
Australian Sea Lion
Jellyfish
Welcome To Our World. It's Your World, Too.
Diagonal-Banded Sweetlips
Cuttlefish
Coral
Leafy Sea Dragon
Spine-checked Anemonefish
Lionfish
Chambered Nautilus
Sea Anemone
Crocodilefish
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IMAX UNDER THE SEA

Educator's Resource Guide

GRADES 3–5

Dear Teachers: Welcome to dynamic science activities and a classroom poster inspired by the IMAX film *Under the Sea.* These materials, created by Scholastic Inc., IMAX Corporation, and Warner Bros. Pictures, can build student skills through engaging **critical-thinking activities** and **hands-on experiments**. You can also further students' learning experience with a film field trip (see below), allowing students to experience face-to-face encounters with some of the underwater world's most mysterious and unusual creatures. We hope you enjoy *Under the Sea*!

Worksheet Guide: For additional educational worksheets, visit WWW.IMAX.COM/UNDERTHESEA.

Worksheet 1: **Creepy Creature Files**	**Worksheet 2:** **Journey at Sea**	**Worksheet 3:** **Hiding Out**	**Worksheet 4** (available online): **Research Expedition**	**Worksheet 5** (available online): **Acidic Oceans**
Students will learn how **adaptations** help animals hunt and protect themselves from predators.	Students will learn about the **geography** of the Indo-Pacific region.	Students will learn about the animal adaptation called **camouflage**.	Students will hone their own skills at **scientific observation** and **data collection** by studying a region in nature.	Students will learn how carbon dioxide causes ocean water to become acidic through a dynamic **hands-on activity**.
Skills/Curriculum: • Reading comprehension • Critical thinking • Animal adaptations • Predators/Prey	**Skills/Curriculum:** • Map-reading • Geography • Latitude and longitude • Coral reefs	**Skills/Curriculum:** • Experimenting • Collecting data • Camouflage • Colors/Patterns	**Skills/Curriculum:** • Observation • Collecting data • Ecosystems • Biodiversity	**Skills/Curriculum:** • Experimenting • Fossil fuels • Carbon dioxide and Acids • Coral reefs
NSES Standards: •K–4: Characteristics of organisms •5–8: Diversity and adaptations of organisms	**NSES Standards:** •K–4: Changes in environments •5–8: Populations, resources, and environments	**NSES Standards:** •K–4: Abilities necessary to do scientific inquiry •5–8: Abilities necessary to do scientific inquiry	**NSES Standards:** •K–4: Organisms and environments •5–8: Populations and ecosystems	**NSES Standards:** •K–4: Properties of objects and materials •5–8: Properties and changes of properties in matter
Lesson Ideas: Start a discussion by having students compare their body characteristics to those of an animal, such as a lion. How are these characteristics adapted to each lifestyle?	**Lesson Ideas:** Have students extend the lesson by researching the climate of Australia and comparing it to that of the United States.	**Lesson Ideas:** Start a class discussion by asking students why it might be useful for an animal to blend in with its surroundings. When might it want to stand out?	**Lesson Ideas:** Have your students imagine that each of them is the first scientist to enter a rain forest. What observations would they make? How would they record these observations to share with other scientists?	**Lesson Ideas:** Have students do research to find out how much carbon dioxide they are responsible for releasing each year. They can calculate their "carbon footprint" at: www.zerofootprintkids.com

WORKSHEET ANSWERS: Worksheet 1: 1. Attacks predators with venom-filled spines; 2. The great white shark is sleek to help it swim fast. The sea dragon looks like seaweed to hide from prey.; 3. Shark, eel, dragon: lives in ocean, is a predator, uses surprise to catch prey; Shark, eel: sharp teeth, longer than 2 feet; Dragon, eel: eats crustaceans; Shark: swims faster than 15 miles an hour; Dragon: has leaf-shaped fins. **Worksheet 2:** 1. d; 2. a; 3. d; 4. b. **Worksheet 3:** 1. a) Answers may vary. Example: walking stick insect; 1. b) To hide from predators; 2. a) It can change its coloring. It can blend in with more than one type of environment.; 3. a) Mimic octopus can look like sea snakes, lionfish, and other creatures. It changes its appearance depending on the type of animal it is trying to trick. **Worksheet 5:** When calcium carbonate is placed in acid, bubbles will form around the material. After soaking in the acid, calcium carbonate materials will soften and start to dissolve.

BOOK AN IMAX® FIELD TRIP

Engage your students with an unforgettable learning experience.

Each of the activities inside provides eye-opening extensions connected to viewing *Under the Sea*. **IMAX films are ideal teaching tools that:**

- Present new knowledge in a powerful, popular medium
- Inspire thoughtful and lively classroom discussion
- Motivate students for extended learning

Field trips are economical and easily arranged. To book a field trip, contact your local IMAX theatre today! For locations near you, visit www.IMAX.com.

