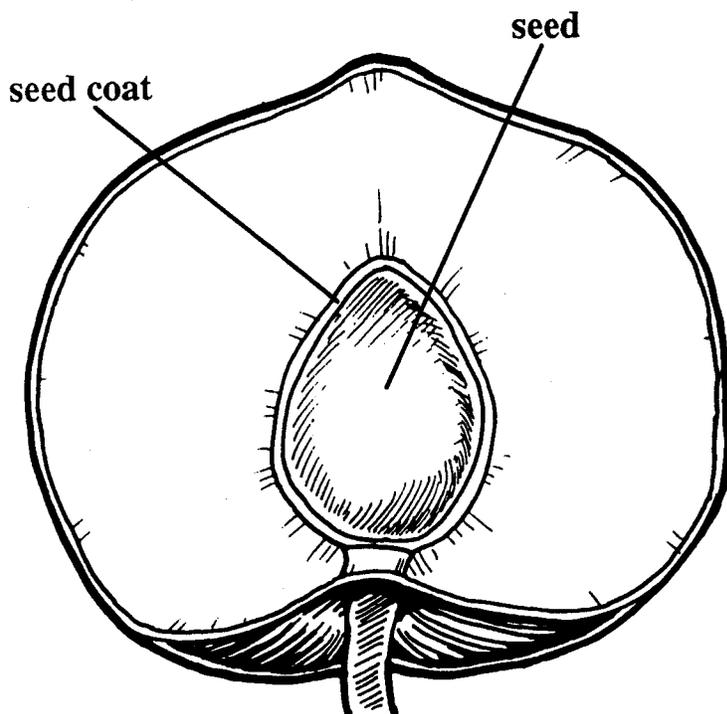
SEEDS AND FRUIT

Background

The *ovary* is located at the base of the flower and contains the *ovule*. During the life cycle of a flower, the ovules develop into seeds and the ovaries develop into fruits.

