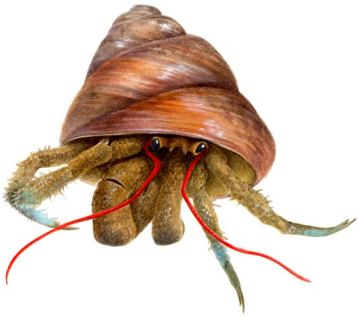
Crabs: Claws and Shells



Topics
Crabs, Adaptations

Grades
PreK-2

Site
Indoors

Duration
90 minutes, in three parts

Materials
- **Crab Cards**
- Clay or foil
- Pipe cleaners
- Egg carton sections, small boxes, jars, lids, food cups, yogurt containers or film canisters for shells
- Salad tongs, chopsticks, clothespins, spoons or scoops
- Miscellaneous small objects like marbles, paper, clips, pennies, juice caps, string, buttons, paper scraps, rice, beans

Vocabulary
adaptations, claws, exoskeleton, molt

Next Generation

Practices

Developing and using models

Core Ideas

LS1.A Structure and function

Crosscutting Concepts

Structure and function

Performance Expectations

See page 5

Focus Question

What behaviors and body parts do crabs have to help them survive?

Overview

Students will learn about crabs by using crab cards, constructing a hermit crab model and experimenting with household utensils to see how different kinds of crabs eat and protect themselves.

Objectives

Students will be able to:

- Identify major body parts of crabs that help them survive.
- Describe two structural and behavioral adaptations crabs use for feeding and protection.
- Compare pictures of three kinds of crabs and infer the feeding behaviors of each.

Background

What makes a crab a crab? Ten legs, an exoskeleton and claws are some of the more observable characteristics. There are almost 9,000 species of crabs and they come in all shapes and sizes. Spider crabs can grow as large as 12 feet from claw to claw. Pea crabs never grow larger than one-half inch. A few crabs are terrestrial but most are aquatic. Many marine species can be found at the rocky shore.

Crabs have **adaptations** to help them survive. One of these adaptations is an **exoskeleton** which is a hard, rigid covering that protects the soft internal organs of the animal. The exoskeleton is made of a protein called chitin and calcium carbonate. It is often made of separate plates connected by a thin membrane which creates "joints" and allows a crab to move more easily. The exoskeleton doesn't grow so in order for the crab to get bigger, it must **molt**. This means a crab grows a new soft exoskeleton inside the existing one and then sheds the outer one. The outer exoskeleton splits along the back and the crab backs out. While waiting for the new exoskeleton to harden, the crab is very vulnerable and hides from predators.

VOCABULARY

Adaptations: body parts and behaviors that help an animal survive

Claws: pincher-like appendages on the first pair of crabs' legs

Exoskeleton: a hard, rigid covering that protects the soft internal organs of a crab

Molt: shedding existing exoskeleton so the animal can grow larger

ELL TIPS

Hands-on activities are a great way to introduce new concepts. Using manipulatives to build a concrete example helps English Language Learners and all students, learn new vocabulary.

A hermit crab is different from most crabs. It has an exoskeleton but also borrows a shell to protect its soft abdomen. It doesn't produce its own shell. Its larvae are free swimming but once they get larger, they settle and find an empty snail shell to move into. They have two small back legs that hold onto their found shell. (A shell is different from an exoskeleton in that it does grow throughout an animal's lifetime and the animal cannot survive separate from its shell.) Hermit crabs molt as they grow and have to find larger shells that fit their expanded body size.

Crabs also have enlarged **claws**, or pincers, on their first pair of legs. These are used for protection, communication, excavating burrows, attracting mates and gathering food. Many crabs are scavengers and eat dead plants and animals.

Belonging to the subphylum Crustacea, crabs have well-developed brains. They have sensory organs to find food, stay away from danger and find a mate. The head has compound eyes. Crabs are either male or female. The fertilized eggs are attached to the female's abdominal appendages. The female broods the eggs on her body until they hatch and become free-swimming larvae. The larvae go through several molts until they enter a more crab-like stage when they can swim and crawl along the bottom. They molt one more time and become juvenile crabs.

Teacher Preparation

1. Find books about crabs (see "Resources" on page 4 for ideas) and print one set of **Crab Cards** per group of students.

2. Collect enough pipe cleaners and foil or clay for each student to make a hermit crab body and enough containers (e.g., egg carton sections, small boxes, jars, lids, yogurt containers, 35mm film canisters, food cups, etc.) for each hermit crab body to have a shell.

3. Gather the materials for students to use as crab claws (utensils such as salad tongs, chopsticks, spoons, ice cream scoops) and crab food (small objects such as marbles, paper clips, pennies, juice caps, strings, buttons, paper scraps, rice, beans). Decide if you will have one set of claws and food per group or just one set for the entire class.