IMAX®

Worksheet #1

Name: _____ Grade: _____

CREEPY Creature Files

Ocean creatures have many **adaptations**—or characteristics—that help them catch prey or keep from getting caught themselves. Read the descriptions that follow on the unusual adaptations of some animals that live in the Indian and Pacific Oceans. Then answer the questions below on a separate sheet of paper.

LIONFISH

SIZE: Up to 15 inches long
DIET: Small fish

The lionfish's needlelike spines are filled with venom. Lionfish hunt other animals, but they use venom for defense. If threatened, a lionfish injects venom into the attacker.

GIANT MORAY EEL

SIZE: Up to 10 feet long
DIET: Fish and crustaceans, such as shrimp

Giant moray eels hunt by hiding in small crevices. If prey swims by, the eel swoops out. The eel's teeth point backward to keep prey from slipping out.

GREAT WHITE SHARK

SIZE: Up to 21 feet long
DIET: Large fish, marine mammals, such as seals

The great white shark's sleek body helps it swim up to 15 miles per hour. The shark often hunts by swimming beneath prey. The shark bursts upward and catches the meal in its mouth.

SEA DRAGON

SIZE: Up to 18 inches long
DIET: Tiny crustaceans, such as sea lice

The sea dragon has many leaf-shaped fins that help it blend in with seaweed. If prey floats by, the sea dragon sucks it up with its straw-shaped mouth.

1. In your own words, describe how the lionfish defends itself from predators.

2. Compare the body shape of a great white shark with that of a sea dragon. How do these characteristics help each animal catch prey?

3. Great white sharks, giant moray eels, and sea dragons look very different, but they also have many similarities. Using the list of characteristics to the right, draw a Venn diagram to compare the creatures.

Lives in the ocean	Eats crustaceans
Has leaf-shaped fins	Is longer than 2 feet
Is a predator	Has sharp teeth
Swims faster than 15 miles an hour	Uses surprise to catch prey

BONUS ACTIVITY — Under the Sea

See *Under the Sea* to uncover more unusual ocean creatures. Create a new case file on one of the creatures in the movie. What adaptations does your creature use to hunt prey or hide from predators?

The lionfish's stripes actually help it blend into the coral reef. This adaptation helps it sneak up on prey.

Worksheet #2

Name: _____ Grade: _____

JOURNEY at Sea

The movie *Under the Sea* explores the waters of the Indian and Pacific Oceans, which include some of the world's most important coral reefs. These underwater structures, built by tiny coral animals, provide food and shelter to ocean life. The "Coral Triangle" (highlighted in the map below), has reefs that are home to the most diverse community of sea organisms in the world. Some of these reefs are at risk from threats such as pollution and global warming. Study the map below to learn more. Then use the map to answer the questions that follow.

1. Which city shown on the map is located closest to the Great Barrier Reef?
   a. Perth
   b. Adelaide
   c. Sydney
   d. Brisbane

2. Which of the following is located furthest north?
   a. Raja Ampat Islands
   b. Coral Sea Islands
   c. Great Barrier Reef
   d. Sydney, Australia

3. Which of the following is located south of the Tropic of Capricorn?
   a. Raja Ampat Islands
   b. Great Barrier Reef
   c. Papua New Guinea
   d. Cape Catastrophe

4. Which of the following Australian cities is located farthest south?
   a. Perth
   b. Adelaide
   c. Sydney
   d. Brisbane

BONUS ACTIVITY Under the Sea

On the map, track the filming expeditions for *Under the Sea*. Choose one location from the film and write a paragraph about the region. Include in your description organisms that live there as well as environmental threats in the area.

The Coral Triangle is home to 3,000 species of fish, including the diagonal-banded sweetlips.

Worksheet #3

Name: _____ Grade: _____

HIDING Out

Many sea organisms use **camouflage** to help them survive. They use color and shape to hide from other organisms. Check out three masters of disguise below, and then answer the questions on a separate sheet of paper.

BLENDING IN

1. The bumpy skin and dark green and brown coloring of the stonefish make it look like a piece of coral or rock on the ocean floor. This camouflage helps the stonefish hunt. The stonefish sits quietly on the sea floor. When a fish swims by, the stonefish leaps up.

a. Can you think of another animal that blends into its surroundings like the stonefish?

b. The stonefish uses camouflage to help it hunt. What is another reason why an animal might want to blend into its surroundings?

QUICK CHANGE

2. Cuttlefish can change the color of their skin to match their surroundings. A cuttlefish swimming over sand may turn its body into a smooth tan color. Over gravel, the cuttlefish's body will suddenly show different-colored spots.

a. How is the cuttlefish's camouflage different from the stonefish? What advantages might this give it?

MASTER MIMIC

3. Octopuses can change color and they can also alter the shape of their bodies to hide out. An octopus may roll up into a ball to look like a rock, or change the texture of its skin to look like the rough surface of a coral.

a. The mimic octopus can change its appearance to look like many other organisms. Research the mimic octopus and describe some of the ways it uses disguise on a separate sheet of paper.