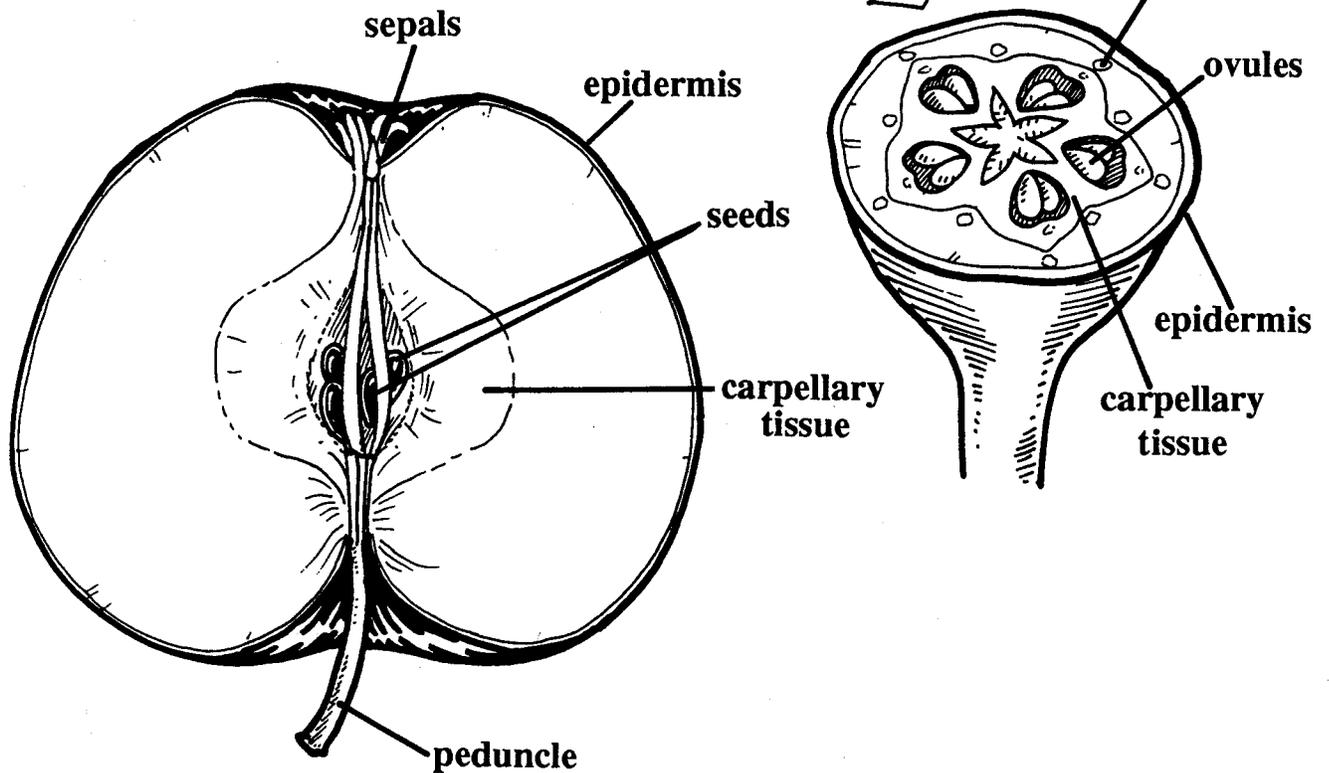
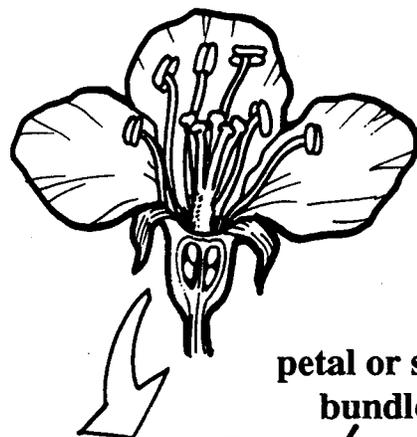
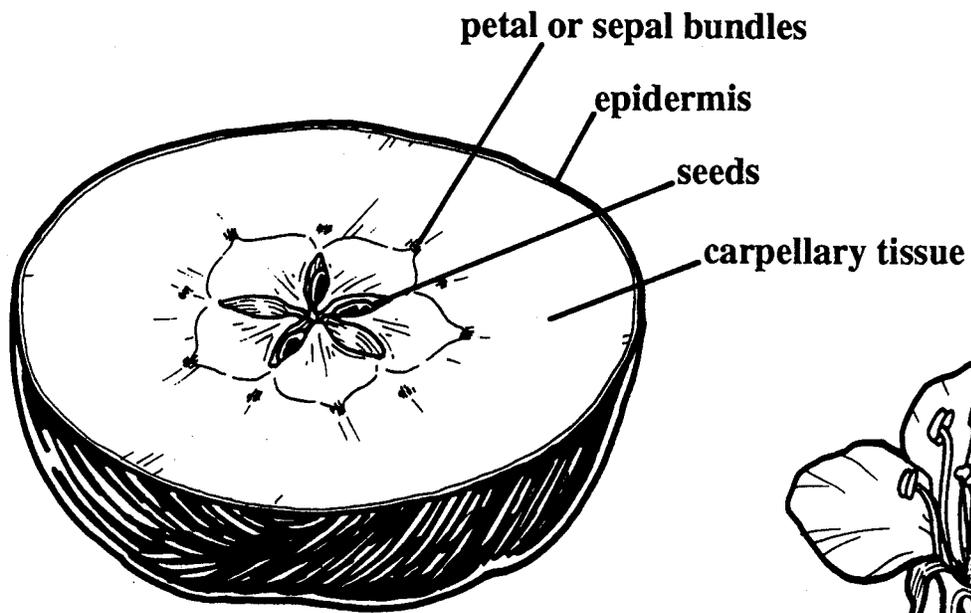
When the sperm cell fertilizes the ovule, it forms a *zygote*. The zygote develops into an *embryo*. The outer-most layer of the ovule hardens to protect the embryo. A *seed* is defined as a mature ovule containing an embryo and bound by a protective seed coat.

