

Lesson 2 How Do Flowers Work?

Learning Objective: Students will identify the major parts of a flower and be able to explain their function as they relate to reproduction.

Success Indicators:

- Students will be able to describe the different life cycles of plants.
- Students will be able to identify plants in each of the different life cycles.
- Student will understand the different phases of plants.
- Students will identify the major parts of a flower.
- Students will be able to explain the functions of the parts of the flower.

Question: How do plants reproduce?

Introduction:

Different kinds of plants have different life cycles. Plants fall into three main groups: annuals, biennials and perennials. Plants also go through three different phases of development: vegetative, reproductive and dormancy.

Facilitating the Activity:

- Use the background information (in the section of these teacher notes entitled *Background Information for the Teacher - How Do Flowers Work?*) to design and present a lecture to the students, and then have the students do the *Flower Dissection Lab*. (Contact a local florist. Often they are willing to donate or sell batches of lilies, which they can obtain during any season of the year. Lilies are excellent specimens for students to dissect because of the large stamens and pistils.)

Classroom Discussion: Students should be able to describe the differences between annual, biennial, and perennial plants. They should also be able to describe the different phases of plant development.

Additional Information: An excellent resource for students who may be interested in wildflower identification is *A Field Guide to Wildflowers*, by Roger Tory Peterson and Margaret McKenny.

Next Generation Science Standards: TBD

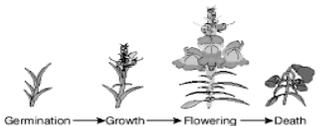
Fly Higher: Have students try out the *Virtual Flower Dissection* activity!

Glossary:

- annual – a plant that completes its life cycle in one year and then dies. Examples would be corn, peas, and watermelons.
- anther – produces the pollen (male sex cells)

- biennial– a plant that takes two years to complete its lifecycle. In the first year, the plant grows leaves, stems, and roots, and then the plant goes dormant during winter. The next growing season the stem of the plant greatly elongates, producing flowers.
- dicot – plants that contains two seed leaves (cotyledons) in the seed
- dormancy – the period of time in the life of a plant when growth and development stops. For example, during the winter, grass in a lawn goes dormant and stops growing until spring.
- filament – a stalk that has the anther at its tip
- fruit – a developed, ripened ovary
- herbaceous plants – plants that have stems that are not hard or woody
- monocots – plants that contains one seed leaf (cotyledon) in the seed
- ovary – contains the ovules or eggs
- ovule – egg cell
- perennial – a plant that has a life cycle longer than two years. It keeps coming back year after year. Examples would be woody plants like trees and strawberries.
- petals – brightly colored structures used to attract pollinators
- pistil – the female reproductive part of a flower made up of three main parts: ovary, stigma, and style
- pollen – the male sex cells of a plant
- pollination – the transfer of [pollen](#) grains from the male [stamens](#) to the female pistils
- reproductive – the stage in a plant’s life when it produces flowers
- seed – develops from a fertilized ovule. The seed contains a tiny plant embryo along with a food supply needed to get the plant started
- sepal – green leaf-like structure beneath the petals
- stamen – the male reproductive part of a flower which consists of the anther and filament
- stigma – sticky surface at the tip of the pistil that captures the pollen
- style – tube-like structure and connection to the ovary between the stigma and ovary
- vegetative – the stage in a plant’s life when it produces stems, leaves, and roots

Background Information for the Teacher - How do Flowers Work?

<p>PLANT LIFE CYCLES</p> <p>Different kinds of plants have different types of life cycles related to the length of the plant’s life. Plants fall into three groups: annuals, biennials and perennials (see Figures 1, 2, and 3). Plants also go through three different phases of development: vegetative,</p>	<p>ANNUAL LIFE CYCLE</p>  <p>Figure 1. Life Cycle – Annual</p>
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reproductive and **dormancy**. During the vegetative phase the plants grows and matures. During the reproductive phase the plant creates offspring. Dormancy is the period of time in the life of a plant when growth and development stops. For example, during the winter, grass in a lawn goes dormant and stops growing until spring.

The vegetative phase begins when a plant seed germinates (sprouts) and grows producing leaves, stems and roots. Some plants will spend a relatively short time in a vegetative phase, then flower and die in just one growing season (**annuals**). Examples of annuals are corn, peas, and watermelons. Other plants will continue growing vegetatively for years (**perennials**). Some perennials are woody plants like trees, and some are **herbaceous**. Herbaceous perennials generally die in the winter season but will grow new shoots and leaves the following spring such as strawberries, asparagus, and daffodils. Woody-type perennials remain alive during the winter season but will be dormant until the environment reaches optimal temperatures for them to begin to develop.

