



Let's Build a Model of Pollination

Learn about pollination and cross-pollination by making a model bee and flower, and seeing how pollen is spread.

Overview

 Grades 2-8

 60 min

Topics

Environmental Science

STEM





About the Activity

Learn about pollination and cross-pollination by making a model bee and flower, and seeing how pollen is spread.

Native bees are important pollinators that help plants make fruits and seeds. But how does it all work?

In this activity, you'll create models of a flower using paper materials and tape, and a "native bee" using a spoon and tape. Using your models, you will see how bees pollinate flowers to serve an important purpose in growing food like apples, cherries, tomatoes, watermelon, and cucumbers.

This activity is part of our 4-H At-Home Native Bees Series. See the rest of the activities [here](#).



Materials

- [Native Bee Handouts 1 & 2](#)
- 2 white paper plates
- 3 pieces of paper of different colors to make pollen and nectar (you can also print the grid for pollen and nectar size onto these pages)
- Clear tape
- Scissors
- 12 white paper cupcake liners
- 2 index cards (or 1 piece of construction paper, cut in half)
- [Flower photos for each flower model \(2 apple, 2 cherry, 2 squash\)](#)
- Plastic spoon
- Pen and marker



Activity Steps

Start by reading about the five different native bees in [Native Bee Handout](#), and then ask yourself how these bees are similar and different. List three things you learned.

Next, let's make a model of two flowers and a bee.

- 1 Start by decorating two paper plates so they look like a flower. The center is often yellow. You can add some detail to your flower models by coloring petals along the edges of each plate with crayons or magic markers. **Print the flower photos.** You will use these flower photos with your model in Steps 8-10.

DID YOU KNOW?

There are 4,000 different species of native bees in North America, but you might be surprised to learn that honey bees are not native to our continent. They were brought here from Europe, and made themselves right at home. Though honey bees may be good pollinators, other native bees are also really important for pollinating food crops like tomatoes, blueberries, almonds, and apples. Mason bees can even help apple and cherry orchards increase yield.



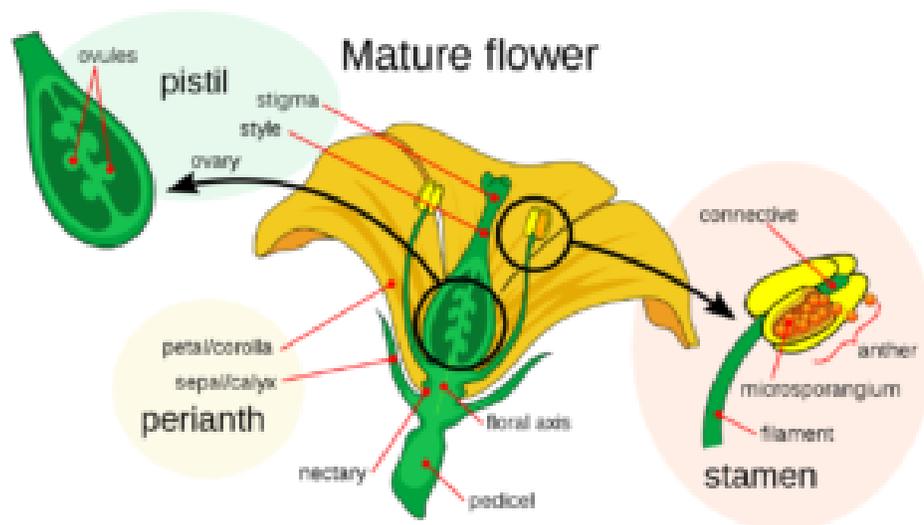
- 2 Write the word "nectar" on the inside edge of two of the paper cupcake liners, then attach one to the center of each paper plate using the clear tape.

**DID YOU KNOW?**

Nectar is food for the bees and is found in the center of the flower.

**3**

For a flower to be pollinated and make fruits and seeds, pollen must land on the stigma.



Create a stigma for each of your two flowers by rolling and taping one index card (or half sheet of construction paper) into a tube that fits in the paper cupcake liner leaving space around.



Tape one end of the tube to the center of the paper cupcake liner so that it stands upright. To close the top of the tube, press the sides together and tape the end. Then, place three loops of tape on the closed end. This "sticky" top represents the stigma.



- 4 Choose one color of paper to be nectar for your flowers. You can print the grid onto your colored paper. Use the grid lines or estimate the 5mm squared size to cut the paper into the pollen squares. Divide your squares evenly between the two nectar paper cupcake liners.



