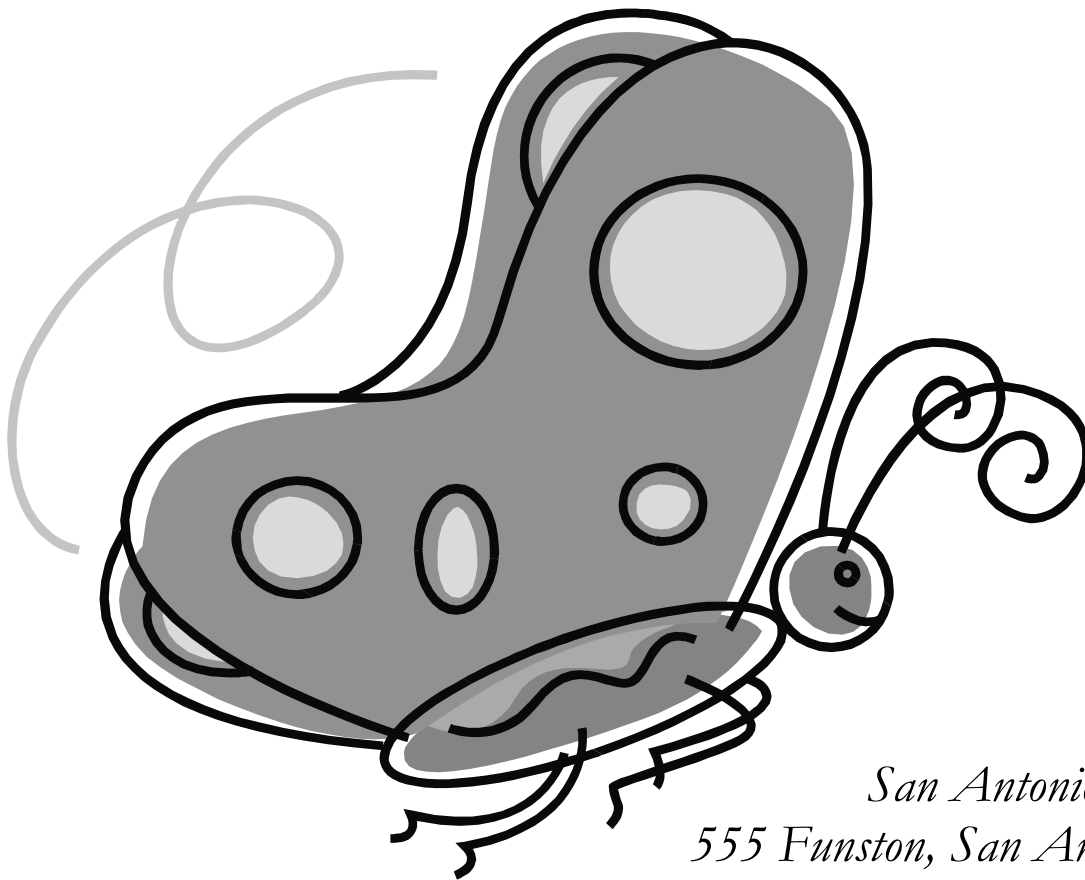


# **San Antonio Botanical Garden**

## **Educational Curriculum Unit**

### **Pollinators and Flowers**

**Grades K – 5**



*San Antonio Botanical Garden*  
*555 Funston, San Antonio, TX, 78209*  
*[www.sabot.org](http://www.sabot.org)*

# How to use this Unit

---

- Design** This unit is designed to help you prepare your students for their visit to the San Antonio Botanical Garden (SABG) with pre-visit, visit, and post-visit activities.
- Contents**
- |   |       |
|---|-------|
| TEKS .....  | 2-7   |
| Summary.....  | 8-9   |
| Vocabulary List .....                                   | 10    |
| Pre-visit Activity #1 (for classroom).....              | 11-14 |
| Pre-visit Activity #2 (for classroom).....              | 15-18 |
| Visit (Field Trip) Instructions (for use at SABG) ..... | 19-20 |
| Post Visit Activity (for classroom).....                | 21    |
| Additional Resources List .....                         | 22    |
| Evaluation .....  | 23    |
- Grade Level** This unit is designed for use with children in grades K-5 and is linked with the Texas Essential Knowledge and Skills (TEKS) guidelines. This background information is provided as a supplement to your regular materials. We offer two versions for the worksheets for you to choose to most age-appropriate level for your students.
- Pre-Visit to SABG** You may find it helpful to visit the garden independently before bringing your classroom on the visit so that you are more familiar with the gardens.
- Lesson Plan** We recommend teaching the concepts covered in the summary and the vocabulary first, as part of your regular plant curriculum (adjusted for your class level). Then complete the pre-trip activities, making age/attention appropriate revisions as you see fit. It is best to do the pre-visit activities within two days prior to the field trip so that students will see the relevance between their field trip and the classroom activities. We also recommend completing at least two post-visit activities within two days of the field trip to reinforce the visit experience.
- Schedule Visit** Every school group that comes to the SABG must be pre-scheduled. Please call as soon as you read this information in order to schedule your class visit (210-207-3255).

**We are always looking for ways to make the gardens work for you. Please contact our education department if you have additional suggestions, comments, or ideas on ways the SABG can help you and your classroom.**

*Also see the evaluation form at the end of this unit (page 23).*

# Kindergarten TEKS\*

\*These are just some of the TEKS you will be addressing with this unit.

## Language Arts

110.2

- K.1 Students learn to listen attentively and ask and respond to questions and retell stories; The student engages actively in a variety of oral language experiences.  
*A: determine the purposes for listening, such as to get information, to solve problems and to enjoy and appreciate*  
*C: participate in rhymes, songs, conversations, and discussions*
- K.3.C: The students ask and answer relevant questions and make contributions in small or large group discussions
- .K.4: The student communicates clearly by putting thoughts and feelings into spoken words.  
*A: learn the vocabulary of school such as numbers, shapes, colors, etc.*
- K.8: The student develops an extensive vocabulary.
- K.9C: The student can retell or act out the order of important events in stories.
- K.14: The student develops the foundations of writing.  
*A: write his/ her own name and other important words*
- K.16: The student uses writing as a tool for learning and research.

## Mathematics

111.12

- K.1: The student develops whole-number concepts and uses patterns to sort and explore number, data, and shape.
- K.1: The student uses numbers to name quantities.
- K.2: The student describes the order of events.
- K.8: The student uses attributes to determine how objects are alike and different.  
*B: compare two or more objects based on their attributes*
- K.9: The student recognizes the characteristics of shapes.  
*C: describe identify, and compare circles, triangles, and rectangles*

## Science

112.2

- 112.2.1: Student work asking questions, gathering information, communicating findings, and making informed decisions.
- 112.2.2: The student identifies components of the natural world.
- 112.2.4: Student learns that a system is a collection of cycles, structures, and processes that interact.
- K.1: The student participates in the scientific process.
- K.2: The student develops abilities necessary to do scientific inquiry in the field and the classroom.  
*A: ask questions about the organisms, objects, and events*  
*B: gather information using simple equipment and tools to extend the senses*
- K.3: The student knows that information and critical thinking are used in making decisions.
- K.4: The student uses age-appropriate tools and models to verify that organisms and objects and parts of organisms and objects can be observed, described, and measured.
- K.5: The student knows that organisms, objects, and events have properties and patterns.
- K.6: The student knows that systems have parts and are composed of organisms and objects.  
*B: record observations about parts of plants including leaves, roots, stems, and flowers*  
*D: identify that when separated from the whole, may result in part of the whole not working*
- K.7: The student knows that many types of change occur.  
*D: observe and record stages in the live cycle of organisms in their natural environment*
- K.8: The student knows the difference between living organisms and non-living objects.
- K.9: The student knows that living organisms have basic needs.  
*B: give examples of how living organisms depend on each other*
- K.10: The student knows that the natural world includes rocks, soil, and water.

## Art

117.2

- 117.2.1: Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks.
- K.1: The student develops and organizes ideas from the environment.  
*A: glean information from the environment using the five senses*  
*B: identify colors, textures, forms, and subjects in the environment*

# First Grade TEKS\*

\*These are just some of the TEKS you will be addressing with this unit.