Biennials are plants that complete their life cycle in two growing seasons. During the first season (summer in the Midwest), plants will go through the vegetative stage then become dormant during the winter months. The plant will grow vegetatively again the following spring and produce flowers, then seed/fruit then die. Common biennial plants include beets and hollyhocks.

The **reproductive** phase is when a plant flowers and produces fruit. The type of plant along with environmental conditions will determine when and how a plant will enter into its reproductive phase.

Some plants go through **dormancy**, a phase of inactivity . Dormancy can be seen in seeds as well as mature plants. Plants will enter dormancy when stressful growing conditions are present, such as drought, cold weather, and short daylight periods. Plants will remain in the dormant stage until favorable conditions return.

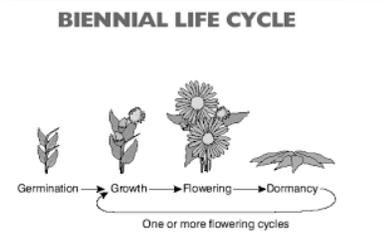


Figure 2. Life Cycle - Biennial

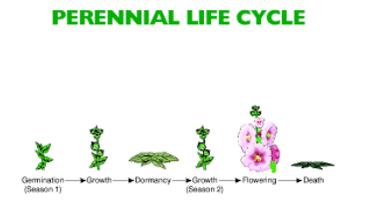


Figure 3. Life Cycle - Perennial

PARTS OF A FLOWER

Flowers are the reproductive organs of the plant which produce sex cells. You will have a chance to learn about the parts of a flower by dissecting a living flower in the *Flower Dissection Lab*.

TYPES OF FLOWERS

A flower that has all four major parts (**sepals**, **petals**, **stamens** and **pistils**) is called a complete flower (see Figure 4). Examples include apples, lilies, and peas. Some flowers lack one or more of those major parts and are referred to as incomplete. Examples of plants with incomplete flowers are anemone, American elm, and walnut.

A flower that contains both stamens and pistils is referred to as a perfect flower. Examples would be apples, cherries and peas. A flower that lacks a stamen or a pistil is referred to as an imperfect flower. Corn, holly, squash, willow, and walnuts are examples of imperfect flowers.

FUNCTION OF A FLOWER

Flowering plants produce **fruits** and **seeds** so they can reproduce (But animals such as humans, benefit from the ability to eat many of nutritious fruits and seeds. Humans also like to grow many plants just for the beauty of their flowers.).

When the male part of a flower (stamen –made up of filament and anther) produces **pollen** grains (male sex cells), the pollen grains must land on the female part (**pistil** – made up of stigma, style, and ovary) of the flower. This process is known as **pollination** (see Figure 5). The successful result of pollination is called fertilization, and this happens when sperm cells inside the pollen grains unite with the **ovules** (egg cells) inside the **ovary**. During the growing season these fertilized eggs develop into seeds, and the ovary that contains them develop into a fruit.

Flowers can be very diverse in shape, color, and size, and they can be pollinated in many ways (see Figure 6). Some flowers are pollinated by wind or even rain. Other types of flowers use sweet liquids (nectar) to attract or lure pollinators such as bees, birds, butterflies and even

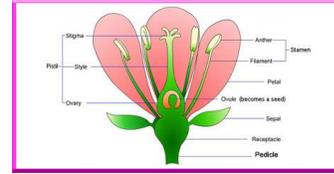


Figure 4. Parts of a Flower

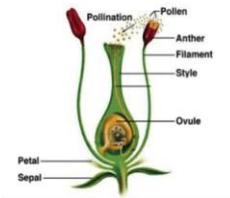


Figure 5. Pollen Production

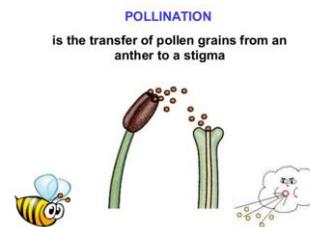


Figure 6. Pollination

bats to the plant, and the plants use these pollinators to transfer pollen from the male flower parts to the female flower parts. Some flowers are even specialized to attract only certain types of pollinators.

Horticulturalists and botanists use flowers to identify the species and variety of a plant because of the uniqueness of each flower. Flowers are produced commercially for their fragrance and beauty. Some countries and companies even use the flower petals in the production of perfume.