PCS eDventures!™
Experts in Hands-On STEM Education

Honey Bee STEAMventure

As one of nature's biggest workaholics, honey bees have provided humans with honey and wax for hundreds of years. But they're more than just sweet-treat making machines. Honey bees are actually incredibly social, cooperative insects! Honey bees also play an incredibly important role in the ecosystem of our planet. With their daily jobs, unique ways of communicating and can-do attitude, there is a lot going on in that hive. To help bring the secrets of honey bees to your learning environment, we've put together some stimulating STEM stingers to share with your students.

To get your student's buzzing about honey bees, propose these discussion questions:

- What do you know about honey bees?
- What do honey bees do?
- Why are honey bees important?

STEAM ENRICHMENT

HANDS-ON STEM EDUCATION

For over 30 years, PCS Edventures has inspired students to develop a passion for Science, Technology, Engineering and Mathematics (STEM), focusing our efforts on making learning and discovery a fun and interactive process for grades K-12.

- Classroom
- After-School
- Home Learning

The World of Honey Bees

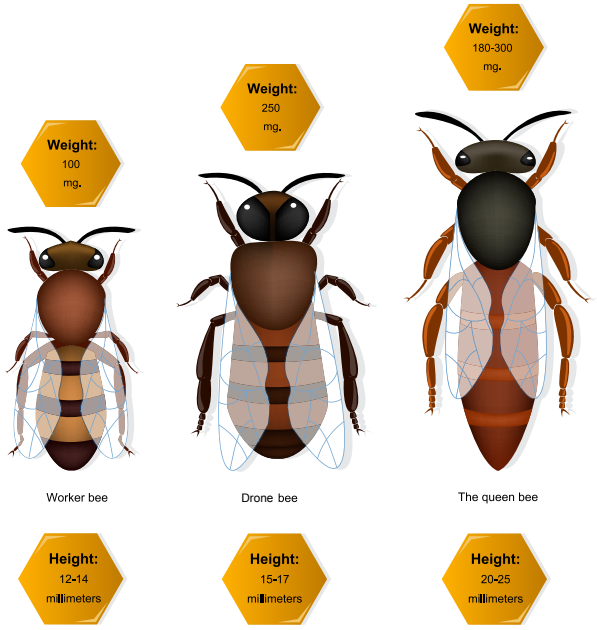
There are generally three types of honey bee: **Workers, Drones and the Queen.**

Worker Bees

These are the bees you're used to seeing flying around. All worker bees are female, and they spend their days foraging for food, building on their hive, cleaning up after the other bees and acting as personal air conditioners. Hives can get cramped and the air can get stagnant — that's why worker bees can be seen beating their wings while in the hive to help circulate air.

Drones

All male honey bees are drones, and their main job is to fertilize the queen. As arguably the laziest of all bees, drones don't produce wax, and they don't collect pollen or nectar. This means that to stay alive, they either eat the honey stored in the hive or they beg for food from the worker bees. While they don't help with the day-to-day upkeep of the hive or the production of honey, these bees still have the very important job of helping the queen expand the colony by fertilizing her eggs.

