Animal Armor

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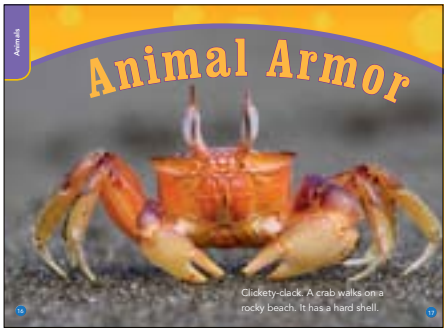

pages 16-17

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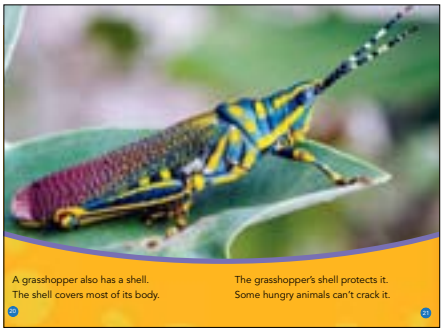

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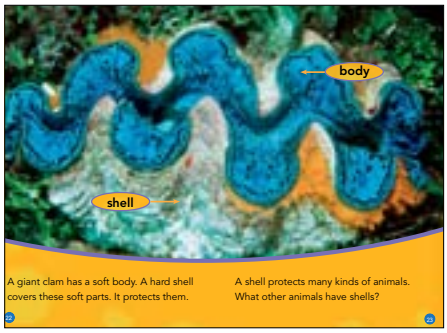


pages 22-23

poster

Animal Armor: Overview

Summary

- Some animals, called invertebrates, have soft bodies without bones.
- Some invertebrates have a hard external covering called an exoskeleton that protects their soft bodies.
- An exoskeleton keeps an animal safe.

Learning Objectives

Students will:

- understand what an exoskeleton is;
- recognize that an exoskeleton provides protection for soft-bodied animals;
- learn strategies which can help them read difficult words.

Materials Needed

- a photo of a suit of armor
- *exo* and *skeleton* written on two strips of paper
- index cards
- a ball of yarn
- beads or hollow pasta such as rigatoni
- construction paper (1 piece per student)
- glue
- a piece of chart paper (optional)
- an assortment of supplies such as egg cartons, cardboard tubes, aluminum foil, wax paper, or plastic wrap
- cotton balls (1 per student)
- "Words to Explore" and "Amazing Armor" posters

Resources

- Learn more about exoskeletons: *http://www.britannica.com/EBchecked/topic/198292/exoskeleton*
- Watch a grasshopper shed its exoskeleton: *http://kids.britannica.com/comptons/art-18448/A-grasshopper-molts-shedding-its-outer-layer-and-leaving-a*

Animal Armor: Background

- All animals are classified according to common characteristics, or traits. The two largest groups of animals are vertebrates and invertebrates. Invertebrates are animals that do not have a backbone.
- Some invertebrates have a hard outer skeleton called an exoskeleton.
- Exoskeletons work like a suit of armor. They can cover an animal's entire body and provide support and protection. They also may work with the animal's muscle system to help the animal move.
- Not all exoskeletons are the same.
  - ► An exoskeleton can be a single large piece, like a snail's shell.
  - ► An exoskeleton can be two or more hard pieces held together by a flexible tissue. A clam has this type of exoskeleton.
  - ► An exoskeleton can be divided into two or more pieces, which allows the animal to move. Crustaceans, insects, and spiders have exoskeletons like this.
- The animals featured in this article are the ghost crab, hinge-beak shrimp, painted grasshopper, and giant clam. Each of these animals has an exoskeleton.

Fast Facts

- An exoskeleton is rigid and does not always grow as the animal grows. Thus, as some animals gets bigger, they shed their exoskeleton and grow a new one. One animal that does not shed its exoskeleton is the giant clam. Instead, its shell grows as it grows.
- About 84 percent of all known species of animals have an exoskeleton. Insects make up the majority of these animals. There are more than 900,000 different kinds of insects on Earth.