After fertilization, the ovary enlarges and develops into a fruit containing the seed(s).



Name _____

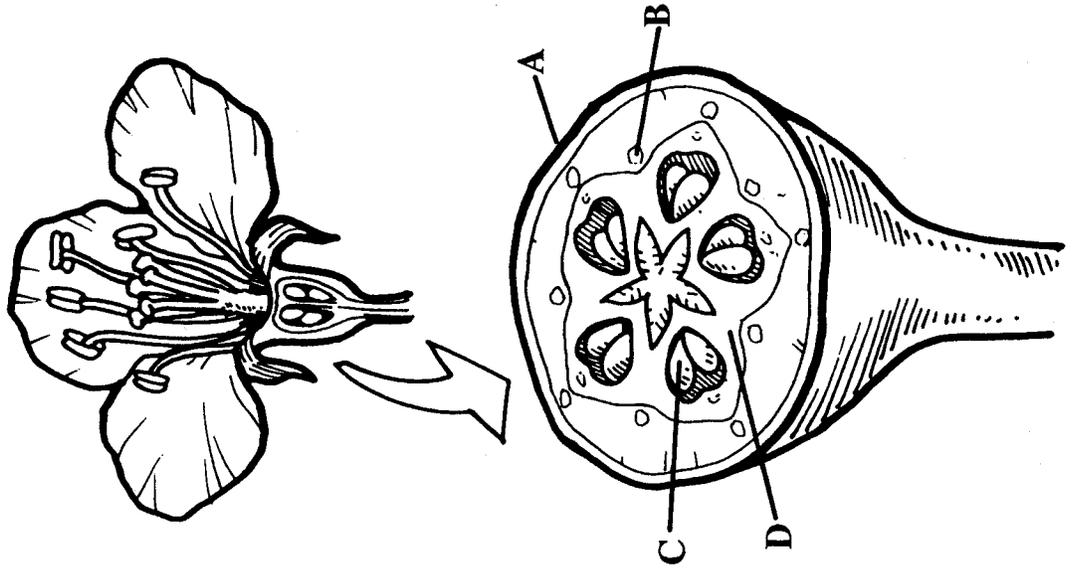
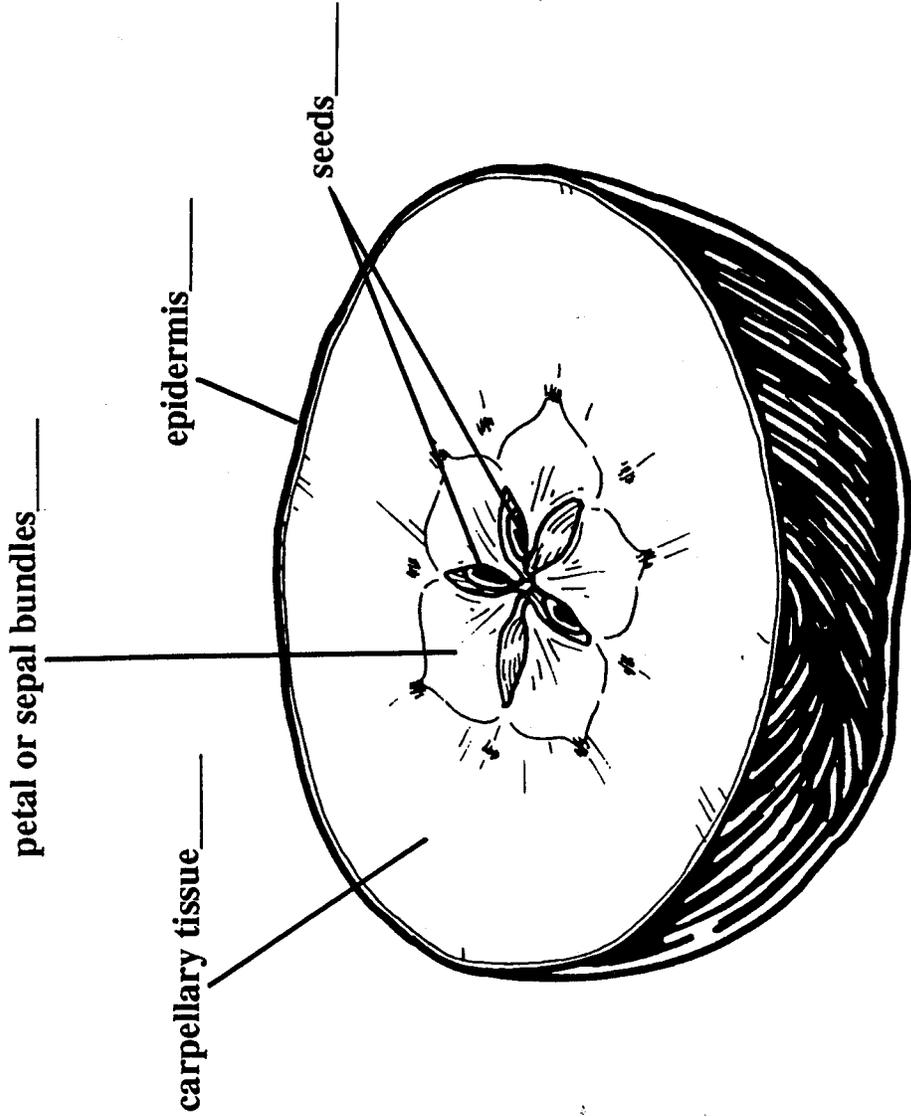
Inside a Fruit