- 5 Next, make anthers to hold the pollen. Label each of the 10 remaining cup paper cupcake liners with the word "pollen," and using more tape, attach five around each of the nectar paper liners that are already placed on the center of each flower. The parts of your two flowers should still look identical at this point!

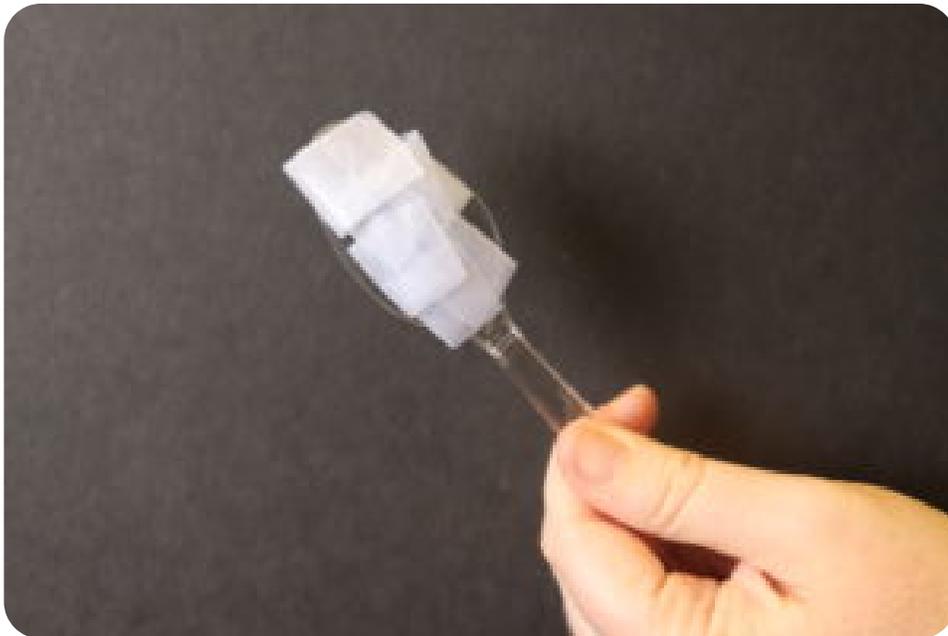
**DID YOU KNOW?**

Bees visit flowers to get nectar and pollen for food. When a bee visits a flower, it touches the anthers and the stigma as it tries to get the nectar.

- 6 This is where your two flowers begin to look different for the model. Choose two new colors of paper to represent pollen, and cut each into 7mm squares, or print the provided grid onto the colored paper. On one flower model, divide one color of pollen between the five anthers. Divide the second color of pollen between the five anthers for the other flower model.



- 7 Now, make your bee! Write "bee" on the spoon with a marker. Native bees have hairs on their body that pick up the pollen. Create the hairs by attaching loops of tape to cover the back of the spoon.



**DID YOU KNOW?**

Many native bees are solitary bees and do not live in a hive. Instead, the bees make their own nest for their young. Many native bees can't fly very far (100 meters, or a little longer than a football field) when looking for food, but bumble bees can fly up to 2 miles.

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Let's use the bee to show how native bees pollinate cherry flowers!

**DID YOU KNOW?**

Native bees make a pollen ball by mixing pollen and nectar. They put the ball into each put in the cavity, lay an egg, and seal the cavity with each of their offspring.



Place the photos of the cherry flowers next to each flower model you created. Take your bee spoon, and choose one of your flower models. Touch the sticky back of the spoon to the nectar in the center of the flower. Next touch the pollen in the anthers, and then touch the stigma.





Now visit your other flower doing the same motions of touching the nectar, pollen, and stigma. Bees visit many flowers before returning to their nests with the pollen and nectar they collected.



Look at your cherry flowers. Some varieties of cherry trees are self-pollinating. They can be pollinated

with pollen from the same tree or pollen from a different cherry tree. If you have pollen on the stigma, those flowers are pollinated and that flower will turn into cherry fruit!



Now look at your bee. How much pollen and nectar did you collect? Nectar is food for the bee. The bee also makes food for their young in the nest using pollen and nectar.

Once you have observed the results, you can remove the tape loops from the bee and the top of the flower models, and replace them with new, clean tape loops.