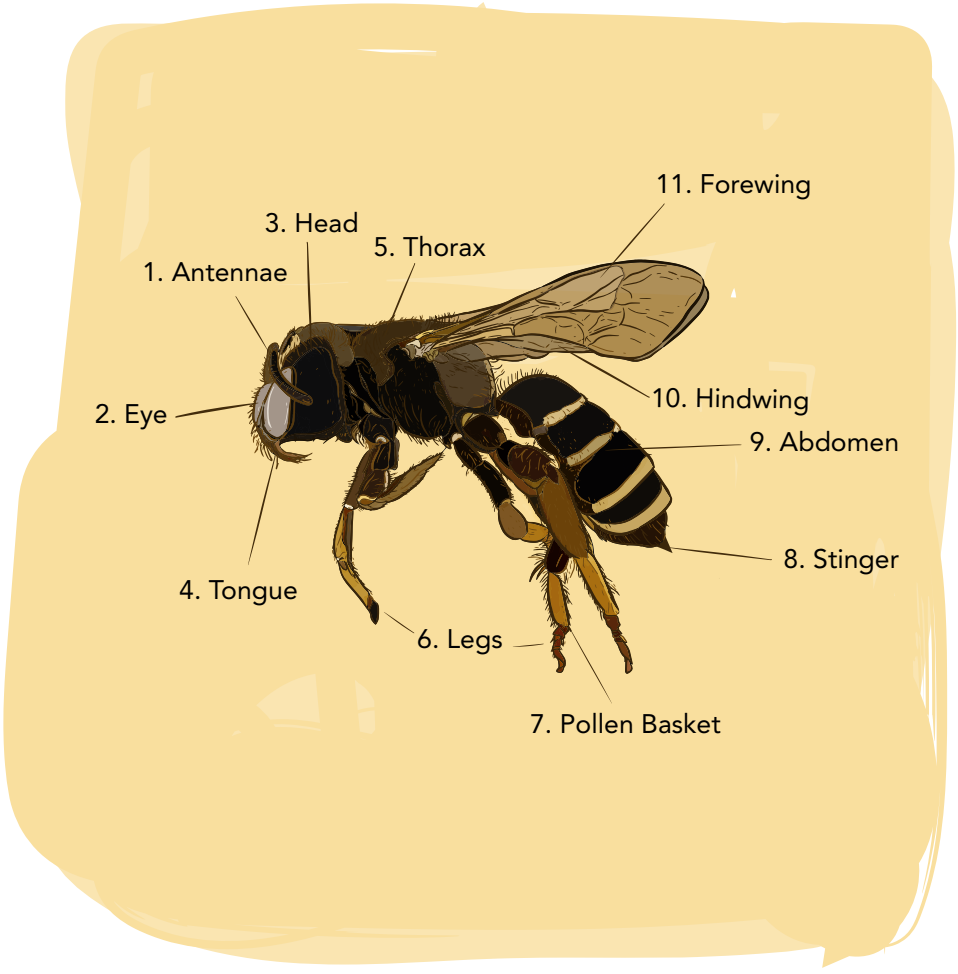


The Queen

The queen bee is the mother of the hive — she is the only bee who can produce the eggs needed to populate the hive. Just like the worker bees, her workday never stops. The Queen is always producing eggs. On her busiest days, she can lay up to 2,000 eggs. Queens can live for five years, but after her third year, her ability to lay eggs greatly diminishes. For the longevity of the hive, worker bees notice when a queen is starting to rear fewer bee babies and they will replace her with a new queen from the youngest available larvae — these new queens can be as young as 1 day old!

Honey Bee Anatomy

1. Antennae
2. Eye
3. Head
4. Tongue
5. Thorax
6. Legs
7. Pollen Basket
8. Stinger
9. Abdomen
10. Hindwing
11. Forewing



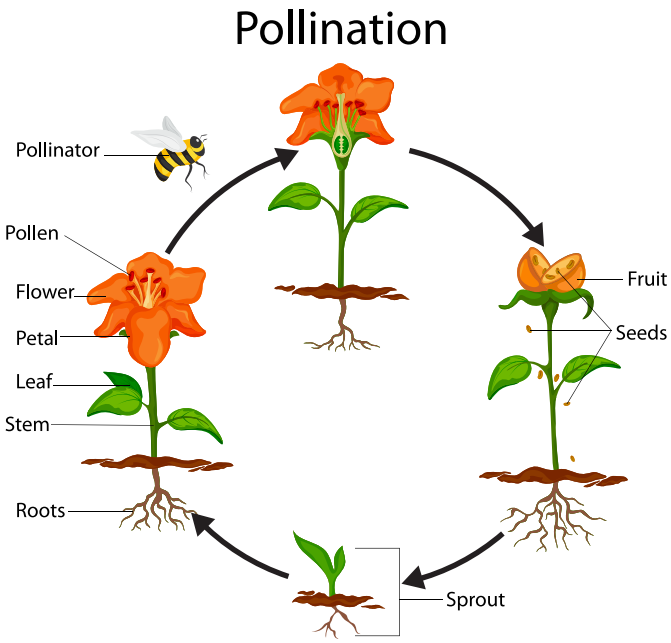
The Importance of Honey Bees

To understand why honey bees are so important to humans, we need to delve a little deeper into how they make honey. Just like with a cake or cookie, before honey bees start making their honey, they need to collect their ingredients. For natural honey, there are two main ingredients: nectar and a special bee enzyme. The bees produce the enzyme on their own, which means they only need to collect nectar for the honey-making process to begin.

So, where do bees get this nectar? From flowers, of course! That's why you always see worker bees buzzing around flowers, hard at work guzzling the sweet nectar. Once they've collected enough nectar, the bees return to the hive where they drop their enzymes and nectar into honeycombs. Then, the honey bees wait for the nectar mixture mature into honey. Like putting your cake into an oven, this mixture needs to reduce its water content — only, bees use evaporation, not heat, to reduce the mixture into the gooey consistency we love. From feeding their hive to human consumption, honey is a renewable, cruelty-free resource.

