

## Introduction to Rocky Intertidal Zones

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**Grade: K-12**

**Group Size: 30 students**

**Time: 55 minutes**

### **BACKGROUND**

The rocky intertidal ecosystem is divided into a series of zones. Scientists define the zones by the amount of exposure to air and by the amount of time the substrate is submerged under water. Intertidal zones are also identified by the types of organisms that are found there. Tides result in daily changes in water levels. The intertidal zone is the area along the shoreline, which is exposed at low tide and submerged during high tide. Ecologically, the intertidal zone is a diverse community where organisms are divided by the vertical zonation of the tidal zones. **The spray zone** is never submerged and only receives ocean water due to the splash from crashing waves. **The high tide zone** is only submerged briefly during the highest tides. **The middle tide zone** is regularly both exposed and submerged by the tide. **The low tide zone** is mostly submerged and only exposed to the air during the lowest tides. The distribution of diverse rocky intertidal organisms is dictated by zonation, and each organism has adaptations to help them survive in the zone in which they live. If an animal is moved from the low zone to the high zone, it may not be able to survive in its new environment. The intertidal zone contains great diversity and has always been fascinating to children who love to collect shells and see the sea creatures who live there.

### **Tidepools**

During low tide, tidepools often form throughout the different zones. This is because of the irregular rocky environment. A myriad of plants and animals live in these pools, because they provide the most protection from desiccation and predation. However, these inhabitants must be able to withstand temperature and salinity changes. At low tide, the tidepool is exposed to the sun, and the water will increase in temperature as well as start to evaporate, increasing its salinity. Invertebrate and algae species inhabit these pools as well as several fish species. Sculpins, eels, octopi, and nudibranchs can survive only within tidepools or subtidal regions. Sea anemones, sea stars, crabs, and many kinds of algae species may also reside here. Coralline algae species form thin layers on the surface of rocks. The algae may be pink with calcium carbonate which is the same material that composes the hard shell of many invertebrates. This acts as a defense for common grazers like sea urchins and snails.

### **Concept review questions:**

What is zonation and how are zones defined? (Splash, high, middle and low. Amount of time spent submerged or exposed to air, and by organisms that live there)

How is a tide pool formed and where would you find them? (By irregular rocky environment, at low tide throughout the rocky intertidal)

What are some of the abiotic and biotic factors that affect organisms in different zones? (Abiotic=Temp, salinity, wave height, tidal range, Biotic=competition, predation)

### **OVERVIEW**

Students will create a diagram of the intertidal zones and determine what organisms live in each zone. Students will draw the zones that correspond to the geological structures of the rocky intertidal. Finally, students will use their critical thinking skills to determine where in the rocky intertidal each organism lives and place the organism in the zone that is within the limitations for survival. You can use different color codes to denote different abiotic factors such as temperature and salinity. Note that when students are drawing structures and creating organisms, they will not all be to scale. You should include a discussion of how size and space plays a role in zonation patterns (competition and predation).

### **CONTENT STANDARDS**

National and State Education Content Standard(s):

Grades K-4 Life Science, organisms and environments,

Grades 5-8: Life Science, Diversity and adaptations of organisms, Earth and Space Sci., Structure of the

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earth system, Earth's history.

Grades 9-12: Life Science: Earth and Space Science, Energy in the earth's system

### **PERFORMANCE OBJECTIVES**

Students will be able to:

- Identify rocky intertidal zones
- Understand how tides shape the zonation patterns
- Identify various common local organisms that live in each zone
- Explain abiotic and biotic factors that restrict organisms to different zones

### **MATERIALS**

A large butcher block or poster type paper, measuring 12' x 6', or whatever size fits the room

Multicolor markers, crayons, colored pencils, or sharpies

Tape for hanging the diagram

Pictures of marine life from different zones that are glued onto cardboard or some other sturdy paper

Double sided tape

### **ADVANCE PREPARATION**

Have all of the marine life already glued onto paper

You can pre-label as much or as little as you want on the diagram depending on the grade level.

### **PROCEDURE**

1. Either hang the paper for the diagram or lay it on the floor
2. Label the structures of the rocky intertidal
3. Students place different organisms at their appropriate depths in the ocean.
4. More advanced students can label and identify biotic and abiotic factors affecting each zone

### **EXTENSION**

Discuss the importance of the rocky intertidal zone and why it is a fragile environment. How do humans have an impact on this ecosystem? What can students do to protect it?

### **ASSESSMENT**

In order to assess student's learning, before the beginning of the activity, students can draw on a piece of paper what they think the rocky intertidal is, what they think lives there and where, and why they think this ecosystem might be important. They can repeat this a day after they do the activity, and a week later to see how much information is retained.

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