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Next, let's use the models to explore cross-pollination.



Some plants can only be pollinated when they receive pollen from a different plant of the same type. This is called cross-pollination. Many apple varieties need cross-pollination between two different trees to make apples.

Place the photos of the apple flowers next to each model.

Visit one apple flower and then the other apple flower, doing the same motions of the bee touching the nectar, pollen, and stigma at each flower model.

Once the bee has visited both models, look at your apple flowers. Apple flowers must be pollinated with pollen from a different apple tree. For your flower to be pollinated, a different color of pollen than the color on the anthers must be on the stigma. Do you have pollen that landed on the stigma of the two flowers? Did they get pollinated? Why or why not? If the flower is pollinated with the other color pollen, that flower will turn into apple fruit.

Now, look at your bee. How much pollen and nectar did you collect? You can count the number of each different color. Now, once again, remove the tape loops from the bee and the top of the flower models, and replace them with new, clean tape loops.

10

Let's explore plants that have male and female flowers.

DID YOU KNOW?

Some plants have different male and female flowers meaning that one flower has anthers with pollen and a different flower has the style with the stigma.



Many plants in the squash family, including pumpkins, zucchini, cucumbers, melons and gourds, have

separate male and female flowers.

To create a female flower model, remove the anthers (the five outer paper cupcake liners) from one flower model. The female flower photo has the picture of the pumpkin. Place the female flower photo next to the female flower model.

Now remove the style (paper tube) from the center of the other flower model. That flower is now the model of the male flower, which cannot make fruit. Place the male flower photo next to the male flower model.



Use your bee spoon to visit the flowers, start by collecting pollen and nectar from the male flower. Now visit the female flower. What happens when the bee visits the female flower? What can they collect? Did you have to visit both pumpkin flowers to get both pollen and nectar? Did pollen land on the stigma? Why or why not? If the female flower is pollinated, you will have a pumpkin!

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Native bees live for six weeks. Apple and cherry trees bloom for two weeks. Where do you think native bees get their food once the apple trees or cherry trees are done blooming? Place the prairie plant photo near your flower models. Prairie plants bloom throughout the growing season. It is important for native bees to have many flowers to gather nectar and pollen. In the next activity we will explore how adding habitat provides more food for native bees.



Test Your Knowledge

See how much you've learned about this theme

Question 1

How far can most native bees fly?

- a. 100 meters, or about the length of a football field
- b. 10 miles
- c. 1 mile
- d. A few feet at a time

Question 3

Why do bees visit flowers?

- a. To help flowers get pollinated
- b. To gather pollen and eat nectar
- c. To find a mate
- d. All of the above

Question 5

What happens to the flower after it is pollinated?

- a. All of the above
- b. It grows roots
- c. It grows larger
- d. It turns into fruits and seeds

Note: Answers can be found on the last page of the PDF

Question 2

How many native bee species are there in North America?

- a. 4,000
- b. 40
- c. 4
- d. 400

Question 4

Where does the pollen need to land for a flower to be pollinated?

- a. On the stem
- b. On the anther
- c. On the nectar
- d. On the stigma



Reflection Questions

Bonus questions to inspire wonder:

1. How are some of the native bees different from honey bees?
2. How do bees help flowers get pollinated?
3. Why are pollinators like bees especially important for plants that need cross-pollination or have separate male and female flowers?
4. Why is it important to have flowers blooming at all times during the spring, summer, and fall?
5. What is the difference between cross-pollination and self-pollination?



Investigate and Explore

Take what you've learned to the next level to learn more and explore the possibilities. Ready to learn more? You can get an incredible, close-up view of many native bees studied by the USGS Native Bee Inventory and Monitoring Lab on their website. What makes a bee a bee? Listen to this presentation by Dr. Joseph Wilson as he explains the difference between a bee, a wasp, and a fly. You might be surprised!





Career Connections

STEM Careers If you liked learning about how bees help to pollinate plants, you might enjoy a career in STEM. STEM careers are exciting and rewarding, and you can pursue a STEM-related career wherever you live, whether you're in a city, a rural community, or anywhere in between. Watch this video and learn what it takes to be a field sales representative from Wyatt Jones of Bayer Crop Science.



Test Your Knowledge answers

1) a. 100 meters, or about the length of a football field. 2) a. 4,000. 3) b. To gather pollen and eat nectar. 4) d. On the stigma. 5) d. It turns into fruits and seeds.

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