## Language Arts

110.3

- 1.1: The student is introduced to new vocabulary through stories and informational books.
- 1.2: Students learn to listen attentively and ask and respond to questions and retell stories; The student engages actively in a variety of oral language experiences.
  - A: *determine the purposes for listening, such as to get information, to solve problems and to enjoy and appreciate*
  - C: *participate in rhymes, songs, conversations, and discussions*
- 1.3: The student knows that information and critical thinking are used in making decisions
  - C: *ask and answer relevant questions and make contributions in small or large group discussions.*
- 1.4: The student communicates clearly by putting thoughts and feelings into spoken words.
  - A: *learn the vocabulary of school such as numbers, shapes, colors, etc.*
- 1.10: The student reads widely for different purposes in varied sources.
- 1.12: The student develops an extensive vocabulary
- 1.15: The student generates questions and conducts research about topics using information from a variety of sources including selections read aloud.
- 1.17: The student develops the foundations of writing.
- 1.23: The student uses writing as a tool for learning and research

## Math

111.13

- 1.1: The student uses whole numbers to describe and compare quantities
- 1.3: The student recognizes and solves problems in addition and subtraction.
- 1.6: The student uses attributes to identify, compare, and contrast shapes and solids.

## Science

112.3

- 112.3.2 Students identify basic needs of living things, explore ways that living things depend on each other.
- 112.2: Student will identify components of the natural world.
- 112.3.4: The student learns that a system is a collection of cycles, structures, and processes that interact.
  - 1.1: The student conducts classroom and field investigations and participates in the scientific process .
  - 1.2: The student develops abilities necessary to do scientific inquiry in the field and the classroom.
    - A: *ask questions about the organisms, objects, and events*
    - B: *gather information using simple equipment and tools to extend the senses*
  - 1.3: The student knows that information and critical thinking are used in making decisions.
  - 1.4: The student uses age-appropriate tools and models to verify that organisms and objects and parts of organisms and objects can be observed, described, and measured.
  - 1.5: The student knows that organisms, objects, and events have properties and patterns.
  - 1.6: The student knows that systems have parts and are composed of organisms and objects.
    - B: *record observations about parts of plants and animals*
    - D: *identify that when separated from the whole, may result in part of the whole not working*
  - 1.7: The student knows that many types of change occur.
    - D: *observe and record stages in the live cycle of organisms in their natural environment*
  - 1.8: The student knows the difference between living organisms and non-living objects.
  - 1.9: The student knows that living organisms have basic needs.
    - B: *give examples of how living organisms depend on each other*
  - 1.10: The student knows that the natural world includes rocks, soil, and water.

## Art

117.5

- 117.5.1: Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks.
  - 1.1: The student develops and organizes ideas from the environment.
    - A: *identify similarities, differences, and variations among subjects, using the senses*
    - B: *identify color, texture, form, line, and emphasis in nature and in the human-made environment.*

# Second Grade TEKS\*

\*These are just some of the TEKS you will be addressing with this unit.

## Language Arts

110.4

- 110.4.2.1: The student listens attentively and engages in a variety of oral language experiences.  
A: *determine the purposes for listening, such as to get information, to solve problems and to enjoy and appreciate*  
C: *participate in rhymes, songs, conversations, and discussions*
- 2.3: C: The student will ask and answer relevant questions and make contributions in small or large group discussions.
- 2.4: The student communicates clearly by putting thoughts and feelings into spoken words.
- 2.12: The student generates questions and conducts research-using information from various sources.
- 2.20: The student uses writing as a tool for learning and research.

## Math

111.14

- 2.1: The student uses whole numbers to describe and compare quantities
- 2.3: The student adds and subtracts whole numbers to solve problems.
- 2.7: The student uses attributes to identify, compare, and contrast shapes and solids.

## Science

112.4

- 112.4.1 Students conduct simple field investigations to develop skills of making measurements.
- 112.2: Student will identify components of the natural world.
- 112.3.4: The student learns that a system is a collection of cycles, structures, and processes that interact.
- 2.1: The student conducts classroom and field investigations and participates in the scientific process.
- 2.2: The student develops abilities necessary to do scientific inquiry in the field and the classroom.  
A: *ask questions about the organisms, objects, and events*  
C: *compare results of investigations with what students know about the world*
- 2.3: The student knows that information and critical thinking are used in making decisions.
- 2.4: The student uses age-appropriate tools and models to verify that organisms and objects and parts of organisms and objects can be observed, described, and measured.
- 2.5: The student knows that organisms, objects, and events have properties and patterns.
- 2.6: The student knows that systems have parts and are composed of organisms and objects.  
B: *manipulate, predict, and identify parts that, when put together, can do things they cannot by themselves*  
C: *observe and record the function of plant parts*
- 2.7: The student knows that many types of change occur.
- 2.8: The student distinguishes between living organisms and nonliving organisms.
- 2.9: The student knows that living organisms have basic needs.  
A: *identify the external characteristics of different plants and animals that allow their needs to be met*  
B: *Compare and give examples of the ways living organisms depend on each other and on their environments*
- 2.10: The student knows that the natural world includes rocks, soil, and water.

## Art

117.8

- 117.8.1: Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks.
- 2.1: The student develops and organizes ideas from the environment.  
A: *identify variations in objects and subjects, using the senses*  
B: *identify color, texture, form, line, and space and art principles such as emphasis, pattern, and rhythm*

# Third Grade TEKS\*

\*These are just some of the TEKS you will be addressing with this unit.

## Language Arts

110.5

- 110.5.3.1: The student listens attentively and engages in a variety of oral language experiences.  
*A: determine the purposes for listening, such as to get information, to solve problems and to enjoy and appreciate*  
*C: participate in rhymes, songs, conversations, and discussions*
- 3.3: C: The student will ask and answer relevant questions and make contributions in small or large group discussions.
- 3.4: The student communicates clearly by putting thoughts and feelings into spoken words.
- 3.12: The student generates questions and conducts research-using information from various sources.
- 3.20: The student uses writing as a tool for learning and research.

## Math

111.15

- 3.3: The student adds and subtracts whole numbers to solve problems.
- 3.11: The student selects and uses appropriate units and procedures to measure length and area.

## Science

112.5

- 112.5.1 Students conduct simple field investigations to develop skills of making measurements.
- 112.5.2: Student will identify components of the natural world.
- 112.5.4: The student learns that a system is a collection of cycles, structures, and processes that interact.
- 3.1: The student conducts classroom and field investigations and participates in the scientific process.
- 3.2: The student develops abilities necessary to do scientific inquiry in the field and the classroom.  
*A: plan and implement descriptive investigations*  
*B: collect information by observing and measuring*  
*C: analyze and interpret information to construct reasonable explanations*
- 3.3: The student knows that information and critical thinking are used in making decisions.
- 3.4: The student knows how to use a variety of tools and methods conduct science inquiry.
- 3.5: The student knows that systems exist in the world.  
*A: observe and identify simple systems such as a sprouted seed*
- 3.8: The student knows that living organisms need food, water, light, air, a way to dispose of waster, and an environment in which to live.  
*A: observe the habitats of organisms within an ecosystem*  
*D: describe how living organisms modify their physical environment to meet their needs*
- 3.9: The student knows that species have different adaptations that help them survive and reproduce in their environment.
- 3.10: The student knows that many likenesses between offspring and parents are inherited from the parents.  
*A: identify some of the inherited traits of plants*
- 3.11: The student knows that the natural world includes earth materials and objects in the sky.

## Art

117.11

- 3.1: The student develops and organizes ideas from the environment.  
*B: identify art elements such as color, texture, form, line, and space and art principles such as emphasis, pattern, rhythm, balance, proportion, and unity in artworks*
- 3.2: The student expresses ideas through original artworks, using a variety of media with appropriate skill.  
*A: create artworks based on personal observations and experiences*

# Fourth Grade TEKS\*

\*These are just some of the TEKS you will be addressing with this unit.

## Language Arts

- 110.6  
110.6
- 110.6.4.1: The student listens attentively and engages in a variety of oral language experiences.  
*A: determine the purposes for listening, such as to gain information, to solve problem, or to enjoy and appreciate*
- 4.5: The student will speak appropriately to different audiences for different purposes and occasions.  
*C: present dramatic interpretations of experiences, stories, poems to communicate*
- 4.13: The student inquires and conducts research using a variety of sources.  
*A: form and revise questions for investigations, including questions arising from units of study*
- 4.15: The student writes for a variety of audiences and purposes, in a variety of forms.  
*F: choose the appropriate form for his/her own purpose for writing, including journals*
- 4.21: The student uses writing as a tool for learning and research.

