WHAT IS A FLOWER?

INSTRUCTIONAL OBJECTIVE: When students finish this project, they will have gained respect for the beauty of flowers and appreciate their ecological and practical importance.
Dear Teacher,

The Idaho Botanical Garden is an outdoor learning environment. We want to make your visit comfortable and enjoyable, and ask that your students are dressed appropriately for the weather and have water, especially in the warm weather months.

**TERMS**

**Angiosperms:** Flowering plants that produce seeds enclosed in a fruit.

**Anthers:** The boxlike structures at the top of stamens, where pollen is produced.

**Botanical garden:** A place where plants are collected and displayed for scientific, educational and artistic purposes.

**Fertilization:** The union of male sperm cells and female egg cells.

**Filament:** The stalk of the stamen.

**Flower:** The reproductive structure of an angiosperm.

**Fruit:** A ripened ovary containing seeds.

**Nectar:** The sweet liquid produced by flowers to attract pollinators.

**Ovary:** The hollow compartment at the base of the pistil which contains ovules. It develops into a fruit containing seeds.

**Ovules:** The structures in a flower ovary that can develop into seeds.

**Pistil:** The female part of a flower; stigma, style, and ovary.

**Pollen:** A yellow, powder-like material containing sperm cells.

**Pollen tubes:** Tubes that carry sperm cells from the stigma into the ovary.

**Pollination:** The process of pollen coming together with the stigma of a flower.

**Pollinators:** Animals which carry pollen from one flower to another.

**Seed:** A structure containing a baby plant and its food supply, which is surrounded by a protective seed coat.
**Stamens:** The male part of a flower.

**Stigma:** The part of the pistil that receives the pollen.

**Style:** The slender part of the pistil which supports the stigma.

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**KEY CONCEPTS**

Flowers are the reproductive structures of angiosperms. Angiosperms are the group of plants that produce seeds enclosed in a fruit. They are the largest group of plants and an important part of our environment.

Please look at the diagram of the typical flower below. Find the male parts (stamens) and the female part (pistil). The pistil contains ovules, which in turn each contain an egg, and stamens produce pollen, which contains sperm. Petals often attract pollinators. Sepals protect the rest of the flower.

![Diagram of a flower](image)

The colors and aromas of flowers, which delight us, attract insects, birds, and bats necessary for pollination. Plants that use the wind to carry their pollen, like oak trees and many grasses, have small flowers without much color. Pollen is transferred via animals or the wind to the tip of the pistil (stigma). Pollen tubes form and grow down the style toward ovules in the ovary.

Two sperm travel down the pollen tube and fertilizes the egg in an ovule. The ovule now begins to develop into a seed, and the ovary into a fruit.
FLOWER TRIVIA

• Perhaps you can’t eat the daisies, but there are quite a few other blossoms from the garden that have numerous culinary uses.
• The state flower of Idaho is the Syringa, *Philadelphus lewisii*.
• According to the article “Our State Flowers” found in a June, 1917 issue of *National Geographic*, when selecting state flowers, six states accepted the verdict of the school children as the voice of the people!
• Not all flowers smell good to us! Those that attract flies as pollinators sometimes have the odor of and may look like rotten meat.
• Bat-pollinated flowers usually have dull-colored flowers that open at dusk and have mouse-like smells.
• The female flowers of the cattail make an excellent fire starting material.
• While in the blooming stage, the larkspur is poisonous.
• The morning glory is one of the most serious field weeds in Idaho. It causes problems for Idaho’s farmers.
• Big Sagebrush, *Artemisia tridentata*, flowers in August and September during which time its pollen fills the air and is a common cause of hay fever.
• Florida means flowery.
• Cornflowers, *Centaurea cyanus*, occur widely through the Mediterranean region and into Central Asia. The blue cornflower, which retains its color even when dried, was discovered mixed with petals of the blue lotus in the tomb of Tutankhamun, on the King’s mummy and adorning the image of Anubis.
• The Romans used roses and lavender as ‘strewing’ flowers to improve the fragrance of their homes by spreading them all over the floors of the houses!
• Shakespeare’s plays are full of references to flowers, and some botanical gardens have a special Shakespeare Garden.
• The Brooklyn Botanic Garden has a Fragrance Garden for the Blind with raised beds containing different types of plants with scented flowers and descriptive plaques in Braille.
• Bees have to make about 80,000 trips to flowers to gather a jar of honey for you. If all of these journeys were made into one, a bee could go around the world twice.

