

MATERIALS

- Big pictures of honeybees (12)
- Honey to taste
- Spoons/sticks for tasting honey
- Life cycle of a honeybee paperweight
- Large piece of fabric/sheet
- Empty comb from hive (if available)
- All About Honeybees worksheet (one for each student +1)

PREPARATION

- Gather materials, print out worksheets
- Study up on honeybee societies; students are fascinated by how hives interact.
- This lesson works well with a black or white board handy, arrange for this before lesson

ACTIVITY

Part 1: All about Honeybees

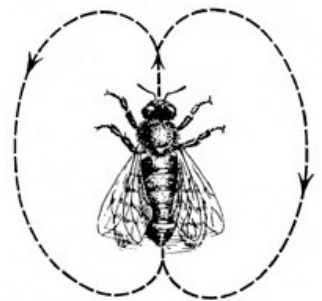
Show students the big honeybee pictures and the honeybee paperweight to introduce them to the life of a honeybee. Include information about the three types of honeybees, their lifecycle, and their role as pollinators.

Part 2: Growing Up as a Worker Bee

- Ask students to come together in a cluster in the classroom and tell them, “We are going to pretend we are honeybees growing in the hive”.
- First, have students crouch down to become bee eggs, each laid in an individual hexagonal honeycomb cell by the queen bee, now being fed royal jelly for 2-3 days by nurse worker bees. As you say this, tap each student on the head so they know they have been fed. Ask students to grow into larvae, slowly getting taller and taller until they are standing at full height,
- Now, they are capped with bee’s wax by worker bees so they can’t grow any bigger. Take the sheet/fabric and hold it over all the students’ heads to demonstrate this. Next, the larvae spin a cocoon – entering the pupal phase. In their pupa, bees form their “bee parts” – eyes, antennae, wings, stinger, etc.
- “After 21 days of growing, you are ready to emerge – chew through the wax covering on your cell,” (remove the fabric from above students) “and try out your new wings.” Encourage students to consider the different tasks of the worker bee - nurse, housekeeper, house builder, guard, and forager – as they fly back to their seats.

Part 3: Pollination Communication

- “Honeybees communicate the specific locations of good sources of pollen and nectar by dancing. One of their dance moves is called the ‘waggle dance’. To do the waggle dance, point your body in the direction of the field of flowers, wiggle, do a loop to the left, wiggle, do a loop to the right. The other foragers will then be able to locate the food source.”
- Try out the waggle dance a few times, pointing in different directions so students have to adjust the direction of their waggle dance. (“Now, imagine I found a field of flowers rich in nectar and pollen in the south!”) Ask them to communicate to each other, repeating the dance back silently to show they understood.



Optional activities for additional time

Have students complete the “All about Honeybees” worksheet.

Journal entry (see the “Evaluate” section on the next page).

ENGAGE

To channel everyone's energy toward the importance of honeybees in our current agricultural system, start class by asking, "What did you eat today?" After listing the whole ingredients in what students name (i.e. cereal – wheat), make a point by crossing out 1/3rd of the items listed. Tell students that there would be 1/3rd less food in the world, one meal a day less, without honeybees playing their role in pollination. Introduce the role of pollination in creating fruits and seeds – thanks honeybees!

OBJECTIVES

- Students will understand the lifecycle of the honeybee and their different roles in honeybee society (worker, drone, and queen bee).
- Students will understand the concept of pollination.
- Students will understand the role of pollinators in the garden and their necessity in our agricultural systems.

EXPLAIN

Three types of honeybee

Inside of the honeybee hive, there are three different kinds of bees: the **worker**, the **drone**, and the **queen**. The honeybee cannot survive as an individual – their complex societies depend upon all three types of bees working together. All worker bees are females, and do most of the work in the hive. They are the nurse bees, feeding and caring for baby bees, housekeepers, house builders, guards, and later in life, foragers for food. Drone bees are male, their job is to mate with queen bees from other hives on their once in a lifetime "mating flight". Queen bees are mother to all the bees in their hive, laying about 1500 eggs/day.

The life of a honeybee

After the queen bee lays a worker bee egg in the bottom of a hexagonal honeycomb, young worker nurse bees feed it royal jelly (a secretion from the heads of worker bees) for 2-3 days, until the egg hatches. As it grows into a larva as tall as its honeycomb cell, it is fed honey by worker bees. The larva is then capped with bees wax and builds a cocoon, wherein it develops into a bee. Upon hatching, the worker honeybee begins to care for young bees growing. The queen bee develops in a larger, special "queen cell" and is fed only royal jelly for the entire period of her growth.

Pollination and agriculture

Honeybees **pollinate** flowers, enabling them to reproduce and give higher yields of fruits, while looking for **nectar**, which they ferment, making **honey**, and **pollen**, which they consume as their source of protein. Other examples of pollinators are butterflies and the wind. Worker bees communicate to each other the location of good flowers for harvesting pollen and nectar by dancing. They convey information about the distance and direction of the food source using the changing position of the sun in the sky. Honeybees can produce more food than they need to survive, so if we harvest responsibly, we can be lucky enough to share in the bees' great invention – honey!

ADDITIONAL CONTENT INTEGRATION *(see previous page)*

Introduce students to beekeeping and the beekeeper, considering the role of humans in our agricultural system. Explain how beekeepers wield power over the hives they watch over, and can use this power for good, positive managements and stewardship, or negatively and manipulate the honeybees. Draft a list of "Responsibilities of the Farmer" toward the natural world (i.e. "The farmer has a responsibility to create a safe, friendly environment for honeybees and other beneficial insects").

ADDITIONAL MATERIALS

- Chart paper
- Marker

EVALUATE

Journal prompt: How can we attract bees and other pollinators to our school garden?