



Essential Question:

HOW DO HONEY BEES SUPPORT COLONY GROWTH?

LEARNING OBJECTIVES

- Explain how different organisms use their unique adaptations to meet their needs.

RESOURCES

- Anticipation Guide
- Video, *The Swarm*
- Readings, *Preparing to Swarm, Swarming, After the Swarm*
- Video, *Interview with a Beekeeper: Swarm!*
- Assessment, *Trouble with the Swarm Scenarios*
- Journals, Paper, or Digital

MATERIALS

- Notebooks
- Writing Utensils

OVERVIEW OF LESSON / BACKGROUND

The health and growth of the honey bee population is largely dependent on the queens. With only one queen per hive, a huge number of worker bees and smaller number of drones depend on this leader for the survival of the entire community. The queen's main role is laying eggs—up to 2,000 of them in one day. She is also responsible for splitting the community by flying off with a select group of bees, leaving a new queen behind with the hive.

New queen bees are created when eggs are laid in queen cups, different from the cells in which other bees are laid, and worker bees tending the larvae feed them a diet rich in royal jelly. Because multiple queen bees may be cultivated at once, an emerging new queen will attempt to kill her rivals and take over the hive. After a queen completes her work of laying eggs in the queen cups, she then leaves the hive with approximately 60% of the worker bees to start a new hive elsewhere. This is known as a swarm and divides the hive and encourages growth of the population.

Bees also rely on an incredibly complex social system and intense cooperation. The worker bees perform a number of jobs during their lifetimes, changing roles on a particular schedule according to age and sometimes interrupted based on the needs of the community. The drones play a very specific but singular role that allows the queen to continue to fertilize her thousands of eggs over time. This lesson addresses all the bees' roles in the community and drives towards an understanding of the swarm.



LESSON ACTIVITY

INTRODUCTION

ANTICIPATION GUIDE & VIDEO

1. Have students complete the short **Anticipation Guide** that accompanies this lesson. You may also choose to complete this activity in the form of a class discussion, but it may be interesting to the students to note their original answers and track their learning throughout the lesson.
2. Show **The Swarm** video once through without stopping. Then, show the video again, stopping every few seconds to talk about the action. Ask and answer questions. (Note: The video shows a honey bee swarm.)
3. Explain to students that there is some mystery surrounding the honey bee swarm, but there are some things we know for sure. This lesson will explain what is known but also open up the mysteries.



READING

1. Post the three sections of the reading at stations around the room. If you are using printed resources, ensure that the font is large enough to read from a few feet away. If you are using digital pages and have the technology, place a few devices at each station.
Station 1: Preparing to Swarm **Station 2:** Swarming **Station 3:** After the Swarm
2. Tell students that they must travel to the readings together, as a whole group. Review the stations with the students and tell them to travel to the stations in order: Preparing to Swarm, Swarming, After the Swarm.
3. Emphasize the following directions:
 - a. Everyone reads at a different pace and that's fine (some people read quickly and then process, some process as they read, etc.); make sure that your classroom is a safe space for a variety of reading speeds.
 - b. Classmates will need to cooperate to make sure everyone can see the text, has a turn at the front, etc.
 - c. When students arrive at the stations, they should be silent. They can only move to the next station when everyone is ready, but they cannot talk to establish that readiness. The silence should only end when they've started to move to the next station.
 - d. Tell the students to bring their journals (or paper) and writing utensils. Before the first station and in between stations, they should discuss what they know or have learned with one or two other students and come up with a question about the next station. Have them take notes and write their questions down in their journals in between stations.
 - e. When everyone is finished with the third reading, they should all return to their seats while chatting about what they learned in the last reading.
4. Have students complete the "swarm-style" reading activity.



WRITING

1. Lead a class discussion about the experience of reading as a swarm. Ask the students to consider and respond to the following questions:
 - a. Was it challenging to do something as a group when everyone has their own speed and you needed to change positions and make decisions in silence?
 - b. What didn't work?
 - c. What ideas and behaviors helped the class succeed?
 - d. How is working individually different than working as a group?
2. Review the purpose and structure of a topic sentence and supporting details. Lead students through a pre-write for the prompt below. Provide hints for supporting details: group behavior, timing, movement, etc.

Write a paragraph explaining how a honey bee swarm is similar to or different from a school cafeteria at lunchtime.



VIDEO

Have the students watch the video ***Interview with a Beekeeper: Swarm!*** (Note: this activity does not encourage or require the taking of notes or assessment, per se. The students should just watch carefully and be invited to discuss their reactions.)