## Math

- 111.16
- 4.3: The student adds and subtracts whole numbers to solve meaningful problems.
- 4.11: The student selects and uses appropriate unit and procedures to measure weight and capacity.

## Science

- 112.6  
112.6
- 112.6.1 Students conduct field investigations to develop skills of using scientific method.
- 112.6.2: Student will identify components of the natural world.
- 112.6.3: The student learns the roles of living and nonliving components of simple systems.
- 112.6.5: A system is a collection of cycles, structures, and processes that interact.
- 112.6.6: Investigations are used to learn about the natural world.
- 4.1: The student conducts classroom and field investigations and participates in the scientific process.
- 4.2: The student uses scientific inquiry methods during field and laboratory investigations.  
*B: collect information by observing and measuring*  
*C: analyze and interpret information to construct reasonable explanations*
- 4.3: The student uses critical thinking and scientific problem solving to make informed decisions.  
*C: represent the natural world using models and identify their limitations*
- 4.4: The student knows how to use a variety of tools and methods to conduct science inquiry.
- 4.5: The student knows that complex systems may not work if some parts are removed  
*A: identify and describe the roles of some organisms in living systems such as plants in a schoolyard*
- 4.8: The student knows that adaptations may increase the survival of members of a species.
- 4.9: The student knows that many likenesses between offspring and parents are inherited or learned.
- 4.11 The student knows that the natural world includes earth materials and objects in the sky.

## Art

- 117.14
- 117.14.1: Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks.
- 4.1: The student develops and organizes ideas from the environment.  
*B: identify color, texture, form, line, and space and art principles such as emphasis, pattern, and rhythm*

# Fifth Grade TEKS\*

\*These are just some of the TEKS you will be addressing with this unit.

## Language Arts

- 110.7  
110.7.5.1: The student listens actively and purposefully in a variety of settings.  
*A: determine the purposes for listening, such as to gain information, to solve problem, or to enjoy and appreciate*
- 5.5: The student will speak appropriately to different audiences for different purposes and occasions.  
*C: present dramatic interpretations of experiences, stories, poems to communicate*
- 5.13: The student inquires and conducts research using a variety of sources.  
*A: form and revise questions for investigations, including questions arising from units of study*
- 5.15: The student writes for a variety of audiences and purposes, in a variety of forms.  
*F: choose the appropriate form for his/her own purpose for writing, including journals*
- 5.21: The student uses writing as a tool for learning and research.

## Math

- 111.17  
5.3: The student adds and subtracts whole numbers to solve meaningful problems.

5.11: The student applies measurement concepts.

## Science

- 112.7  
112.6.1 Students conduct field investigations to develop skills of using scientific method.
- 112.6.2: Student will identify components of the natural world and Earth systems.
- 112.6.3: The student learns that adaptation relates to organisms' roles and niches.
- 112.6.5: A system is a collection of cycles, structures, and processes that interact.
- 112.6.6: Investigations are used to learn about the natural world.
- 5.1: The student conducts classroom and field investigations and participates in the scientific process.
- 5.2: The student uses scientific inquiry methods during field and laboratory investigations.  
*B: collect information by observing and measuring*  
*C: analyze and interpret information to construct reasonable explanations*
- 5.3: The student uses critical thinking and scientific problem solving to make informed decisions.  
*C: represent the natural world using models and identify their limitations*
- 5.4: The student knows how to use a variety of tools and methods to conduct science inquiry.
- 5.5: The student knows that complex systems may not work if some parts are removed  
*A: describe some cycles, structures, and processes that are found in a simple system*
- 5.6: The student knows that some change occurs in cycles.  
*C: describe and compare life cycles of plants and animals*
- 5.9: The student knows that adaptation may increase the survival of members of a species.  
*B: analyze and describe adaptive characteristics that result in an organism's unique niche in an ecosystem*
- 5.10: The student knows that likenesses between offspring and parents can be inherited or learned.

## Art

- 117.17  
117.14.1: Students rely on their perceptions of the environment, developed through increasing visual awareness and sensitivity to surroundings, memory, imagination, and life experiences, as a source for creating artworks.
- 5.1: The student develops and organizes ideas from the environment.  
*B: identify color, texture, form, line, and space and art principles such as emphasis, pattern, and rhythm*



# Summary for Teachers

---

## Why Flowers?

The flower is one of the most important parts of a plant. The flower is not only an important to the plant itself, but flowers are significant in the lives of humans and other animals as well. For plants that reproduce using seeds, the flower is indispensable as the flower is the part of that plant where seeds are produced. Seeds play an important role for people, as we get many important foods and products from seeds. Corn, beans, and nuts are just a few examples of foods we eat that are actually seeds.

Even fruits, a significant source of nutrition for humans, are also linked to flowers. When the seeds begin to grow in a plant, they form a protective covering, which we call the fruit of the plant. Apples, peaches, and even bean pods are fruit, because they contain seeds. Flowers also benefit other animals, such as insects and birds. For example, many insects and birds need the nectar inside of a flower to eat or to make into honey. Due to the importance of flowers and seeds, it is necessary for students to understand how they work and their role in the environment. For example: understanding how flowers and pollinators interact makes people more aware of the dangers involved with using pesticides and other potentially damaging practices.

## Flower Parts

The flower of a plant is used to make the fruit and seeds, which grow into a new plant. The seed (and its fruit) develop by combining male and female parts of a plant. Some plants are “perfect plants” which have both male and female elements in the same flower; others are “imperfect plants” and actually require pollinators to move pollen from male flower to female flower. Pollen is created by the male component of a plant, the stamen, and contains information the seed needs to make the new plant have the same characteristics as the male “parent” plant. Pollen looks like yellow dust.

## Male

## Female

The complement to the male part of the plant—the female part, the pistil, creates ovules. These ovules contain information the seeds need to make the new plant have the same characteristics as the female “parent” plant. By joining the information from the male and female plant, a new plant can be formed. In order for the new plant to grow from the seed, the pollen and ovule must become connected to one another.

Because plants cannot move on their own to combine the pollen and the ovule, they need help moving the pollen to the ovule. Some plants wait for the wind to spread the pollen; other plants use the help of insects and birds, which we call pollinators. The plants and the pollinators help each other. The plants give the pollinators nectar, and in return, the pollinators move the pollen from the male parts to the female parts.

## **Plant Methods**

### **Color**

Plants have several methods to attract pollinators. One method is the color of a flower. Flower colors, whether pale or bright, are designed to attract pollinators. Bright flowers attract pollinators active during the day, where pale colored flowers attract pollinators active at night. Some flowers, like orchids, even mimic certain types of insects, which trick pollinators into thinking they are performing a mating ritual.

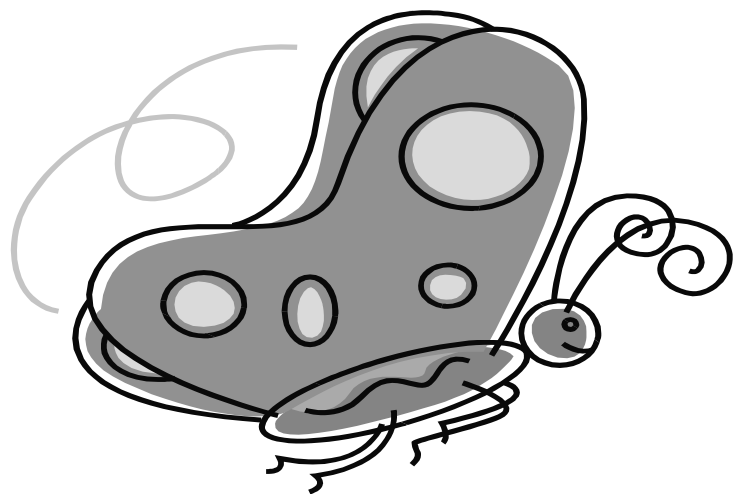
### **Scent**

The scent of a flower is another method used to attract pollinators. Flowers give off a unique smell that will attract a certain type of pollinator. For example, one type of plant has a flower that smells like rotten meat. There is a particular type of fly that is attracted to this rotten smelling plant. Bees, by contrast, are attracted to the sweet smell of many flowers.

### **Shape**

An additional method used to attract pollinators is the shape of a flower. For example, a hummingbird has a long skinny beak, so it likes flowers with long skinny tube-shapes.