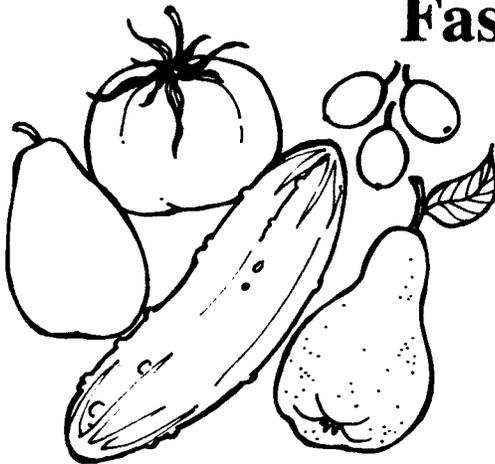
Name _____

Inside a Fruit

Match up the fruit parts with the ovary parts from which they originated.



Fascinating Fruit



When you hear the word *fruit*, you probably think of foods like apples and oranges. Actually, botanists (scientists who study plants) define *fruit* as “the fleshy part of the plant that contains the seeds.” Apples and oranges are fruits. So are tomatoes.

Flowering plants develop seeds inside an ovary. As the seeds mature, the ovary develops into a fruit. Some fruits contain a single seed. Others have many seeds in them.

We eat different fruits in different ways. Sometimes we eat all of a piece of fruit, including the seeds. Usually, the seeds in this type of fruit are very small. Strawberries are an example of this kind of fruit. Other times we dispose of the seed and eat the rest, as we do when we eat peaches.

Read the clues below and fill in the blanks with the names of the appropriate fruits.

1. This is a large citrus fruit. Its pulp can be white or a shade of pink. Its juice is rather sour and somewhat bitter. Its name contains the name of another type of fruit.

_____ _____

2. This sweet, juicy fruit is quite large and usually contains many, many seeds. As its name suggests, this fruit is over 90% water.