GAME

1. Play Group Motion to give your students a sense of moving as a group without talking.
 - a. Have students gather into a circle. The movements will travel around the circle, student by student.
 - b. Have one student begin with a small movement (and sound, if he or she likes).
 - c. Have each student, in progression, exaggerate the motion and sound a tiny bit. The exaggeration should be so small that it might not even be perceptible.
 - d. Allow the movement and sound to grow as it moves around the circle and let the students see how it winds up.
 - e. Run several rounds of the game to allow multiple students to start and to demonstrate how different movements become exaggerated.
2. Debrief the game by talking about how communication moves throughout a group and what members of the group need to do to participate in the action.

ASSESSMENT

TROUBLE WITH THE SWARM SCENARIOS: Have students imagine the results of the following scenarios and discuss their ideas or write about them in their journals. (This assessment favors well-reasoned and informed answers over exacting answers.)

1. The queen refuses to leave the hive when a swarm is necessary for hive health.
2. Only drones leave with the queen when the swarm begins.
3. All the scout bees die as soon as the swarm takes off.
4. None of the larvae left in the hive are fed royal jelly.

DEBRIEF OF ANTICIPATION GUIDES: Have students return to their **Anticipation Guides** and see if their answers have changed and/or their questions have been answered.

EXIT CARD

Ask the students to complete a quick-write poem titled *Swarm* on a piece of paper or index card. Do not impose any requirements on the poem but encourage students to use descriptive words and some of the five senses in the poem.

DIFFERENTIATION

SUPPORTS

- Circulate around the room during the **Anticipation Guide** portion and discuss background knowledge and ideas with students who need support.
- Provide **Trouble with the Swarm Scenarios** with clues attached (e.g., “Drones do nothing but eat and mate,” or “Scout bees find the new space for a hive.”)

EXTENSIONS

- Provide students with additional readings about swarms.
- Discuss places that may be unsuitable for a hive.
- Have students think and write about the idea that bees behave entirely on behalf of the colony and its health and survival, giving up their own individual interests.

VIRGINIA STANDARDS OF LEARNING (SOL)

SCIENCE

- 4.5: The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem.
- Organisms also have behavioral adaptations, or certain types of activities they perform, which help them meet a life need.
 - During its life cycle, an organism's role in the community—its niche—may change. For example, what an animal eats, what eats it, and other relationships will change.

READING

- 4.6: The student will read and demonstrate comprehension of nonfiction texts.
- a) Formulate questions that might be answered in the selection.
 - b) Identify the main idea.

WRITING

- 4.7: The student will write cohesively for a variety of purposes.
- a) Focus on one aspect of a topic.
 - b) Write a clear topic sentence focusing on the main idea.
 - c) Include supporting details that elaborate the main idea.

RESOURCE ANTICIPATION GUIDE



You are about to learn about honey bee swarms. Before you begin the lesson...

COMPLETE THESE STATEMENTS

1. If I were to see a swarm of bees on a branch, I would think

2. Bees that are swarming need _____

3. Bees that are swarming are very dangerous because they are angry. **TRUE** **FALSE**

AND ASK SOME QUESTIONS

1. One question I have about honey bee swarms is:

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2. Another question I have about honey bee swarms is:

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AFTER THE LESSON

Check your answers to the first three questions and see if you can answer the questions you created.

At some point, a queen will leave her hive with about half the bees from the colony and search for a place to build a new hive. As she is preparing to leave, she lays eggs in special cups built to hold queen bee larvae. Worker bees begin feeding royal jelly to those larvae to develop new queens. Eventually, one new queen will emerge from these larvae to reign over the hive. Meanwhile, the old queen and thousands of bees fly away from the hive and move together in a swarm to begin searching for another place to settle.

No one is sure exactly how a group of bees decide to swarm. Maybe the hive gets too crowded as bee larvae are born and grow. Maybe the queen has done a great job laying eggs and there are not enough empty cells for her to fill. Maybe the bees have made so much honey and the queen has laid so many eggs that the bees working to construct more cells can't keep up. Whatever the cause—and maybe there is more than one—at some point, the swarm happens.

RESOURCE SWARMING



When a swarm happens, a large moving cloud of bees can be seen flying across fields and streams. The sight can be alarming!

After the bees have left their hive, they need to find a place to wait while the scout bees look for their next home. When the scout bees set out to check out the local real estate, the rest of the swarming bees may rest together on a branch or under an eave.

The queen is protected by her colony and the worker bees take a sort of break. During this phase, the bees are docile. They settle down and wait for the signal to move.

When the scouts return with a good location, the bees move together to their new home. The builders get to work building out the hexagonal cells of the hive and the foraging bees take up their collections of nectar and pollen. The workers begin tending to the queen again. They feed her and she begins laying eggs again.

The new hive grows and, if it stays healthy, will split again when the time is right. If a beekeeper finds a swarm—on a branch, for example— in between hives, she can sweep the whole group of bees into a box and provide a new home for them.

At Sweet Virginia, we love to get calls that a hive is swarming. If you ever see a swarm, leave it alone, don't spray anything on it, and be sure to call your local beekeeper for help!