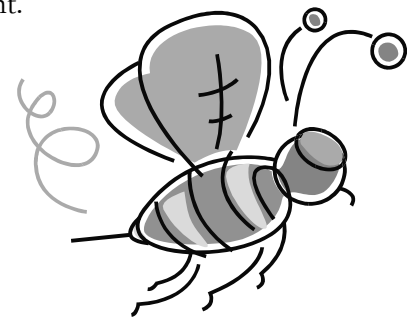
As a pollinator moves from one flower to another, the pollen is spread from plant to plant and male part to female part (even in perfect plants this results in cross-pollination). Once the pollinators have done their work, the ovule connects with the pollen and a seed is formed inside the flower. After the seed has matured, it will grow into a new plant, as long as it finds the proper growing conditions.



# Pollinators Vocabulary

---

<b>Anther</b>	Top of the stamen, where the pollen is produced and held until it is taken to the female part of the flower.
<b>Calyx</b>	The term for the group of sepals located just under the petals, which provide protection to the petals. Forms a cup shape when closed.
<b>Corolla</b>	The term for a flower's petals, collectively.
<b>Filament</b>	The tube that holds up the anther, giving support to the plant.
<b>Hypothesis</b>	A theory in science stated for further investigation.
<b>Nectar</b>	The sweet smelling and tasting liquid inside a flower.
<b>Organism</b>	A general term for a living thing such as plants or animals.
<b>Ovary</b>	The bottom part of a flower's pistil; holds the ovule, where a seed is formed.
<b>Ovule</b>	The small plant structure that creates seeds containing female genetic information.
<b>Petal</b>	The colorful showy part of a <b>flower</b> that protects the plant's reproductive parts and attracts pollinators.
<b>Pistil</b>	Name for the three female parts, collectively, of the flower (the stigma, style, and ovary).
<b>Sepal</b>	The individual, often green, leaf-like structures located just below the petals, used to protect the flower bud.
<b>Stamen</b>	Name for the two male parts, collectively, of the flower.
<b>Stigma</b>	The apex of the flower's pistil, the area where the pollen is deposited at pollination; traps pollen.
<b>Style</b>	The slender part of a pistil, situated between the ovary and the stigma; pollen travels through this to get to the ovary.



# Pre-Visit Activity #1: Flower Structure

---

## Objective

Using critical thinking and the scientific method, students learn that there are many parts of a system, while learning to identify the basic flower structures and the function of the flower parts. Students will be able to recognize that the function of the flower is to produce seeds. Students will also learn shape vocabulary by studying plant parts and discussing color, form, and texture.

## Materials

- Pollinators worksheet #1a or 1b copies (“learning parts of the flower”)
- Gloves for students’ hands (to protect them from pollen stains)
- Aprons for students (*optional*--to protect the clothing from stains)
- One large flower (e.g. lilies or other flowers with large petals and very visible parts). *Check with florists and funeral homes for donations of discarded flowers.*
- Magnifying hand lenses
- Black construction paper
- Tweezers (optional)
- Colored pencils
- Metric ruler (if age-appropriate)

## Directions

### Step One

To introduce your students to thinking critically about flowers, you could write the word “flower” on the board and ask students to provide words that describe flowers. You could also bring in several types of flowers and have the students investigate these flowers to come up with descriptions.

- *Where there certain words or types of words that are often used to describe flowers?*
- *What characteristics do most flowers share?*
- *You may hint that flowers produce seeds for new plants and that pollination is necessary for new seeds to be produced.*

## Directions

### Step Two

For this classroom activity, decide whether students will work apart or in small groups. Prepare an “investigation station” for each student/group to feature a page of black paper, one flower, one hand lens, one ruler (if age-appropriate), colored pencils, and copies of the pollinators worksheet #1a or 1b.

Before the students leave their desks, begin by focusing on critical thinking. Ask them to write (or state out loud) what they currently think is the purpose of a flower. You should write their ideas on the board so that you can come back to these hypotheses after the activity is over.

## Directions

### Step Two

Now that the students have begun to consider the “reason” for flowers, have them move to the investigation stations. Lead the students through the following steps:

1. Identify the stem.
2. Gently remove the rest of the flower from the stem.
3. Place the flower top onto the black paper.
4. Using the hand lens, study the flower and its structure.

## Directions

### Step Three

Have students study the flower without touching it and then describe the separate parts that they can find in the flower. Explain that all flowers are not exactly the same, but there are some common aspects. Your students can write this down on the back of their worksheet or just talk aloud in class. Write the answers on the board so that you can then write the scientific names for these parts next to the class descriptions (it may be helpful to make an overhead of the worksheet or copy it onto the chalkboard so that you can help the students follow the activity). *Younger students need not focus on scientific names—skip ahead to step 4.*

Now that you have introduced the names of the plant parts, you may let your students label the parts of the flower on their worksheet, and/or you may instruct them to color in each different part with a different color of pencil:

1. Petal
2. Stigma (part of the pistil)
3. Style (part of the pistil)
4. Ovary (part of the pistil)
5. Sepal
6. Filament (part of the stamen)
7. Anther (part of the stamen)

## Directions

### Step Four

Now that the students have been introduced to the name of the plant parts, encourage them to take a closer look by peeling off the sepals.

Ask students to answer the following questions:

- How are the sepals held onto the flower?

- Are the sepals growing on top of one another or are they growing so that they will form a cup when they close?
- What color are the sepals?
- What shape are the sepals? (or what shapes make up a sepal?)

## Directions

### Step Five

Now encourage the students to move onto to studying the petals.

Ask students to answer the following questions:

- How many petals does your flower have?
- Are the petals attached to one another? Or are they separate?
- What do the petals feel like?
- Do the petals smell?
- What shape is the petal?
- What color is the petal?
- What do you think petals are used for?

If your students are familiar with rulers, ask them to measure two petals, recording the length and width on the back of their worksheet.

## Directions

### Step Six

Move onto examining the next group of structures in the flower, the stamen, composed of the filaments and anthers. Explain that the stamens are the male part of the flower. Their long stalks are called filaments. At the end of each filament is the anther, where the pollen is held.

Ask students to gently wiggle the anther.

Ask students to answer the following questions:

- How is the anther attached to the filament?
- Does it feel secure?
- Does it move back and forth like a see-saw?
- What color is it?
- What does it feel like?
- What shape is it?

Now ask students to use their hand lenses. Have them look for the pollen at the end of the anther. Once they see it with the lens, have them shake some pollen onto the black paper.

- What color is it?

**Directions**  
**Step Seven**

Now instruct the students to pull the anthers and the filaments out of the flower. The only structure left is the female part, called the pistil. The pistil is made up of three parts: the style, stigma, and the ovary. Ask students to gently touch the top of the pistil, called the stigma. Explain that this is where the pollen sticks onto the female part from the anther. The tube connecting the top to the bottom of the pistil is called the style. The pollen travels down this tube to the bottom of the pistil. At the bottom of the pistil is where the pollen is formed into a seed. This is where the pollen sticks onto the female part from the anther. This area at the bottom is called the ovary.

Ask students to answer the following questions:

- Is the stigma sticky?
- What color is the stigma?
- What shape is the stigma?

**Directions**  
**Step Eight**

Have students gently break open the ovary with their fingers or with tweezers.

Ask students to answer the following questions:

- Do you see any seeds? (suggest students use the hand lens)
- Is the ovary one open area?
- Is the ovary divided into small sections or chambers?
- What color is the ovary?
- What color are the seeds?
- What shape are the seeds?

**Directions**  
**Step Nine**

Have students clean up their investigation stations and then return to their desks.

For conclusion of the activity, ask students to answer the following questions:

- Why do you think petals are often brightly colored?
- Why do you suppose flowers have strong smells?
- If you were a pollinator, what would attract you? (this leads into activity #2)
- Do you still agree about your earlier hypotheses about the purpose of a flower?
- If not, how have you changed your ideas?



# Pre-Visit Activity #2: Pollinators

---

**Objective:** Students will use scientific inquiry and critical thinking to reason the relationship between flowers and pollinators, understanding that structures, interactions, and processes found in systems can do things together that they cannot do alone.

Students will also learn about the lifecycle of a flower, the different types of pollinators, and how a pollinator is attracted to a flower, while learning to retell stories and the order of events.