Animal Armor: Prepare to Read

Activate Prior Knowledge

1. Bring a photo of a suit of armor to class.
2. Invite students to look at the photos in the article. Ask them to share what they already know about each of the animals shown. List each animals' characteristics on the board.
3. Then show students the photo of the suit of armor. Ask students what they see in the photo, and how it might be connected to each of the animals in the article.
4. Guide students to understand that each of the animals shown has a protective covering, much like a suit of armor. Tell them that they will learn more about the animals' armor as they read the article.

Vocabulary

Words to Explore

1. Prior to this activity, write the prefix *exo-* and the word *skeleton* on two separate sentence strips.
2. Display the "Words to Explore" poster for students. Read aloud the vocabulary word *exoskeleton*.
3. Tell students that this word contains a word that they might be familiar with. Ask a volunteer to identify that word. (*skeleton*) Post the sentence strip with the word *skeleton* on the board. Then have students share what they know about skeletons.
4. Ask students what other letters this word contains. (*exo-*) Post the strip with the prefix *exo-* on the board so that it is before but not attached to the word *skeleton*.
5. Explain to students that the prefix *exo-* is special because it is added to the beginning of the word. A prefix changes the meaning of a word.
6. Tell students that every prefix has a different meaning. The prefix *exo-* means "outer" or "outside."
7. Discuss with students how this prefix changes the meaning of the word *skeleton*. Guide them to understand that a skeleton is inside a body, while an exoskeleton is outside a body.
8. Move the two sentence strips together so that they spell the word *exoskeleton* on the board.
9. Read aloud the sentence from the poster. Ask a volunteer to explain why an exoskeleton would cover a crab, but a skeleton could not.

Animal Armor: Reading

Explore Reading

Reading Difficult Words

1. Write the words *armor*, *clickety-clack*, and *grasshopper* on the board. Tell students that each of these words appears in the article they are about to read.
2. Tell students that as they begin to read, they are going to come across words that are difficult. But that doesn't mean they can't read the words.
3. Explain to students that sometimes words they already know are part of a bigger word. Underline the letters *arm* in *armor*. Invite a volunteer to read the word *arm*. Underline the letters *or.* Invite another volunteer to read that word. As a class, put the two word together to sound out *armor*.
4. Tell students that sometimes they can look for similar sounds. Invite a volunteer to underline the similar sounds *ick* and *ack* in *clickety-clack*. Help students sound out the word *clickety-clack*.
5. Finally, tell students that it is often helpful to divide a word into pieces and count the syllables. Say aloud the word *grasshopper*. Ask students where you could divide that word to make two words, and draw a line between *grass* and *hopper* in the word. Point out that *grass* has one syllable and *hopper* has two. Clap out the three syllables as you say *grass-hop-per* aloud. Help students sound out each part and then put the parts together into one word.
6. Divide the class into small groups. Using their magazines, have students read the article in their groups. Tell them to identify any words they find difficult and use the strategies they have learned to sound out the words. Circulate among the groups to provide assistance whenever necessary.
7. When the groups are finished, create a classroom list of difficult words. Have volunteers share their strategies for figuring out how to read the words. Have students apply those strategies as you read aloud the article as a class.

Extend Reading

Rhyming Words

1. Display pages 16-17 of the projectable edition. Point out the word *shell*. Ask students to identify words that rhyme with *shell*, such as *bell*, *tell*, or *well*. Write the list on the board.
2. Assign each student a partner and give each pair an index card. Tell students to choose one word from the article, think of three rhyming words, and write those words on the card. Tell them not to write the word from the article. Provide assistance as needed.
3. Have pairs switch cards. Challenge students to find the rhyming words in the article.

Animal Armor: Writing

Explore Writing

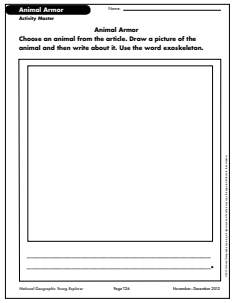
Animals With Exoskeletons

1. Write the word *exoskeleton* on the board.

2. Display the projectable edition for students. Ask students to review the article and point to the exoskeleton on each animal. Ask students to describe an exoskeleton. Is it hard? Is is soft? (It's hard.)

3. Ask students how an exoskeleton protects each animal in the article. (Possible responses include: it is hard; it is like armor; hungry fish can't break it; it covers most of the grasshopper's body; animals can't crack it; it covers soft body parts)

4. Give each student a copy of the Activity Master on page T26. Have students look again at the animals in the article. Ask students which animal they like best and why. Have students draw that animal and then write a sentence about that animal at the bottom of the page. Encourage students to use the word *exoskeleton* in their sentence. Invite volunteers to share their sentences with the class.