_____ _____

3. This fruit is often eaten whole, seeds and all. Its flesh is usually white or yellow. It is often used in salads and sometimes on sandwiches. It can be eaten raw or pickled.

_____ _____

4. This fruit is not eaten fresh. After this fruit is processed, people buy it in jars or cans. Usually this fruit is black or green. An edible oil is also made from this fruit.

_____ _____

5. Many people think this fruit is a vegetable. When ripe, this fruit is red. It is eaten whole, seeds and all. It is the main ingredient in spaghetti sauce.

_____ _____

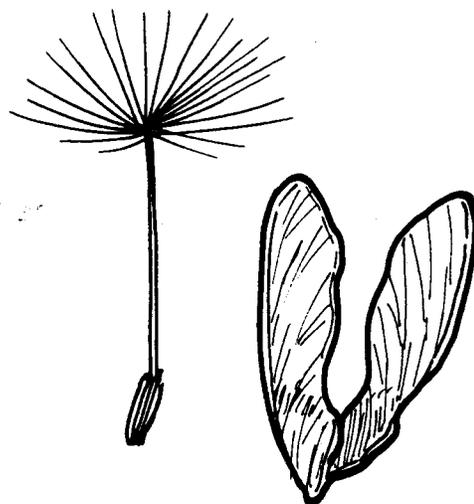
6. Fill in the blanks below with the circled letters to write a plant-related word.

FRUIT AND SEED DISPERSAL

Background

Once seeds and fruits mature, they must disperse from their parent plants. Competition for water, sunlight, and soil nutrients in the immediate vicinity of a parent plant is high. A seedling increases its chance for survival by dispersing from this highly competitive zone. There are five basic means of seed dispersal—wind, animals, mechanical means, water, and humans.

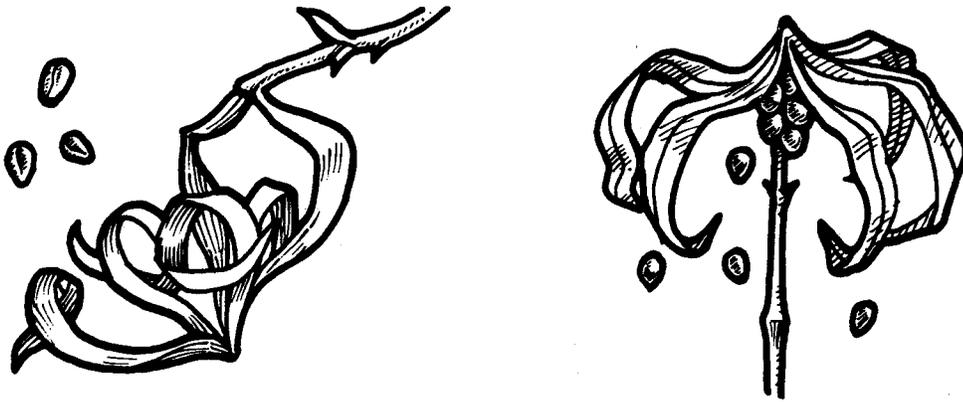
Many seeds are dispersed by wind. Maple fruits have a curved, thin wing which enables them to spin as they fall from the tree. This helicopter action slows the seeds' descent, allowing for air currents to blow the seeds farther from the parent tree. Other plants, such as dandelions, cottonwoods, and asters have fruits possessing plumes which slow the seeds' descent. Instead of plumed fruits, some plants, such as catalpas, produce plumed seeds. Orchids possess no plumes, but their seeds are as tiny as dust. Their size enables them to travel hundreds of miles in air currents.