**Materials:** *Adjust number of each item based your total number of pollinators/flower actors.*

- Small dish full of cut up pieces of paper (the small pieces left inside a hole-punch work great)
- Squares of yellow, red, purple, and white/pale construction paper
- Tape
- Test tubes or other tube-like container (at least 2)
- Long tweezers (2 sets)
- Wooden dowels with tape wrapped around it (at least 2)
- Pollinator and Flower ID cards (see end of unit for template)
- Student worksheet #2a or 2b (see end of unit for template)

## Directions Step One

You are teaching students that pollinators are attracted to flowers for many different reasons. Display one type of pollinator card to the class and discuss why each organism is attracted to flowers and the type of flowers it is attracted to.

**1. Bees** Bees are attracted mainly to nectar and pollen, which they use to make their food—honey. Bees cannot see red but they do like white, yellow, blue, and purple flowers that have a sweet fragrant smell.

*Examples of plants pollinated by bees: mints, violets, snapdragons (the irregular shape provides a good landing platform)*

**2. Butterflies** Butterflies are also attracted to nectar and often visit the same flowers that bees visit. They like red, orange, yellow, pink, purple, and blue flowers that are in a flat cluster in a sunny location.

*Examples of plants pollinated by butterflies: butterfly bush, purple coneflower*



**3. Moths** Moths are nocturnal, flying in the evening, and prefer flowers that are white or pale colored (most easily seen at night). These flowers often bloom at sundown and have a strong smell. They are also often tubular and accessible to long moth tongues.

*Examples of plant pollinated by moths: orchids*

**4. Birds** Most birds have a poor sense of smell, so flowers that depend on birds, like hummingbirds, do not have to be fragrant. Instead, bright colors like red and yellow are attractive to the birds. A tube-shaped flower is also attractive to the bird, signaling that the flower holds a lot of nectar for the hummingbird to eat.

*Example of plants pollinated by hummingbirds: hibiscus, fire bush*

**5. Flies\*** Flies are attracted to flowers that resemble decaying flesh, where they like to lay their eggs. These flowers often have strong, unpleasant odors and maroon colors.

*Example of plant pollinated by flies: Red Trillium*

**6. Beetles\*** Beetles don't see color, so they like the brightness of a white flower that smells sweet. Beetles usually eat flower parts, so the plants that depend on beetles for pollination are large so that there is some flower left after the beetle's meal.

*Example of plant pollinated by beetles: magnolia*

**7. Bats\*** Bats are active at night, like the moths, so they also like white flowers that bloom at night and have a strong smell. Bats are often important in tropical areas.

*Example of plant pollinated by bats: durian, kapok, cloves, cashew nuts, bananas, breadfruit, avocados, dates, figs, mangoes*

**8. Wind\*** Flowers on wind-pollinated plants do not have to attract organisms, so they do not have to be bright or fragrant. Instead, most of these flowers have no petals and have long stamens exposed to wind currents.

*Examples of plants pollinated by the wind: grasses, trees*

*\*You may choose to omit these pollinators in your class discussion, as they are not used in the activity below (although the activity could be expanded for a larger/ older class by adding props for fly eggs/ legs, beetle mouth, bat legs, and wind and flower ID cards for the flowers that are pollinated by these organisms).*

## **Directions**

### **Step Two**

Now that your students are familiar with the ways that flowers attract their pollinators, fill out the student worksheet #2a (“learning about pollinators”). \* You may do the worksheet a class, in small groups, or as individuals. Students will be asked to use the scientific method to determine the ways that a flower attracts a pollinator as well as the way that pollen moves from flower to flower.

*\*You may also omit the worksheet portion of this activity—based on your classroom conditions. Learning should still be effective if you emphasize the questions out loud instead of having students complete the worksheet. Worksheet 2b (“learning about pollinators”) can be done at the end of the activity to reinforce ideas.*

## **Directions**

### **Step Three**

Gather the class to the center of the room, sitting in a circle. Select eight students to be pollinators (2 bees, 2 butterflies, 2 moths, 2 hummingbirds). Give these students pollinator ID cards (we recommend putting holes in the cards with string at the top so students may wear the ID around their necks and have their hands free for the activity[templates at end of unit]). Prepare each type of pollinator with the “tools” of the animal: give the hummingbirds the tweezers; wrap tape on the right hand of the bees and the butterflies (sticky side facing out); give the wooden dowels with tape to the moths. Have the pollinators wait outside the circle.

Explain to the remainder of the class that they are flowers needing to be pollinated (you may group your students into small groups of flowers so they share supplies). Give each “flower” a piece of colored paper (corresponding to the colors in the discussion: red, yellow, white/pale, purple)—either a flat piece or a piece wrapped around a test tube (just make sure you have two pale tubes and at least two bright tubes). Also give each flower a flower ID card that will give them hints on the type of pollinator they need (see template at end of unit).

Give “pollen” (the small bits of paper) to half of the classroom (you can do this side-by-side or alternating—just make sure you give some pollen to each type of flower).

Explain that everyone will end up with some pollen at the end of the activity. Have those with flat paper place the pollen in the center of their “flower.” Those with test tubes should put the pollen inside their test tubes.

## Directions

### Step Four

Ask the pollinators to seek the flower to which they are most attracted. Remind each pollinator to look at his/her ID card for hints. We have simplified the correlations for this activity to a one-to-one ration: bees-yellow; butterflies-purple; moths-white/pale tubular; hummingbirds: bright/red tubular. Depending on your class, it may work better to have each type of pollinator go one at a time.

Let the flowers help the pollinators find the right flower—make sure that flowers use their ID cards to “reject” the wrong type of pollinator and accept only the pollinator on their flower ID card.

Once the pollinator finds the correct flower, explain that the pollinators need to find a way to carry pollen and drop it off at another flower it likes—**without using their hands** (*using the dowels, tweezers, and tape*).

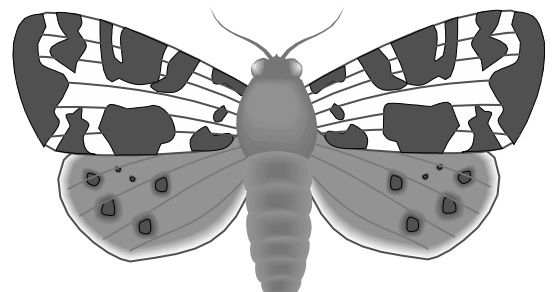
Continue this until all of the pollinators have had a turn and all of the flowers have some pollen.

Clean up by asking for all flowers to put their pollen back into a central receptacle and ask the pollinators to neatly return their “tools.”

## Directions

### Step Five

Return to the worksheet (if used) to discuss the results of the experiment. Ask students to draw conclusions about the ways that a flower can attract a pollinator. Work with students to list the ways that pollen gets from plant to plant and explain how life systems of plants and pollinators intersect. Have students complete worksheet 2b, if desired.



# Visit to the San Antonio Botanical Garden

---

## Reminder

**All visits must be prescheduled! See page one for more information.**

## Time Required

Your class should plan at least one-and-a half hours (90 minutes) for the tour of the garden. Groups are welcome to tour more than the “focus” gardens (listed below) during a visit; if you plan to tour some of the other gardens, obviously, include more time for your trip. The ninety-minute guideline allots for a self-guided tour of these “focus” gardens: Old Fashioned Garden, Formal Garden, Rose Garden, and the Garden for the Blind, all featuring plants that are very popular with pollinators.

## Objectives

With this garden visit students will: use their senses safely for outdoor and garden exploration, continue their study of pollinators and flower parts, as well as exploring the interconnections between living organisms, understanding that systems contain parts that make a great whole.

## Before you Leave

We recommend organizing your students into teams with a designated chaperone. We recommend making nametags for your students and chaperones (this customizes the experience for the students and makes it easier for the chaperones).

Please review the objectives of the trip with students and chaperones, as well as the following rules:

- Students **SHOULD**: Have an enjoyable learning experience!
- Students should **NOT**: Run, Throw Rocks, Shout, Misbehave, Litter, Chase the Ducks, Get in the Fountains or Ponds, Walk through the Display Beds, Eat Snacks, and Collect Seeds, Flowers, or Plants.
- Students **MUST** be supervised in the restrooms and in the gift shop.

Please dress appropriately for the weather: *the program is designed to be outdoors.*

## Food on site

Although food is not normally allowed in the gardens, please contact the SABG Education Director if you would like to have arrangements made if your group is going to be at the garden for more than two hours. We recommend bringing edible flowers like raw cauliflower for a healthy and fun snack for the students that reinforces the connections between flowers and humans.