Animal Armor

Activity Master

Name: _____

Animal Armor

Choose an animal from the article. Draw a picture of the animal and then write about it. Use the word exoskeleton.

National Geographic Young Explorer Page T26 November–December 2012

Activity Master, page T26

Extend Writing

Illustrating the Word "Protect"

1. Write the word *protect* on the board. Have students find the word in the article. Discuss what *protect* means. Ask students to give examples of things that protect them. (seat belts, safety helmets, etc.)

2. Give each student a long piece of yarn, a pair of scissors, a handful of beads or a hollow pasta such as rigatoni, a piece of construction paper, and glue.

3. Tell students to write the word *protect* on their piece of construction paper. Then have them cut the yarn into pieces so they can use it to trace their word.

4. Next have students thread each piece of yarn through the beads or pasta, reform the letters, and glue the word *protect* to their piece of construction paper. You may want to tape the ends of the yarn for extra reinforcement.

5. Discuss with students how the beads or pasta act like an exoskeleton to protect the yarn.

Animal Armor: Science

Explore Science

Different Types of Exoskeletons

1. Prior to this activity, write the words *ladybug*, *clam*, *crab*, and *lizard* on large index cards and make five copies. Also create a T-chart, either on the board or on chart paper, with the column heads: *Exoskeleton*, and *No Exoskeleton*.
2. Ask students to imagine that they are a cat and have just seen a big dog. What would they do? (hiss, draw claws, arch back, screech, etc.)
3. Tell students that all animals, like cats, have ways of protecting themselves. Remind students that many animals have an exoskeleton, which is a hard skeleton on the outside of their bodies. An exoskeleton's job is to protect the soft body of the animal inside.
4. Display the "Amazing Armor" poster for students. Read aloud the text on the poster and have volunteers identify each animal. Show students a set of index cards and review each animal name.
5. Divide the class into five groups. Give each group a set of index cards.
6. Have the groups discuss the animals on the poster and decide which animals have exoskeletons (ladybug, crab, and clam) and which does not (lizard). Then have each group place their animal index cards in the category on the chart they think is correct. You may wish to have students tape the cards in place.
7. Review the chart and evaluate students' answers.
8. Guide students to understand that some animals, like the ladybug and crab, have an exoskeleton that covers their entire body. In other animals, such as the clam, the exoskeleton forms a shell.
9. Point out that the lizard does not have an exoskeleton because it has a skeleton inside its body.

Extend Science

Create an Animal with an Exoskeleton

1. Provide students with an assortment of supplies such as egg cartons, cardboard tubes, aluminum foil, wax paper, or plastic wrap. Also provide tape or glue, markers, and scissors, and give each student one cotton ball.
2. Tell students that their cotton ball is a soft-bodied animal. Have them use the materials you supply to create an exoskeleton for their animal. Point out that the exoskeleton can cover the entire body, such as that of an insect, or it can be a shell.
3. Have students share their finished "animals" with the class.

Name: _____

Activity Master

Animal Armor

Choose an animal from the article. Draw a picture of the animal and then write about it. Use the word *exoskeleton*.

Animal Armor

Name: _____

Assessment

Read each question. Fill in the circle next to the correct answer.

1. What is an exoskeleton?
   - Ⓐ a hard shell
   - Ⓑ a soft body
   - Ⓒ a bone

2. Where is an exoskeleton?
   - Ⓐ inside an animal
   - Ⓑ outside an animal
   - Ⓒ on a tail

3. Which animal has an exoskeleton?
   - Ⓐ crab
   - Ⓑ lizard
   - Ⓒ monkey

Animal Armor

Name: _____

Assessment

Read each question. Fill in the circle next to the correct answer.

1. What is an exoskeleton?
   - (A) a hard shell
   - (B) a soft body
   - (C) a bone

2. Where is an exoskeleton?
   - (A) inside an animal
   - (B) outside an animal
   - (C) on a tail

3. Which animal has an exoskeleton?
   - (A) crab
   - (B) lizard
   - (C) monkey