Now, while honey is a tasty treat, it's not the chief reason why honey bees are so critical to the world's ecosystem. Bees are important because of what happens when they collect nectar — they pollinate flowers!

When bees land on flowers to collect honey, they get covered in tiny pollen particles. These particles are an essential part of millions of plant's lifecycles. In order to reproduce, plants need to be pollinated. Without pollination, plants would only live for one season. To keep creating more and more plants and flowers every year, each plant needs to go through a pollination cycle. Just like how a queen bee needs drones to keep producing more and more eggs, many plants need another plant to pollinate — they need to exchange pollen in order to create more plants.



This is where honey bees come in. When a honey bee moves from flower to flower collecting nectar, it picks up and deposits pollen on different flowers. Without knowing it, each worker bee is responsible for the reproduction of thousands of plants!

For the humans of the world who eat these plants, this process is what makes bees invaluable. On a global scale, there are more honey bees than any other type of pollinating insect, which means honey bees are responsible for pollinating over 80% of the US's flowering crops. Every time you eat an apple, broccoli, nuts or cucumbers, just to name a few, you have honey bees to thank. Without honey bees, plants would stop reproducing and animals would run out of food — that means us, as humans, would have nothing to eat. Without bees, life on the planet Earth would all but die out. We need bees to survive!

Help Save the Bees

So, you know a little more about why bees are so important, but why does that matter? **Because honey bee populations are decreasing drastically.** Because of rampant pesticide use, mites and colony collapse disorder, bee populations have dropped across the planet. While each hive can hold over 60,000 bees, since the 1980s, the number of wild bees has continued to go down. Because of humans, honey bees are dying, which puts a massive stress on the world's ability to sustain human life. That means it's up to us to help protect nature's hardest workers! Here's how you can help save the bees.

1. **Let your lawn get a little wild!** Honey bees don't care about manicured lawns — they love your dandelions. Think about letting a portion of your lawn return to its roots. Bees love meadows, where flowers can grow. They aren't the biggest fans of fresh-cut grass. Help them by letting your lawn produce the natural plants and flowers that bees have been using for thousands of years.

2. **Say no to pesticides and herbicides.** These solutions can contain chemicals that are harmful to bees and other important insects. There are natural, bee-friendly alternatives out there that produce the results you want without endangering bee populations.

3. **Plant a bee-friendly garden.** Research herbs and flowers that attract bees, and create a garden in your yard full of those bee-friendly plants! It's best to pick flowers that are native to your area. You can also place a shallow container full of water in your gardens or yards for a bee pit-stop!

4. **Build bee condos.** With the exception of honey bees, most bees live by themselves. To learn how to create a bee condo, flip to the activity on the next page!

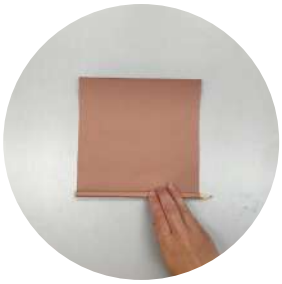
Bee Condo Build

While honey bees live in one big house, most other bee species live solitary lives. To help make their busy lives easier, try creating a bee condo for them to live in year round!

MATERIALS

- **Construction paper**
- **Milk carton (or other waterproof container)**
- **Duct tape**
- **Scotch tape**
- **Scissors**
- **Pencils or pens**

Start by cutting sheets of construction paper to the length of your milk carton.



Roll the construction paper around a pen or pencil, creating tubes.

Tape or glue the tubes together.

Repeat until you have enough tubes to fill the carton.

Cut the top off of your carton.

Fill your carton with the paper tubes. You'll need to create a tight seal within the carton by using scissors or another object to tap the last tube into place.

Use duct tape to surround the carton for an added layer of environmental protection.