BONUS ACTIVITY

Under the Sea

Which animal from *Under the Sea* do you think was the best camouflage artist? Write a persuasive paragraph that explains why you chose the animal. Be sure to describe how that animal uses camouflage.

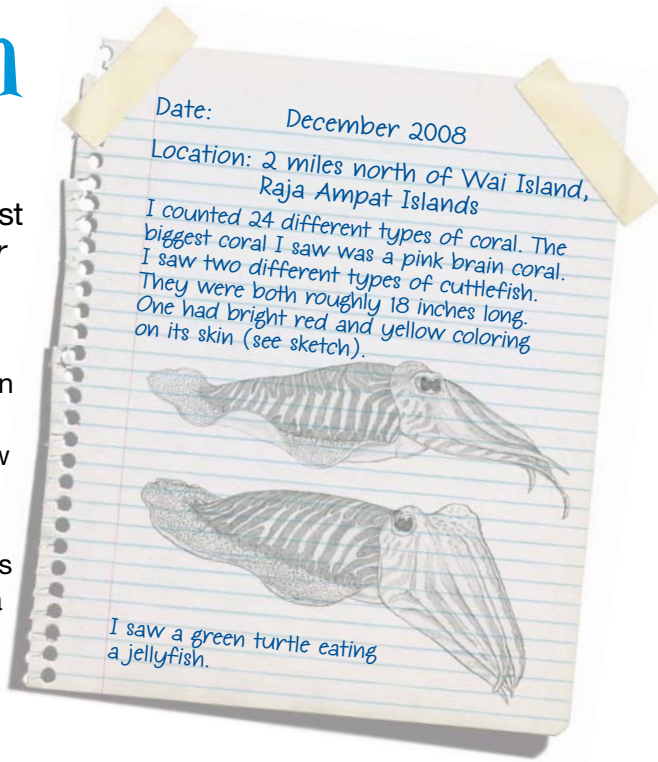
Octopuses have special cells in their skin that can change color.

Worksheet #4

Name: _____ Grade: _____

RESEARCH Expedition

When researchers investigate a new area of the ocean, they record their observations to share with other scientists. At right is an example of some notes a scientist might have taken about a research area in the film *Under the Sea*. In the activity below, you'll embark on your own research expedition—around your home or school.



PART 1: Imagine that you are a scientist studying the region around your home or school. Cut out the attached notecards and use them to record your observations about the area. Draw sketches of the organisms you see on the backs of the cards.

PART 2: Scientists count the number of different organisms in a region to estimate **biodiversity**. They determine whether a large or small variety of organisms live in the region. Use your observations to determine whether your region has a high or low biodiversity.

Date:
Plant or animal observed:
Size:
Color/Shape:
Number seen:
Behavior:

Date:
Plant or animal observed:
Size:
Color/Shape:
Number seen:
Behavior:

BONUS ACTIVITY — Under the Sea

Which geographic area shown in *Under the Sea* had the highest biodiversity? After watching the movie, create a journal entry about the organisms you saw in that region.

The flamboyant cuttlefish is one of the many diverse creatures living in the oceans around Australia and Indonesia.

Worksheet #5

Name: _____ Grade: _____

ACIDIC Oceans

Hands-on Activity

Every day, human activities pollute the air and oceans. One of the oceans' biggest pollution problems is **carbon dioxide** gas. To create energy, cars and factories burn fossil fuels, such as oil and coal. This process releases carbon dioxide into the air. This gas causes Earth's climate to warm by trapping the sun's heat. It also affects the chemistry of the oceans because some of the carbon dioxide is absorbed into ocean water.

When carbon dioxide is absorbed into the oceans, it causes the seawater to become more acidic. The acidic water can harm sea organisms that have shells, such as coral. Try the activity below to find out how this happens.

Materials

5 clear plastic cups:
- One filled with ¾ cup water
- One filled with ¾ cup vinegar
- Three others for labeling (see Step 1 to the right)

Spoon

Marker

3 pieces of material made of calcium carbonate, such as shells (available at pet stores or craft stores), chalk, or antacid tablets

Procedure

1. Label one plastic cup "clean," another one "polluted," and a third one "very polluted."
2. Pour ¼ cup of water into each of the three cups. Add ¼ cup of vinegar to the "polluted" cup. Add ½ cup of vinegar to the "very polluted" cup. Like carbon dioxide, vinegar causes the water to become acidic.
3. Observe the calcium carbonate material. Is the surface smooth or rough? Does the material feel hard or soft? This material is similar to the shells of animals such as coral.
4. Use the spoon to place one piece of the calcium carbonate material in each cup. Observe what happens.
5. After 10 minutes, use the spoon to remove the material from the cups. How has the material changed? Based on your findings, how might acidic water affect sea life?

BONUS ACTIVITY — Under the Sea

After seeing *Under the Sea*, create a poster that explains other effects of carbon dioxide on the ocean's coral reefs. For instance, how does carbon dioxide affect the temperature of the oceans? Research the ways in which your daily activities cause carbon dioxide to be released into the air. Include that information on your poster, along with tips on how to reduce your carbon dioxide contribution.