## At the Gardens

Once you have checked in with garden staff, please proceed to the Wisteria Arbor—a great gathering place with shade. Once your entire group has gathered, hand each student a copy of the journal worksheet (see end of unit for template). Once each student is organized with a paper and pencil, walk to the Old Fashioned Garden.

## Begin Activity

Ask the students to “hunt” for as many pollinators as possible—remembering their discussions from class. Warn them to be careful around the bees to avoid getting stung by the bees. Ask students to record on their journal worksheet how many times they spot one of the six pollinators discussed in class. If they spot any of the pollinators, have them write the color of the flower and draw the shape of the flower the pollinator was around.

## Tour Gardens

Lead the students from the Old Fashioned Garden to the Formal Garden and the Rose Garden.

If your students are adequately familiar with the flower parts, you can also ask them to find a complete flower (one with all the parts) and an incomplete flower (one without all the parts). Incomplete flowers are often missing their sepals.

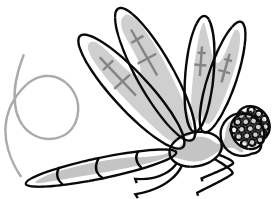
## End Tour @ Garden for the Blind

Have each student find a quiet place throughout the Garden for the Blind to sit down. Tell students to close their eyes and imagine that they only had the senses of hearing, smelling, and touch. Tell them to sit in one spot without talking and concentrate on the sounds they hear, the scents they smell, and the way the air/wind/sun feels to them (up to five minutes).

Ask students to concentrate the most on what they smell.

Have students to imagine they are pollinators flying around the garden.

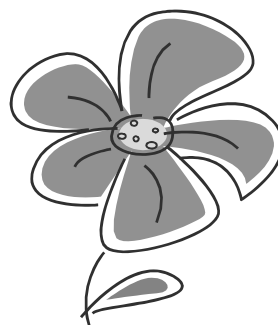
After about five minutes of everyone sitting quietly and concentrating, have each student open their eyes and write and/or draw in their journals, everything they heard, smelled, and felt in their journals. Have the students to write in their journal what kinds of pollinators would be attracted to the flowers they smelled. Bitter, non-sweet smells attract types of flies, while sweet smells attract pollinators who eat or use nectar, such as bees, butterflies, or hummingbirds. Discuss as a group everything they described in their journal.



# Post-Visit Follow-Up

---

- Objective** Students will reinforce their learning about flower parts, pollinators, as well as enhancing critical thinking, visual arts, and creative writing skills.
- Directions** Use at least two of these follow-up activities with your classroom (we recommend the discussion as one of the items).
- Discussion** Discuss with your students the importance of pollinators to flowers and vice versa. Ask them what would happen if there were no pollinators (*flowers would not be fertilized for fruit production and plant reproduction*). Ask the students what would happen if there were no flowers at all (*no nectar, we wouldn't have many of our favorite foods, and plants would not reproduce*).
- Write** Using the descriptive words the students listed while in the Garden for the Blind at the Botanical Garden, help your students create a short poem to describe their experience. Encourage them to be creative. You could also have students write a story about a day in the life of a butterfly or other pollinator; students should learn the role of an author, an artist, and an editor.
- Review** As a class, review the students' journal workbooks. Gather in a circle and/or small groups to talk about what they found at the gardens. Ask them why they think they found what they did (was it easier to hear bees? Easier to see butterflies?) Ask them what their favorite part of the field trip was. You may want to share objects similar to some of the things you may have seen, touched or heard during your visit (flowers, rocks, a green plant, a plastic bird, etc.).
- Create** After discussing the field trip as a class, have each student create a picture of his/her favorite memory of the trip. It could be one flower, a whole garden, classmates together, etc. After students are finished, hang the pictures up in the hallway to let other students know about your trip. You could also create collages with grass, leaves, or petals that you found on the school grounds.
- Evaluate** You may also evaluate your students with the word search (worksheet 3a or 3b) and/or worksheet #1a used as a quiz.



# Additional Resources

---

## K-3 Books

*Butterflies: Pollinators and Nectar-sippers*  
Lola Schaefer, 2001

*How Flowers Bloom*  
Anita Holmes, 2000

*Flowers and Friends*  
Anita Holmes, 2001

## Teacher Resource

*GrowLab®: Activities for Growing Minds*  
National Gardening Association, 1999



## Websites

*National Garden Association*

Visit the National Garden Association at [www.garden.org](http://www.garden.org), or their associated children's site, [www.kidsgardening.org](http://www.kidsgardening.org), for plenty of resources on using garden curriculum in your classroom. For specific pollinators resources, go to: <http://www.kidsgardening.com/themes/pollinator1.asp>

*National Wildlife Federation's Online Activities for Teachers*

Download PDF information and classroom guidelines on pollinators related topics like bats and the lifecycle of butterflies.

<http://www.nwf.org/schoolyardhabitats/onlineactivities.cfm>

*Go Wild! National Wildlife Federation Interactive Page for Kids*

Have your students pursue their technology skills on one of the many activities on this site.

<http://www.nwf.org/gowild/kzPage.cfm?siteId=3&CFID=1237875&CFTOKEN=90371009>

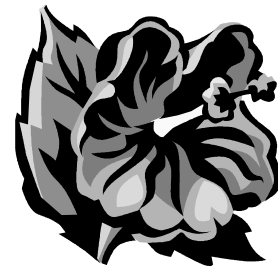
*Pollinators Home Page*

Visit this site for more information and details on all aspects of pollinators.

<http://www.pollinator.com/>

# Feedback and Evaluation

---



## Thank you for using the Pollinators K-5 Guide!

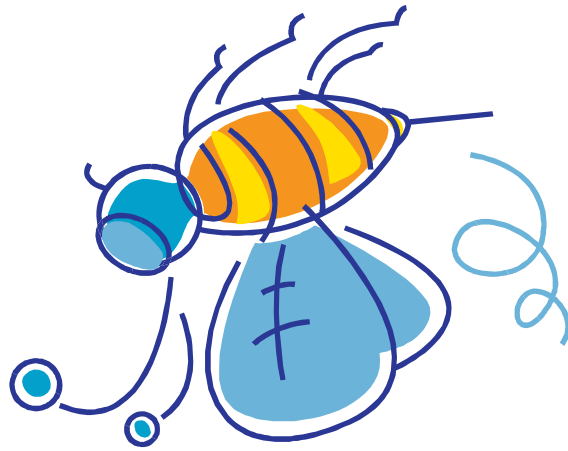
Please take a few moments to give us your feedback so that we may improve our programs in the future.

*Mail completed forms to: San Antonio Botanical Garden, attn: Education Director, 555 Funston, San Antonio, TX, 78209.*

1. I used this curriculum guide with my \_\_\_\_\_ class.
  - a. Kindergarten
  - b. First grade
  - c. Second grade
  - d. Third grade
  - e. Fourth grade
  - f. Fifth grade
  - g. Other, *please explain:*
2. There are \_\_\_\_\_ students in my average class.
  - a. 5-15
  - b. 16-25
  - c. 26-35
  - d. 36+
3. How useful did you find this guide?
  - a. It was helpful; I used some of the suggestions.
  - b. It was great, I found more than a few ways to use this in my classroom.
  - c. It wasn't that good.  
*Please explain your answer:*
4. If you used any of the classroom suggestions in this guide, please tell us what your students thought of them.
5. I brought my students to the SABG as part of this trip.
  - a. Yes, *we toured the gardens on* \_\_\_\_\_ *please fill in date.*
  - b. No, *please explain why not:*
6. Would you be willing to receive information about and consider participating on the SABG Teacher Advisory Board?
  - a. No
  - b. Yes, *please list your contact information:*  
*Name:*  
*Email:*  
*Phone:*  
*Mailing Address:*
7. Please share any specific suggestions or comments about this unit on the reverse of this page.