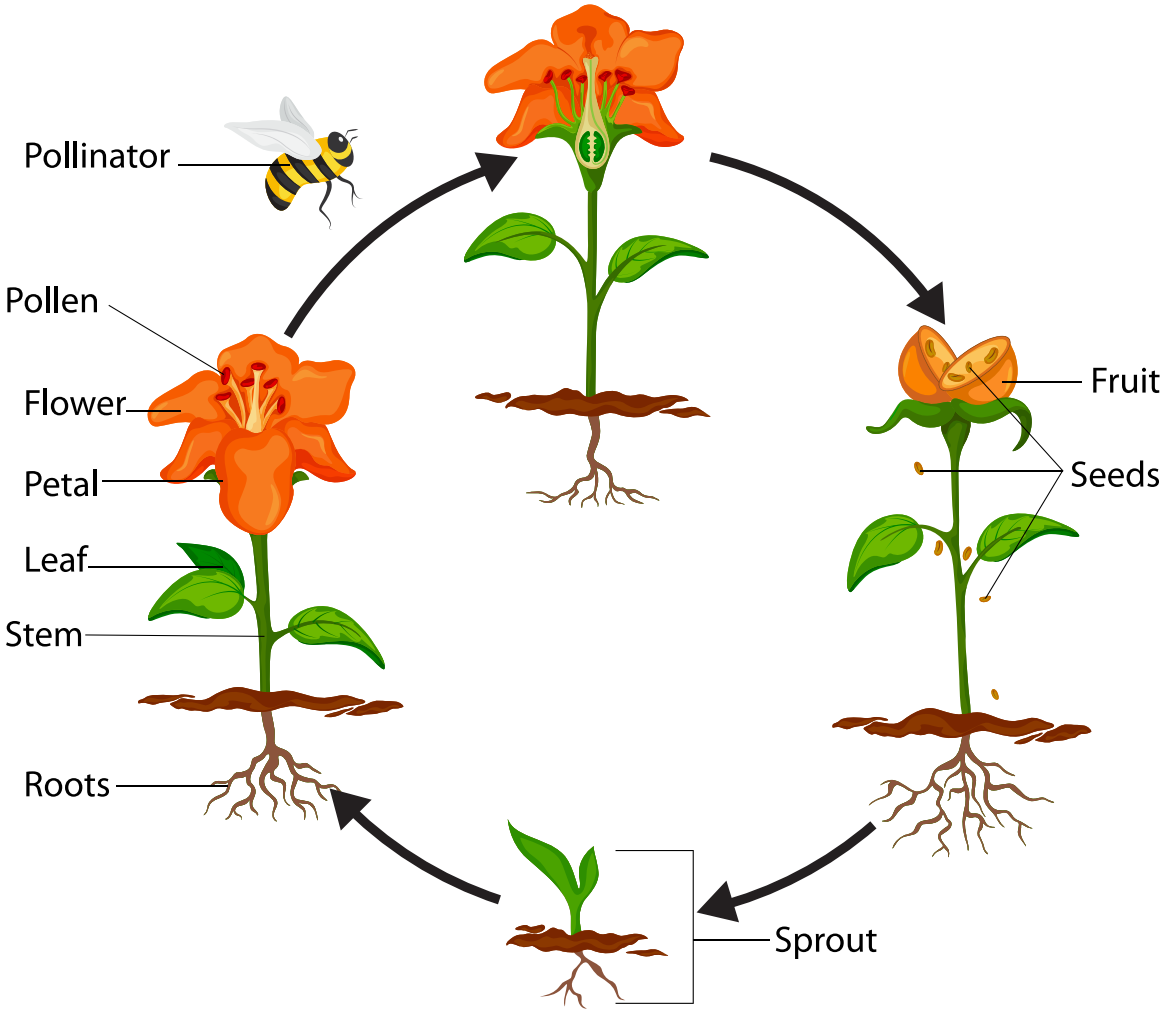
Place the condo near flowers and off the ground. We recommend using zip ties to fix the condo to a tree, stump or under a bush.

Honey Bee Anatomy Activity

Can you name each part of a Honey Bee?

1. Antennae
2. Eye
3. Head
4. Tongue
5. Thorax
6. Legs
7. Pollen Basket
8. Stinger
9. Abdomen
10. Hindwing
11. Forewing

Pollination



References:

Boland, M. (2019, June 20). The importance of honeybees. Retrieved from https://www.mnn.com/earth-matters/animals/stories/the-importance-of-honeybees

National Geographic. (2018, September 21). Honeybee. Retrieved from https://www.nationalgeographic.com/animals/invertebrates/h/honeybee/

The Green House. (2019). Why bees are important. Retrieved from https://www.sustainweb.org/foodfacts/bees_are_important/

University of Arkansas Cooperative Extension Service. (2019). About Honey Bees: Types, races, and anatomy of honey bees. Retrieved from https://www.uaex.edu/farm-ranch/special-programs/beekeeping/about-honey-bees.aspx

For more information, visit: https://edventures.com/collections
or contact a STEM Program Specialist at (800) 429-3110

PCS edventures!™

Experts in Hands-On STEM Education

Brick LAB | STEAM ENRICHMENT | DISCOVER | DRONES