

Be a Bee

Overview: In this game students will learn about pollination by acting out the work of honeybees. They will create bee costumes to wear as they “fly” out to find “pollen” and “nectar.” Then they will communicate with fellow “bees” through waggle dances and bring “pollen” and “nectar” back to their “hive.”

Grade Level/Range: Pre-K to Grade 3

Objectives:

Students will learn:

- Why bees are important and how they help pollinate our crops
- How honeybees communicate with each other

Time: 1 hour

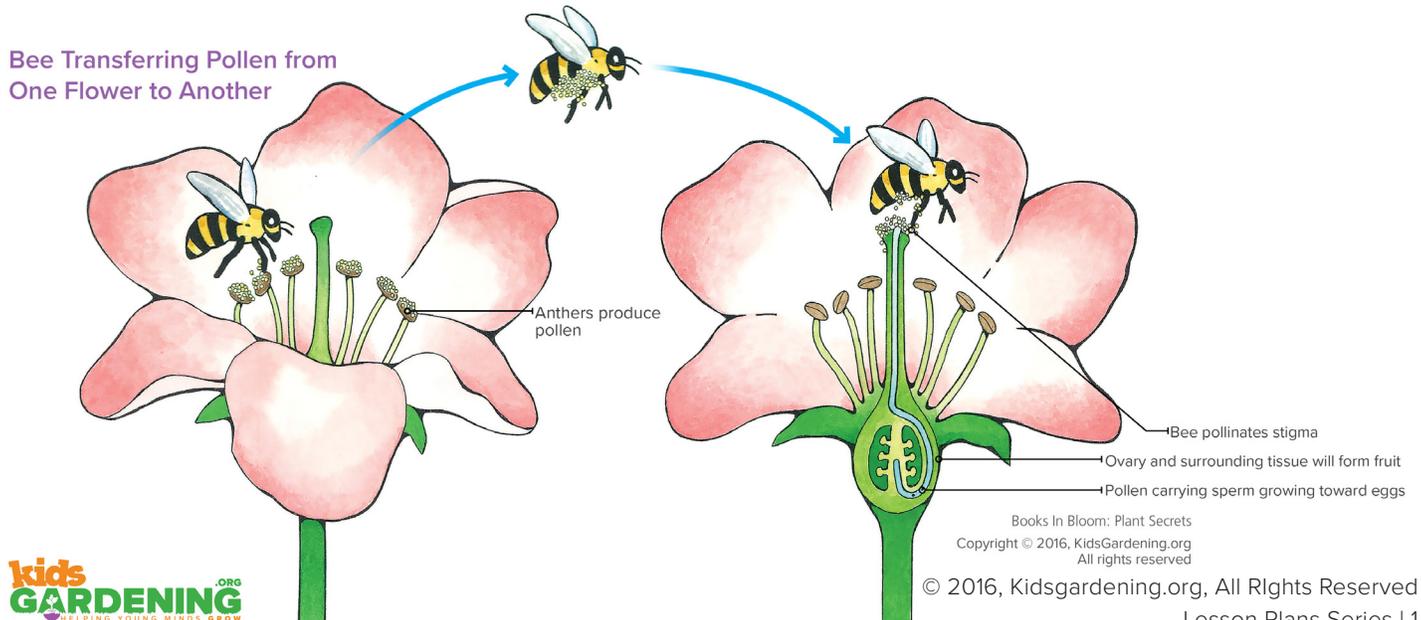
Materials:

- **Antennae:** each student needs 1 plastic headband and 2 pipe cleaners.
- **Wings:** each set of wings needs 1 piece of easel paper; 1 piece of string approximately 12 inches long, 2 pieces of string each approximately 24 inches long; markers to decorate.
- **Flowers:** For each flower, you’ll need one 2 liter bottle, one 20 oz. soda bottle, 3-4 6-inch wooden dowels, 6 2-inch Styrofoam balls, as well as construction paper, tape, yellow paint and glitter. The number of flowers needed will depend on the number of students participating and the size of your space. If you plan to simplify the activity you will need a bucket or tub, paper, and yellow Styrofoam balls.
- **Honeycomb:** Seven (or more) 8-oz plastic drinking cups and cellophane tape. The number of honeycombs cells will vary depending on how many students are participating, how much “pollen” and “nectar” they’ll collect, and how much time you have to play the game.
- Turkey basters or water droppers (up to one for each student)

Background Information:

Both honeybees and native bees are important pollinators of many food crops. Honeybees were first brought to North America by European settlers in the 1600s and have since become naturalized across the country. Honeybees live in large colonies called hives and make honey. There are also over 4000 species of native bees in the U.S., most of which are solitary or live in small groups and don’t make honey.