DO THE FOLLOWING ACTIVITIES BEFORE YOUR VISIT TO THE GARDEN

FLOWER ART: CREATE A NAME TAG

Please create a name tag to wear on your tour of the Idaho Botanical Garden. Your tour guide will need to know who you are!

Cut a piece of index paper (file card stock) measuring approximately four inches by three inches. Cut out one of the pictures below, and color the flower. Paste the colored picture to your name tag, leaving room for your first name. Write your first name on the name tag. Use a safety pin to pin on your name tag just before you leave school to go to the Garden.
FLOWER STRUCTURE

Here is a drawing of a typical flower cut in half. Study the parts of the flower and their relationships to each other!
When you finish reviewing the structure of the flower, make your own flower puzzle by coloring, then cutting out the flower parts. Arrange them on a piece of paper so that they are in their usual positions. Glue or tape the flower parts in place and make up a name for your flower!
FLOWER POEM COLLECTION

Find poems which have already been written about flowers. There are many poems about flowers! Make a collection of the poems you find.

EXTENDED OBSERVATION

Place a long stemmed rose bud in a vase of water. Request that students write down their observations of the flower twice a day, once at the beginning of the day and again at the end. Some students may want to sketch their observations. At the end of several days, ask the students to share their observations with the class.

FLOWER MATH: WHAT IS SYMMETRY?

Have your students study the symmetrical forms of flowers.

For example, when children cut snowflakes and hearts from folded paper, they are involved with creating mathematical symmetry. The folded lines become lines of symmetry. A mirror placed on these lines of symmetry shows a reflection which matches the other side. Because the parts balance on each side of a line, we call this line symmetry. Paper hearts have one line of symmetry, while snowflakes often have many.

Many flowers have lines of symmetry. Ask your students to look at several flowers and identify and count lines of symmetry. Next, instruct them to classify or group the flowers by their lines symmetry.
FLOWER MATH: FINDING PATTERNS

The objective of this mathematics activity is to teach children to become careful observers.

Ask your students to closely observe several flowers. Use real flowers, pictures, or artificial flowers.

Have them count flower parts. For example, ask students to count petals, sepals, pistils, and stamens.

Ask them to find and chart patterns in each individual flower and then observe patterns between different flowers. For example, do all flowers with three sepals have three petals?

Ask your students if they can deduce from their pattern investigation whether the flowers are the same kind. Ask them if there is a relationship between patterns observed and symmetry.

FLOWER DISSECTION

PURPOSE:
To see the parts of a flower.

MATERIALS:
A flower (use flowers that have both stamens and pistils), scissors, hand lens, clear tape, and paper.

PROCEDURE:
• Look closely at your flower. Study it, smell it, but do not take it apart yet.
• On a piece of paper, draw your flower at the top and label these parts: sepal, petal, stamen, pistil, and stem.
• As you study your flower, complete the data chart below.
• Carefully remove the petals. Tape one petal anywhere below your flower drawing and label it.
• With care, cut each remaining part from the flower. Look at each structure with the hand lens. To look at the pollen grains, cut open the anther. To find the ovary, open the pistil.
• As you did with the petal, tape the other flower parts to your paper and label each one.

DATA

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<th>Flower Part</th>
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<th>Description</th>
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POLLEN TUBE LABORATORY EXPERIMENT

Purpose:
To grow pollen tubes for observation under the microscope.

Materials:
Glass containers, molasses, pollen, microscope, slides and cover slips.

Procedure:
• Put one tablespoon of molasses into one half cup of water.
• Put an anther from a large flower on the surface of the molasses water mixture. If you are using a small flower, invert the entire blossom onto the surface of the molasses water mixture. Very large pollen grains may be sprinkled on the surface of the water.
• Let the pollen tubes grow undisturbed for three or four days.
• With a straw or eye droppertake some surface liquid from the culture and put it on a slide. Drop a cover slip over it and observe the pollen tubes on low power first.
• Sketch what you see.
• Corn silks are the styles of corn and pollen tubes grow down through them. How do seeds form and how are they able to produce a new plant?