Animals also play an important role in the dispersal of seeds. Charles Darwin discovered that mud on the webbed feet of ducks contained seeds which could be dispersed from one body of water to another throughout the duck's travels. Some birds and mammals eat seeds which pass through their digestive tracts unharmed. The seed derives dispersal along with a fertilized site once it is passed from the animal's body. Animals also serve as dispersal agents when seeds or fruits attach to their fur or feathers. Cocklebur, bedstraw, bur clover, and beggar-ticks possess tiny hooks or points which attach to animals' fur or people's clothing.



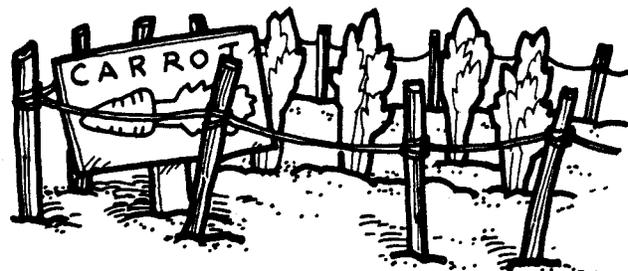
Some seeds are dispersed mechanically by their plants. The fruits of these plants dry out and cause tension in the tissues that hold the fruit together. The fruit eventually becomes so dry that it explodes, sending out its seeds. Touch-me-nots and jewelweeds eject their seeds several feet when their fruits are touched. Impatiens and witch hazel also eject their seeds from dry, mature fruits.



Some plants use water as a means of dispersal. Tropical, beach plants such as coconuts possess seeds which are adapted to flotation in water. Seeds may attach to logs or be contained within large chunks of soil which float in the ocean and disperse to faraway shores.



Humans also play a part in seed dispersal. Like animals, they may pick up seed “hitchhikers,” on their clothing, or they may brush against self-dispersing plants and cause seeds to mechanically eject. Humans also intentionally move species of plants when developing new areas.