In this activity, we’ll focus on the work of honeybees. Forager bees travel around to different flowering plants to collect pollen and nectar. As they brush up against the anthers (the male parts of the flower), pollen also gets stuck on their bodies. When the bees then travel to another flower, they may deposit some of the stuck pollen on to this new flower’s pistil (the female part of the flower), thereby pollinating it and beginning the process of seed development.



Bees collect pollen and nectar to nourish their young and themselves. Nectar is the main ingredient needed for honeybees to make honey. Bees have an ingenious two stomach system. Some of the nectar they consume goes into one stomach to nourish the bee, while some goes into its second “honey” stomach to be carried back to the hive. There they pass off the collected nectar to processor bees that place it in one of the honeycomb cells along with an enzyme that helps change it into honey.

Bees collect pollen in special sacs on their hind legs. Pollen is not used to make honey, but it is also stored in honeycomb cells so it can be used as an alternate food source to honey. Pollen provides the bees with protein, vitamins and minerals.

How do they find the pollen and nectar? Forager bees go out in search of good food sources. When they find one, they will return to the hive and perform a “waggle dance.” This dance communicates to the other bees important information such as the direction of the food source, how far away it is, and even the quality of the food. The angle at which the dancing bee moves indicates direction; a figure-eight dance indicates the food source is far away, and a vigorous shake speaks to the quality of the food. The honeybee’s waggle dance is the only known symbolic language that exists among species other than humans and primates.

Advanced Preparation:

A. To make each flower:

1. Cut the top off of a 2 liter bottle.
2. Cut construction paper into petal shapes and attach them with tape in ring around the edge of the bottle to make it look like a flower. (Use different colors and patterns of petals for each flower.)
3. In the center of the cut-off bottle place a 20 oz soda bottle filled with water to represent the pistil.
4. Push each Styrofoam ball securely on to a dowel. Holding the dowels (like a lollipop on a stick), paint the Styrofoam balls with yellow paint. While the paint is still wet, sprinkle balls with glitter.
5. Place the 6 ball-topped wooden dowels in the cut-off soda bottle between the edge of the bottle and the central 20-oz. soda bottle. These represent the flower’s stamens, with the dowel as the filament, the ball as the anther, and the glitter as the pollen.
6. If you want to simplify this activity, you can just have the students harvest pollen. For flowers, place buckets, tubs, or other containers decorated as flowers around your space. Fill the containers with glitter-coated Styrofoam balls to represent pollen. You can also simply paint the balls yellow and leave off the glitter.

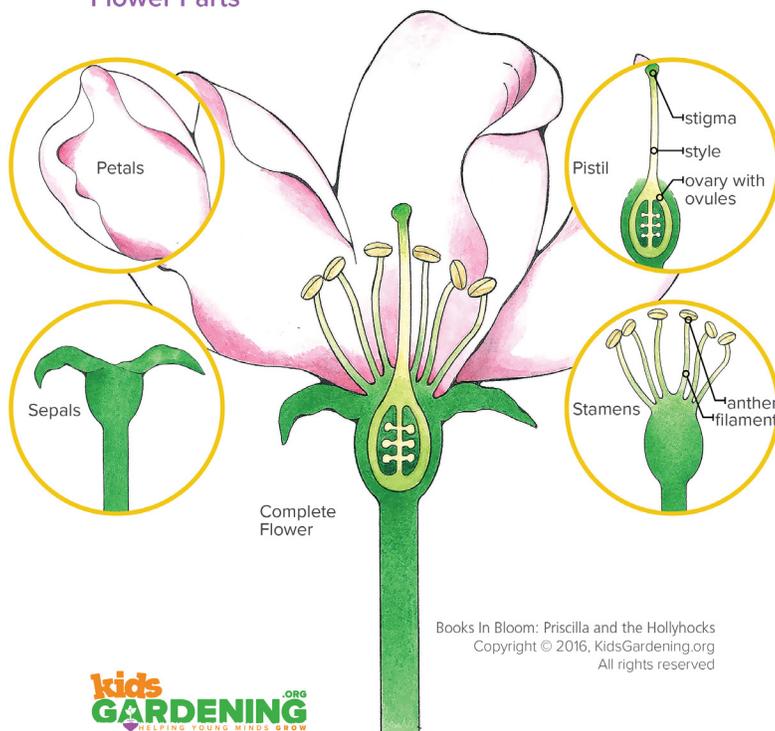
B. Place the “flowers” throughout your garden space.

C. Create a honeycomb by attaching 6-8 oz plastic drinking cups to each other with tape. Although the size of the honeycomb can vary, using at least 7 cups will provide enough to give it a ‘honeycomb’ look. Place the “honeycomb” at your home base or “hive” for your student bees.