JUST-FOR-FUN FLOWER EXPERIMENT

Split the stem of a white flower such as a carnation, Shasta daisy or rose from the bottom of the stem to the base of the blossom. Make up two solutions of food-colored water, and fill two vases with the food-colored water. For example, one vase has dark blue water and one vase contains dark green water. Put one half of the stem in one vase and one half of the stem in the other vase. Leave the flower for several hours or overnight. What happens to the flower?

STUDY STATE FLOWERS!

The primary purpose of this activity is to stimulate student interest and involvement in a variety of subjects. Many skills will be learned and strengthened. Students will have the opportunity to be creative and use higher thinking levels.
• Begin by asking a few volunteers to sketch a large map of the United States. Hang the map on the wall or bulletin board.
• Assign each student a state to research.
• Ask the class what kinds of things they would like to know about their state’s flower. Below are just some questions to consider about state flowers.
  How and why was this flower chosen for its state? When was it chosen and by whom? What is the climate like where your flower grows? What is the blooming period of your flower? Is yours a wildflower or a domestic flower? Is your flower endangered or abundant? Describe the rest of the plant. Is your flower a monocot or is it a dicot? How is your flower pollinated? Describe the fruit and seed of your flower. How is your plant useful? Explain and/or draw the lifecycle of the plant. Describe the relationship between your plant and its environment. What is the scientific name of your plant? What are some common names of your plant? Describe the physical characteristics of your flower, such as the petals, sepals, stamen, pistil, ovary, and ovules.
• Have students consult the internet and reference books for information about their flower.
• Ask each student to take notes on the information they find. Have each make an outline and then write a research paper.
• Oral reports should be given to the class.
• As a community service project have your class give a presentation to a group such as nursing home residents. Students could share and demonstrate information about flowers as well as plant flowers or give flowers as gifts.
• Make an informative and colorful classroom display. Ask each student to draw and color their state’s flower and place it on or around the United States map.
• Role play the act of flowers being chosen by state committees. Decide as a group what the criteria will be for your class flower. Research, campaign, and vote for a class flower. Do your voting in a voting booth designed by the class. Vote on election day! Plant your class flower around your school yard.
• Ask each student to write a letter to someone in another grade regarding the flower he or she researched.
• Ask students to write a poem, song, or story about their flower.
• Using pictures and/or models of all the flowers represented by classmates, produce a classroom identification key to your state flowers. Sort them by color, number of petals, sepals, stamens, distribution, size, leaves, stems, and shape. Brainstorm to identify more sorting categories.

STATE FLOWERS

Alabama.........................................................................................................................................................Camellia
Alaska.........................................................................................................................................................Forget-Me-Not
Arizona.......................................................................................................................................................Saguaro Cactus
Arkansas.....................................................................................................................................................Apple Blossom
California....................................................................................................................................................Golden Poppy
Colorado.....................................................................................................................................................Columbine
Connecticut................................................................................................................................................Mountain Laurel
Delaware......................................................................................................................................................Peach Blossom
Florida.........................................................................................................................................................Orange Blossom
Georgia.......................................................................................................................................................Cherokee Rose
Hawaii........................................................................................................................................................Hibiscus
Idaho..........................................................................................................................................................Syringa
Illinois.........................................................................................................................................................Violet
Possible answers to “How Are Flowers Useful” activity:

Bee food, seed formation, beetle food, bat food, butterfly food, moth food, hummingbird food, people food, bouquets for weddings and funerals, gifts of love and affection, religious significance, perfume, art, landscape appeal, medicine, emblems, spices, table decoration, poison, nourishing to the soul, cause of allergies, get well messages, fruit formation, fragrance, beauty, subject of poems, songs and stories, cosmetics, decorations and more...
2nd Grade:
LS: Life Sciences

LS2.A: Interdependent relationships in ecosystems:
Plants depend on animals for pollination or to move their seeds around. (LS1-2-2)

3rd Grade:
LS: Life Sciences

LS3.A: Inheritance of traits
Many characteristics or organisms are inherited from their parents. (LS2-3-1)
Other characteristics result from individuals’ interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (LS2-3-2)

LS3.B: Variation of Traits
Different organisms vary in how they look and function because they have different inherited information. (LS2-3-1)
The environment also affects the traits that an organism develops. (LS2-3-2)