Procedure

Part One: Crab Explorations

1. **INTRODUCE THE FOCUS QUESTION TO THE CLASS.**
   Share the question: *What behaviors and body parts do crabs have to help them survive?* You may write it up on the whiteboard or have students add it to their science notebook. Give students time to write their initial thoughts down or discuss with a partner. Depending on their prior knowledge, you may need to spend some time exploring the concepts of crabs and adaptations first.

2. **INTRODUCE CRABS OR REVIEW PRIOR KNOWLEDGE ABOUT CRABS.**
   Discuss where students have seen crabs before. If possible, go see some crabs at an aquarium or visit a local tide pool. Go to www.montereybayaquarium.org and watch a video of a crab and sing "Tide Pool Heroes" (track 11) on the *Splash Zone* CD.

3. **STUDENTS MAKE OBSERVATIONS ABOUT THE BODY SHAPE OF CRABS.**
Pass out one set of **Crab Cards** per group. Have students look at the crab illustrations. What do students notice about the crabs? How many legs do they see? *(A crab has 10 legs. The claws are on a crab's front legs.)* How are the crabs the same? *(exoskeletons, claws, ten legs)* How are they different? *(body shape, size of claws, porcelain crabs have longer antennae, hermit crabs have an exoskeleton and a shell)* Depending on students' knowledge, you may need to define "exoskeleton."

Part Two: Construct a Hermit Crab Model

4. **AS A CLASS, DISCUSS HOW CRABS PROTECT THEMSELVES.**
Brainstorm the general characteristics of a crab with the class. You may make a list on the board. *(10 legs, exoskeleton, claws)* Ask students how they think a crab protects itself. (*hard exoskeleton, claws*) Ask the class what else a hermit crab has that may help with protection. *(shell)* This may be a good opportunity to discuss the difference between an exoskeleton and shell. Make sure the class understands that hermit crabs have an exoskeleton and borrow a shell.

5. **STUDENTS CONSTRUCT A HERMIT CRAB MODEL BASED ON THEIR OBSERVATIONS.**
Challenge students to create a hermit crab body shape using clay or foil and pipe cleaners. Students can use the hermit crab **Crab Card** for reference. Be sure they include details like a soft abdomen, legs, claws and antennae.

6. **STUDENTS EXAMINE DIFFERENT "SHELLS" AND PREDICT WHICH WILL BEST FIT THEIR HERMIT CRABS.**
Now tell students they need to help their hermit crab protect its soft abdomen by finding it a shell. Provide different small containers (egg carton sections, small boxes, jars, lids, yogurt containers, 35mm film canisters, food cups, etc.) for students to use as shells for their hermit crabs. Give time for students to sort through containers and predict which will fit their model hermit crab. (You may challenge students to line containers up from smallest to largest, group by color or type or other sorting and grouping activities to help focus their observations.)

7. **STUDENTS CHOOSE A SHELL FOR THE HERMIT CRAB MODEL AND DISCUSS THE BENEFITS OF A SHELL.**
Let students try the various "shells" on their model hermit crabs. Have students choose a shell and attach it to their model. You may create a class graph of chosen containers to show the most popular container type or size. Review the benefits of a shell. Discussion questions may include: *Why do hermit crabs have shells when other crabs don't? What does a hermit crab use its shell for*?

Part Three: Experiment with Different Kinds of Crab Claws

8. **AS A CLASS, DISCUSS HOW A CRAB USES ITS CLAWS.**
Ask students why they think a crab has claws. *(protection and feeding)* Have students look at the crabs' claws on the **Crab Cards**. *Do all crab claws look alike? What are similarities? What are differences*? Tell students that claws tell a lot about how crabs eat. Shore crabs use their claws to scrape, porcelain crabs scoop and hermit crabs grasp. With your hands, show how you would scrape, scoop and grasp. Have students act out finding food with the different claws.

CONSERVATION TIPS

Hermit crabs don't create their own shells. They find (or steal) old ones. When visiting a shoreline, ask students not to collect shells so shells will be available for animals who may choose to make them their home.

THE MISSION OF THE MONTEREY BAY AQUARIUM IS TO INSPIRE CONSERVATION OF THE OCEANS.

9. **STUDENTS EXPLORE CRAB FEEDING STRATEGIES BY EXPERIMENTING WITH HOUSEHOLD UTENSILS.**
   Show students an assortment of crab claws (clothespins, chopsticks and salad tongs for a grasping hermit crab, small spoons for a scraping shore crab, ice cream scoop and large spoons for a scooping porcelain crab) and crab food (small objects such as marbles, paper clips, pennies, juice caps, strings, buttons, paper scraps, rice, beans). Have them predict which tools will be good for grasping, scraping and scooping. Then experiment to see which ones work the best to pick up the small objects.