**Bee**



**Pollinator ID Card**



**You are attracted to  
bright **YELLOW** flowers.**

**Butterfly**

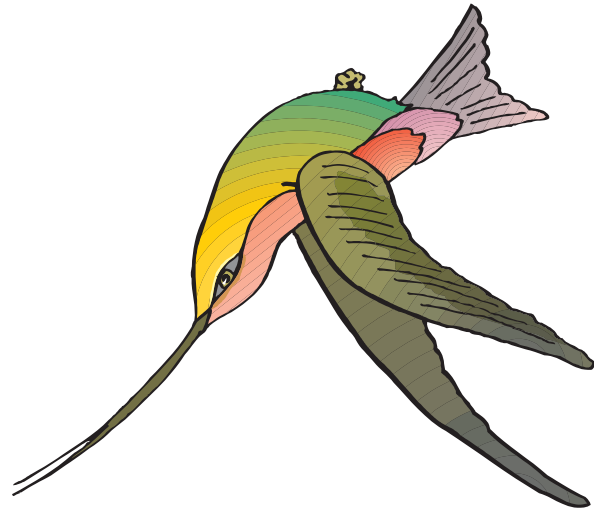


**Pollinator ID Card**



**You are attracted to  
bright **PURPLE** flowers.**

**Humming Bird**

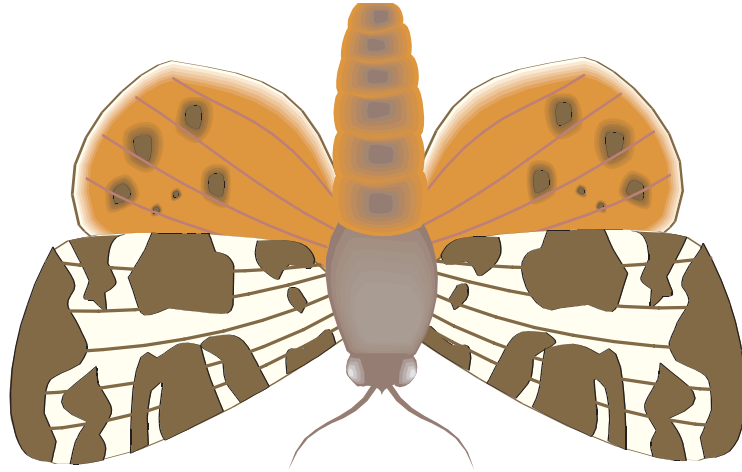


**Pollinator ID Card**



**You are attracted to  
TUBLAR **BRIGHT** flowers.**

**Moth**



**Pollinator ID Card**

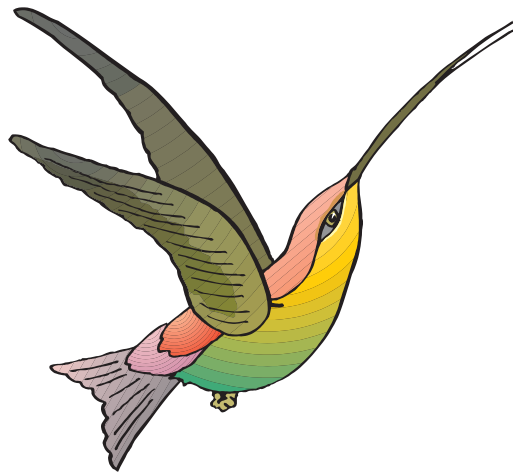


**You are attracted to  
TUBULAR PALE flowers.**

**H!b!scus**



**Flower ID card**

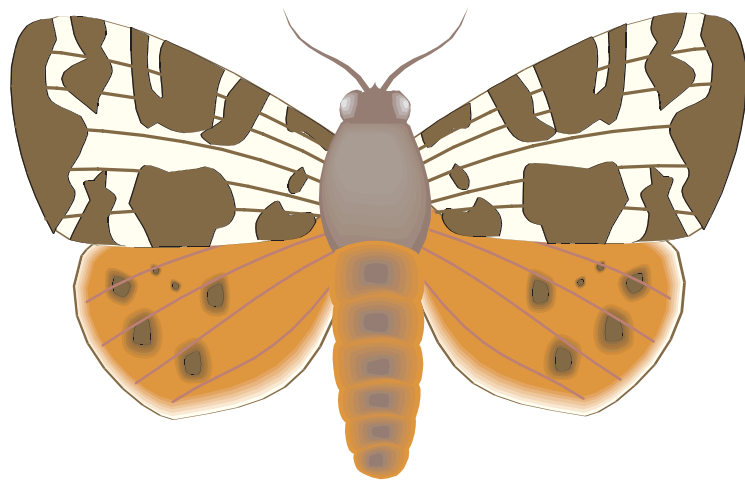


**You need  
HUMMINGBIRDS.**

**Orchid**



**Flower ID card**

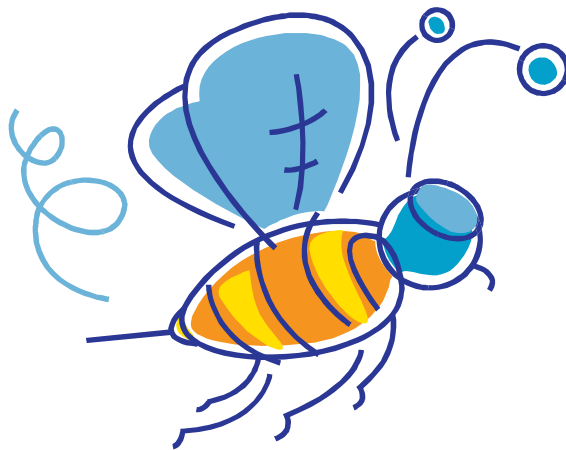


**You need  
MOTHS.**

**Snapperagon**



**Flower ID Card**



**You need  
BEES.**

**Butterfly Bush**



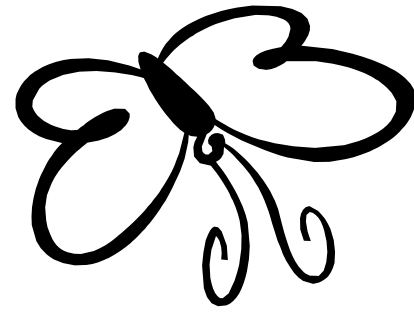
**Flower ID Card**



**You need  
BUTTERFLIES.**



_____	Date
_____	Name



## Field Trip Journal

# Pollinators Unit





## Garden Activity: Visiting the Garden for the Blind

Your teacher will help you go through these questions to practice using your senses.

- What do you smell?
- What kind of pollinators would be attracted to the scents you smelled?
- What do you hear?
- What do you feel?

# Garden Activity: Search for Pollinators

Place a dash (✓) next to each pollinator you see in the gardens.  
At the end of your tour, add up the total number of each pollinator you spotted in the gardens.

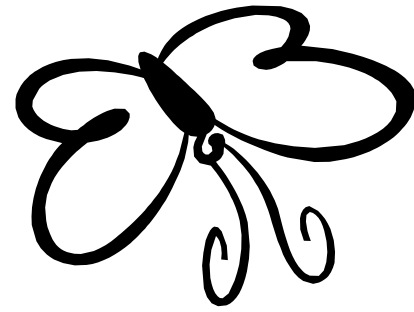
Today I saw a . . .	This many times. . .	Total
Bee 		
Butterfly 		
Hummingbird 		
Moth 		

# Garden Activity: Describing the Flowers

When you see a pollinator, use this chart to describe the flower the pollinator was visiting.

Pollinator Name	Flower Name	Color

_____	Date
_____	Name



## Field Trip Journal

# Pollinators Unit

## Garden Activity: Visiting the Garden for the Blind





Your teacher will help you go through these questions to practice using your senses.

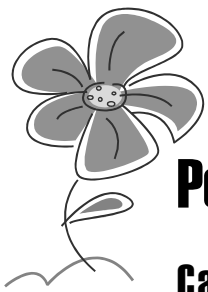
- What do you smell?
- What kind of pollinators would be attracted to the scents you smelled?
- What do you hear?
- What do you feel?

# Garden Activity: Search for Pollinators

Place a dash (✓) next to each pollinator you see in the gardens.

At the end of your tour, add up the total number of each pollinator you spotted in the gardens.

Today I saw a . . .	This many times	TOTAL
<b>Bee</b> 		
<b>Butterfly</b> 		
<b>Hummingbird</b> 		
<b>Moth</b> 		



## Pollinators Word Search

Name \_\_\_\_\_

Date \_\_\_\_\_

Can you find these pollinators and flower parts in the word search below?

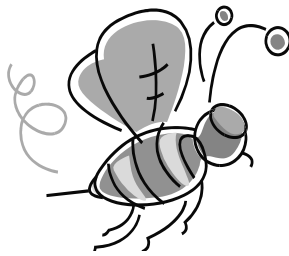
Answers are found up and down (vertical) and side to side (horizontal).

