



Cabrillo Marine Aquarium Lesson Plan

Grade Level: Second through Fourth Grades

Title: Life on the Rocks: A Lesson on Tidepool Adaptations

Objective: Students will learn about some amazing ocean animals that live in the tidepool. They will also learn about their unique adaptations that help them survive on the rocky shore.

California Science Standards: 2nd: 2c, 2d, 4c, 4g 3rd: 3a, 3b, 5b, 5d, 5e
4th: 2b, 3a, 3b, 6a, 6f

Time to Complete: 50 minutes

Materials Provided by CMA Ocean Discovery Kits: *Worksheet: Which Creatures Live in the Tidepool?*, Invertebrate Specimens (sea star, limpet snail, barnacle, urchin spines, sea anemone, octopus), Posters, Books, and Habitat & Ocean DVD's

Materials Provided by Teacher: Drawing paper and markers, pictures & books of tidepool animals

Vocabulary: Tidepools, adapt, tides, high tide, low tide, predators, prey, exoskeleton, suction foot, tube feet, tentacles, camouflage, spines, algae, environment, habitat

Lesson Background and Outline: Read & Discuss with Your Students

Have you ever noticed how the water in the ocean moves away from the beach and then back again? If you build a sandcastle on the damp sand at low **tide**, by high tide it will have washed away. There are usually two **high tides** and two **low tides** every day. When there are rocks at the edge of the ocean you will often find pools of water left there at low tide. Many fascinating creatures live in these pools. There are sea stars, barnacles, urchins, anemones, sea snails, and even the occasional, colorful octopus. The waves that cover the pool at high tide bring water and food for these creatures, but when the tide starts going out again, it takes most of the water with it. The water that is left is heated by the sun, and some pools dry out completely. The creatures that live in the tidepools have to **adapt** to avoid being washed away by the waves, dried out in the sun, or being eaten by **predators**. Some sea creatures, like the barnacle, have a hard shell called an **exoskeleton**. The shell protects it from predators and allows it to store food and water, which keeps it alive even if the tidepool dries out completely. Others, like the sea snail fasten itself onto the rocks with a sticky, **suction foot** so it won't get washed away. On the other hand, the sea star has hundreds of tiny, **tube feet** on the underside of each arm to help it attach to the rocks in the pounding surf. The sea anemone adapts to

its tidepool **environment** by disguising itself as a harmless flower or plant, similar in color and appearance to other marine plants. But the sea anemone is a **predatory** animal and uses its stinging **tentacles** to capture passing **prey**, like a passing fish or a shrimp. The octopus has exceptional **camouflage** capabilities for hunting **prey** and hiding from predators. They can change their shape and color patterns within seconds to match their surrounding environment. The octopus can also squirt clouds of black ink to confuse and dull the senses of unwelcome predators. The sea urchin is covered with hundreds of sharp **spines** that serve as an **adaptation** to discourage many potential predators. As a plant-eater, the sea urchin has adapted to rocky tidepools by developing five sharp, teeth to grind away at the rocks and dig a home to protect itself from the pounding surf.

Activity 1:

Have students work on the Worksheet: Which Creatures Live in the Tidepool?

- Make copies of the worksheet handout and distribute to your students.
- When the sheet is completed, discuss which animals make the tidepool their home and which animals live in another habitat.

**Answer Key: Anemone, Urchin, Sea star, Clam, Barnacle, Snail, Octopus, Crab
(the Gull is a visitor, not a resident)**

Activity 2:

Ask students to answer the following questions about tidepool animal adaptations.

- Barnacles have (**exoskeletons**, bones or borrowed shells) which protect them from predators.
- Sea stars fasten themselves onto the rocks when the tide goes out with (legs, **tube feet**, or hooks) so that they can't be washed away.
- The octopus protects itself from predators by (hissing like a snake, throwing out its guts, or **squirting ink into the water**).
- The sea urchin has (three, four, or **five**) sharp teeth which it uses to dig a home for itself in the rock.
- The sea anemone looks like a marine plant, but it is actually a predatory animal, with stinging tentacles to capture passing (predators, people, or **prey**).

Extensions: Take a Trip to the Tidepools at Low Tide

- Check out the Tide Chart at Cabrillo Marine Aquarium's website link <http://www.protides.com/california/364/>
- LessonSnips <http://www.lessonsnips.com>
- Doheny State Beach Interpretive Programs <http://www.dohenystatebeach.org>
- A Guide to the Side of the Sea: A Teacher's Guide for Field Trips to Rocky Intertidal Areas <http://www.parks.ca.gov/>