10. **REVIEW HOW A CRAB PROTECTS ITSELF AND FINDS FOOD IN ITS HABITAT.**
    Discussion questions may include: *How does a crab protect itself? Why do hermit crabs have shells? What is the most interesting thing you learned about crabs? Do you think it's good that there are lots of different kinds of crabs? Why? Why not? Knowing what you know now about how a hermit crab borrows a shell for its home, do you think people should still collect shells from the beach?*

11. **RETURN TO THE FOCUS QUESTION.**
    Now that students have constructed a hermit crab model and experimented with different types of crab claws, have them revisit the question: *What behaviors and body parts do crabs have to help them survive?* Students may think on their own or discuss with a partner. Then in their science notebook, you may have them draw a line of learning and under it add to their original thoughts about the question.

Extensions

- Challenge older students to compare and contrast the crabs in Part One or the crab claws in Part Three using a Box & T-Chart (page 6).
- Investigate eating behaviors of other animals. Which ones scrape? Grasp? Scoop?
- Read *A House for Hermit Crab* by Eric Carle. Discuss why a hermit crab needs a new home.

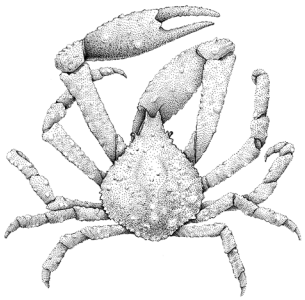
Resources

Website

Monterey Bay Aquarium. www.montereybayaquarium.org
Find information about all sorts of animals, including crabs.

Books and Music

A House for Hermit Crab. Carle, Eric. Simon and Schuster, 1987.
Crabs. Schaefer, Lola M. Pebble Books, 1999.
Grasper. Lewis, Paul Owen. Beyond Words Publishing, 1993.
Is This a House for Hermit Crab? McDonald, Megan. Orchard Books, 1990.

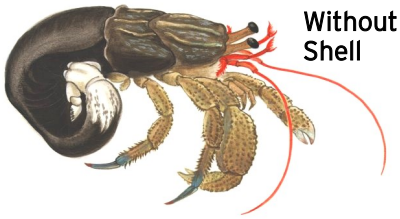


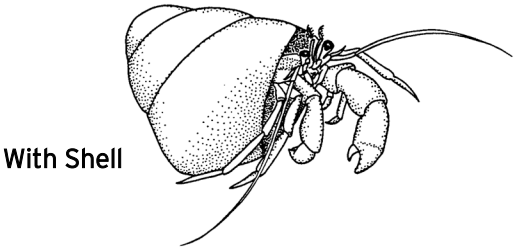
Standards

Next Generation Science Standards www.nextgenscience.org

Performance Expectation
Relates to 1-LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow and meet their needs

Crab Cards

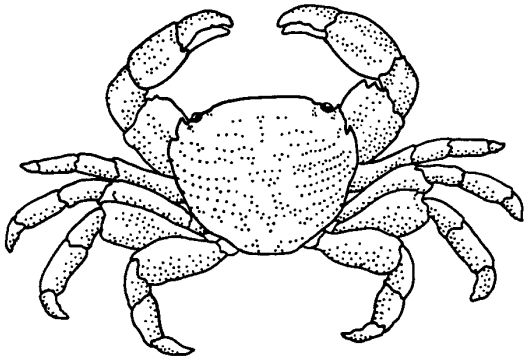




Hermit crab

Size: to 1 in. (2.5 cm)

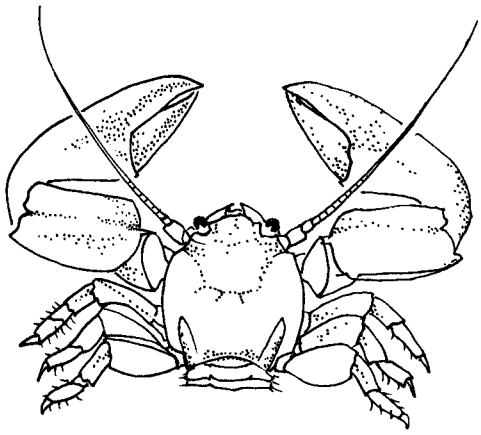
A hermit crab lives in an empty snail shell. The shell protects its soft body. When the hermit crab grows too big to fit its shell, it moves into a new one. It may take an empty shell or steal one from another hermit crab.



Shore crab

Size: to 2 in. (5 cm)

This crab's flat body lets it hide in cracks in the rocks. Sometimes it's in the water, sometimes it isn't. The crab eats small plants that it scrapes off with bowl-like claws on its legs.



Porcelain crab

Size: to 1 in. (2.5 cm)

A crab uses strong claws to gather food and protect itself. If attacked, a porcelain crab attacks back with its claws. During battle it can detach a claw, which keeps pinching while the crab gets away.

Box & T-Chart

Name:

Similarities

Differences