Laying the Groundwork:

Ask students: *How do plants make seeds?* Hold up an example of a flower with clearly distinguishable parts (lilies are great for demonstration) or use the “flowers” you made as models. Flowers have **petals**. At the center of the petals you will find a **pistil** (the female part of the flower where the seeds develop) and one or more **stamens** (the male part of the flower that produces the pollen). The stamen consists of a stalk called a **filament** topped with an **anther** where the pollen is produced. In order for seeds to develop, pollen has to reach the top of the pistil (called the **stigma**) and then travel down the tube-like **style** to the **ovary** at its base. Not only does the pollen need to reach the pistil for pollination to occur; in many plants it needs to reach a pistil of a different flower. Sometimes it can be another flower on the same plant, but many times it needs to be a flower of the same kind on a different plant.

Flower Parts



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How do you think the pollen moves from the anthers at the top of the stamen to the top of the pistil? Do you think it hops over? Some plants rely on wind or water to move pollen from one flower to another. And some plants are self-pollinating, meaning the pollen in one flower pollinates the pistil of the same flower. But many plants need help from animal pollinators to move their pollen so they can produce their seeds. Pollinators get their name because the delivery of the pollen to the pistil is called pollination. Pollinators are most often insects, including bees, wasps, butterflies, flies, and beetles, but may also be hummingbirds and even bats for some plants!

Do you ever see bees in the garden? What are they doing there? Why do you think they are visiting the flowers?

Exploration:

1. Share the above background information about bees and their important role as pollinators with your students. Announce that you are going to dress up and act out the work of honeybees today.
2. First create the bee costumes. Make antenna by attaching pipe cleaners to headbands. Next let students decorate a piece of easel paper to serve as wings. After they finish coloring the paper, use the smaller piece of string to cinch the paper in the middle, dividing it into two wings. Next use the two longer pieces of string to make loops for the students' arms so they can wear their wings. At the cinched up section of the wings, attach each 24-inch length of string at its middle, so that two pairs of 12 inch strings hang down on each side. Holding the wings in place on the child's back, bring each pair of strings over and under the child's shoulder. Then tie the strings together in front to hold the wings securely in place.

As an addition, you can also use small paper bags and additional string to create "pollen sacs" to attach to their legs.

If you plan to have students collect "nectar" as well, pass out turkey basters or water droppers. These represent a bee's **proboscis**, its long, slender tongue that is used like a straw to suck up nectar from a flower.
3. If all students are starting the game at the same time, begin by sending one child out to look for a flower. Once they find one, tell them to come back to the group and create a waggle dance to show the others where to find it. Repeat so that each child gets the chance to be a scout. If students are starting the game at different times, you can still encourage them to work in pairs or groups and ask them to communicate with waggle dances before going out to look for the flowers.
4. Next send all the bees out to collect "nectar" and "pollen" and bring it back to the "honeycomb". To collect pollen, have the students remove the Styrofoam balls from the wooden dowels (or collect the balls from the containers, if you are using this option) and deposit them in designated cups in the "honeycomb." Instruct students to use the turkey basters or water droppers to suck up some "nectar" (water in the 20 oz. soda bottles) and carry it back and squirt it into designated cups in the honeycomb. (Designate specific cups for each – do not combine "pollen" and "nectar" in the same cup).

This can be a cooperative group game with all student "bees" working to fill one larger "honeycomb." Or students can be divided up into teams, each filling their own smaller honeycomb. The team that fills all the cells of their honeycomb first is the winner.

Making Connections:

Have students look at their hands and clothes. Do they see any of the glitter from the “pollen”? Examine the “pistils” from your “flowers.” Do you see any glitter inside of the 20-oz. soda bottles? (Hint – the glitter should be everywhere.) The glitter in bottles represents pollen that made it on to a stigma and pollinated the flower. Use this example to emphasize how the bees help with pollination even though that is not their true objective. Explain to them that flowers and bees have a mutually beneficial relationship because the flowers provide food for the bees and the bees help the flowers develop seeds and thus make new plants. People also benefit from this relationship by having fruits and honey to eat.

If time allows, also discuss the flower petals. Which flowers did you visit first? Were there certain colors or patterns that caught your eye in the garden? In nature, bees are attracted to yellow, blue, and purple flowers. Explain to kids that the reason flowers have developed interesting colors, patterns, shapes, and smells is to attract pollinators.

Branching Out:

Science - Research different crops that rely on pollinators for fruit production. Make a class list of everyone’s favorite fruits and vegetables and then find out how they are pollinated, and when applicable, list the pollinators responsible. Discuss how different our food supply would be if pollinators disappeared.

Environmental Studies - Discuss some of the challenges facing pollinator populations today. Research ways you can help protect pollinators and increase their numbers.

English - Create brochures about the importance of pollinators and what we can do to protect them to take home and share with family and friends.