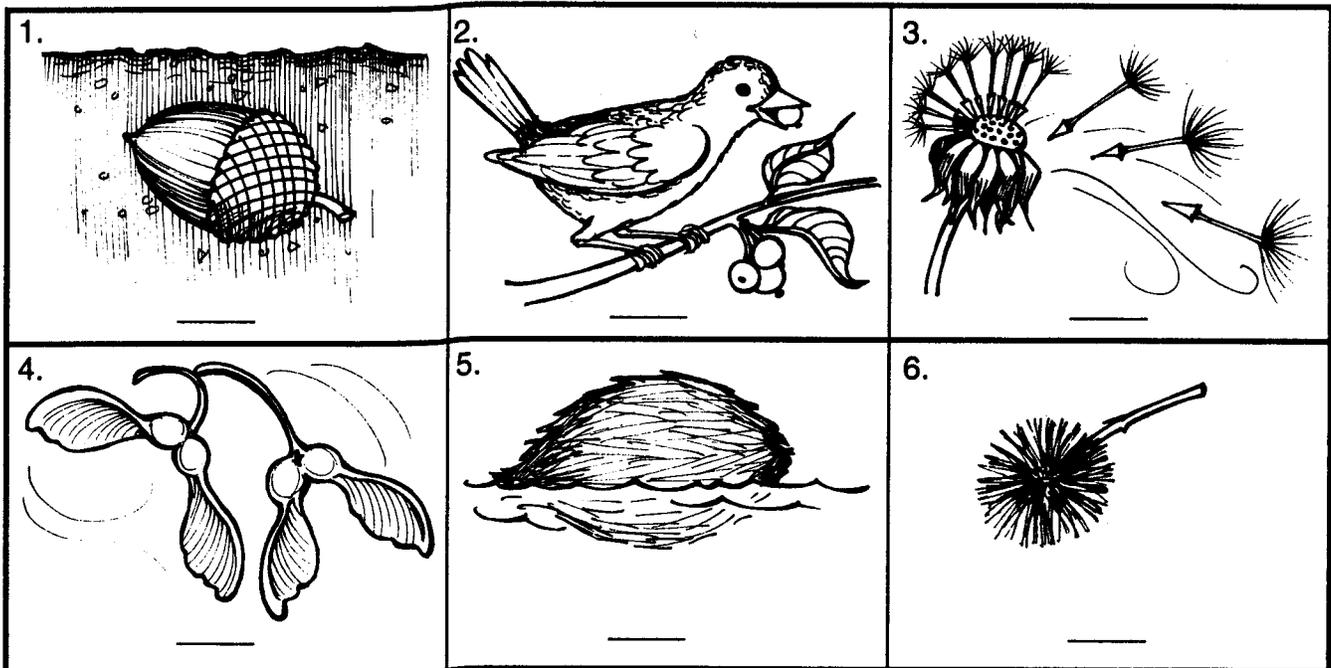


Incredible Voyages

Have you seen maple seeds fluttering in breezes? Perhaps you have made a wish as you blew the fluffy, white seeds from a dandelion. Seeds need to move in order to have space and sunlight to grow and to avoid using up all the nutrients or water in a particular area. Nature has many ways to scatter seeds. Some of the methods are listed below.

- A. Seeds with small hooks become tangled in animal fur or on clothing.
- B. Animals eat fruit. Hard coverings on the seeds enable them to exit in the animals' waste.
- C. Squirrels bury seeds in order to have food during winter. Sometimes they do not dig the seeds up at a later time.
- D. Some seeds are surrounded by fluffy hairs. These hairs catch the wind and act like parachutes.
- E. Some trees produce seeds that have flat frames or wings. These seeds are easily blown by the wind.
- F. Some seeds are able to float on water to new locations.

Carefully examine the seeds shown below. Write the letter of the seed-spreading method listed above that would allow that type of seed to move from place to place.



7. In the space below, draw and label some seeds you are familiar with. Think about how they might travel from place to place.

Watch Out!

When people or animals are attacked, they can run away or fight back. Plants, because they cannot move, have their own ways to keep enemies away. Thorns and spines keep large animals from eating a plant. So do sticky surfaces, tough leaves, and unpleasant odors. Some plants have a defense that can be very dangerous to people. They are poisonous.

Some poisonous plants can cause death. Eating certain mushrooms, for example, can kill a person.

Not all poisonous plants are harmful when eaten. Some can irritate people's skin. Have you ever heard of poison ivy? It is one of many poisonous plants to avoid. Its oil can cause serious skin irritation. Skin that comes in contact with this oil can become red, blistered, and very itchy. Other plants that can cause this type of reaction include poison oak and poison sumac.

People use plants in many ways. For example, we eat plants and make many products from them. Over time, people have learned to tell the difference between useful plants and harmful plants.

In the boxes below, design two posters. One should show why plants are useful to people. The other poster should warn of the dangers of certain plants. Use an encyclopedia and other reference sources for information.



poison ivy

A Breath of Fresh Air

Unlike people and animals, who must find food, green plants are able to make their own food. This process is called photosynthesis. Plants need three things in order for photosynthesis to take place. They need carbon dioxide, light, and water. Plants take carbon dioxide from the air. They usually receive light from the sun. They absorb water from the soil.

Photosynthesis takes place in a plant's leaves. The leaves contain a special substance called chlorophyll. Chlorophyll allows a plant to use energy from the sun to turn water and carbon dioxide into food. The food the plant makes is a form of sugar. The plant then changes the sugar into different kinds of food. This food travels throughout the plant. A plant also creates oxygen during the process of photosynthesis.

Plants take in carbon dioxide and give off oxygen through tiny holes mainly in their leaves. These holes are called stomata.

Photosynthesis is very important to people. They eat the plants that are kept alive because of photosynthesis, and they eat the animals that eat those plants. People also need the oxygen that plants give off during photosynthesis.

1. *Photosynthesis* means "putting together with light." Why is *photosynthesis* an appropriate name for the way plants make their own food?

2. Create a diagram in the box below to show what happens during photosynthesis.