- |                                    |                                 |                                     |
|------------------------------------|---------------------------------|-------------------------------------|
| <input type="checkbox"/> ANTHER    | <input type="checkbox"/> FLOWER | <input type="checkbox"/> PISTIL     |
| <input type="checkbox"/> BAT       | <input type="checkbox"/> MOTH   | <input type="checkbox"/> POLLINATOR |
| <input type="checkbox"/> BEE       | <input type="checkbox"/> NECTAR | <input type="checkbox"/> SEPAL      |
| <input type="checkbox"/> BUTTERFLY | <input type="checkbox"/> OVARY  | <input type="checkbox"/> STAMEN     |

B M B E E J N C P O P S Z P X N  
U P E S E P A L O Q P I S N C E  
T G P O L L I N A T O R D V I C  
T S I Q F N A Z L K B L T F L T  
E E S C L H G O I R A Q G A N A  
R L T T O Z N H N S T A M E N R  
F U I I W F L T W A N T H E R Z  
L R L M E J S C F N O V A R Y C  
Y F M E R Y R L O P K Q P V G J  
Z O Y Q S M O T H A S P H N O P

# Pollinators Worksheet

## Learning about pollinators



Name \_\_\_\_\_

Date \_\_\_\_\_

1. How does a flower attract a pollinator? State your Hypothesis:

---

---

---

2. How does pollen get from flower to flower? State your Hypothesis:

---

---

---

3. Act out the part of a pollinator or a flower in classroom activity. What part did you play?

---

4. Drawing Conclusions. List at least three ways that a flower can attract a pollinator:

---

---

---

5. Look at your hypothesis in question #1, was it correct? [ ] yes [ ] no?

6. Drawing Conclusions. List at least two ways that pollen moves from plant to plant:

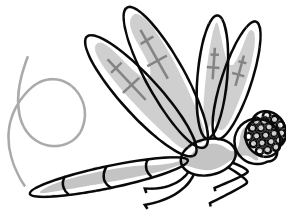
---

---

7. Look at your hypothesis in question #2, was it correct? [ ] yes [ ] no?

# Pollinators Worksheet

## Learning About Flowers



**Name** \_\_\_\_\_

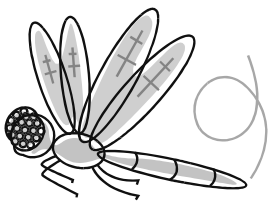
**Date** \_\_\_\_\_

1. Draw a sketch of your flower.

2. How many petals does your flower have? \_\_\_\_\_

3. What color is your flower? \_\_\_\_\_

4. What does your flower smell like? \_\_\_\_\_

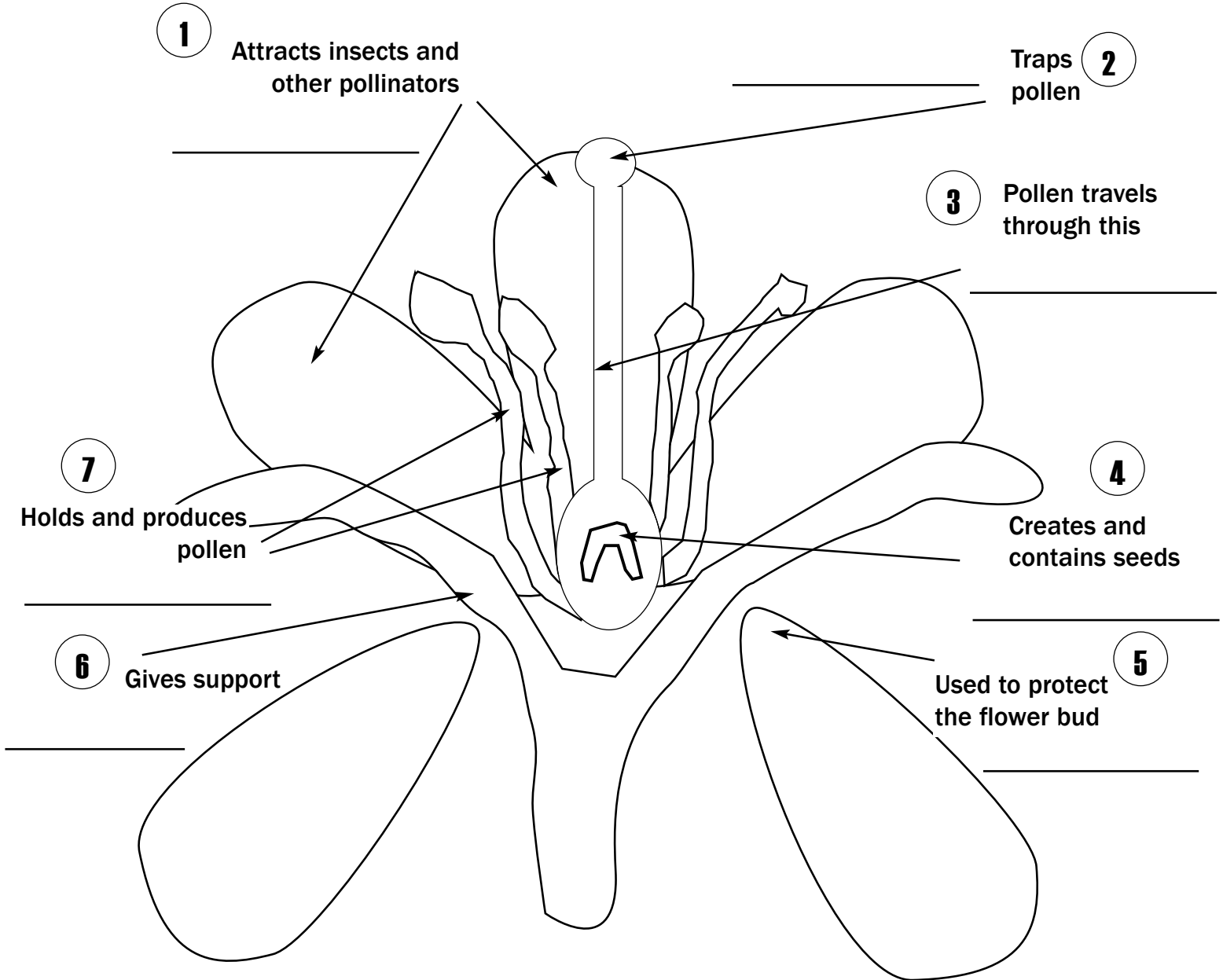


# Pollinators Worksheet

## Learning the Parts of a Flower

Name \_\_\_\_\_

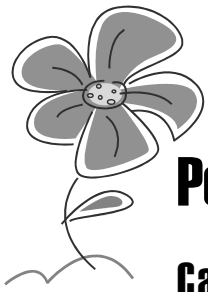
Date \_\_\_\_\_



The Pistil is made up of parts **2 + 3 + 4**

The Stamen is made up of parts **6+7**





# Pollinators Word Search

Name \_\_\_\_\_

Date \_\_\_\_\_

Can you find these pollinators and flower parts in the word search below?

Answers are found up and down (vertical) and side to side (horizontal).

BEE

FLOWER

POLLEN

BUTTERFLY

HUMMINGBIRD

SMELL

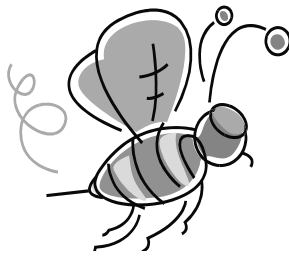
COLOR

MOTH

B M B E E J N C P O P S Z P X M  
U P E S M E L L O Q P I S N C O  
O G C O L L E N X O P O D V I T  
T S O Q F N A Z L K B L T F L H  
E E L C L H G O I R A Q G A N A  
R L O T O Z N H N S T A P X N R  
F U R I W F L T W L A C I M O R  
L R L M E J S C F N Z O E R Y C  
Y F M E R Y R L O P K Q P V G J  
Z O H U M M I N G B I R D Q S M

# Pollinators Worksheet

Learning about pollinators



Name \_\_\_\_\_

Date \_\_\_\_\_

Draw a picture to illustrate the sentence below.

---

**A bee visits a flower to get nectar.**

*The bee will make honey from the nectar and helps pollinate the flower.*