

Background:

The Intertidal Zone presents a unique set of challenges for the organisms that live there. Extreme fluctuations in moisture level, heat, salinity, and sunlight make it a habitat suitable for only a few highly conditioned species. Tide pools are marked by conditions that change dramatically over a very small area, also going from only occasionally wet to usually submerged in a matter of a few feet. The intertidal zone is thus known for its great diversity and has always been fascinating to children who love to collect shells and see the sea creatures who live there.

Activities in this lesson are designed to enable you to investigate the creatures of intertidal zones and how they've adapted to their conditions.

Outcomes: Students will...

1. Develop an understanding of regulation and behavior: all organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment. Regulation of an organism's internal environment involves sensing the external environment and changing physiological activities to keep conditions within a range to survive.
2. Learn that an organism's behavior evolves through adaptation to its environment. How a species moves, obtains food, reproduces, and responds to danger is based in the natural history of that species.

Activity: Part 1 Explorers Share their Observations

1. Imagine that you're 18th Century scientific explorers on an expedition to an uncharted part of the world. While landing at remote beaches you observe organisms that nobody from your society has ever seen before. They should write brief descriptions to illustrate the organisms to people at home.
2. Explain that scientists have to rely on descriptive skills when identifying organisms. Especially before popular use of photography, biologists had to describe the features of organisms to distinguish between species. Today, careful description still is a foundation of scientific research.
3. With a partner, turn your backs to one another. Each person should have a pencil and a piece of paper. One group member will provide verbal explanation of the features and characteristics of what they have discovered in the rocky intertidal zone and the partner will draw these verbal explanations. You cannot use the name of the organism (like clam) or scientific terms (e.g. madreporite). Include measurements and specific data about the size and shape so that the person drawing can make annotations. Use a ruler so that you can measure shells if you choose to. All drawings are put up in the ship's record's library when complete.

Materials: A variety of shells starfish, mussels, gastropods, limpets, etc. (one per group) & rulers.

Objectives: Students will...

1. Practice description skills using marine organisms.
2. Learn the difficulty of painting a verbal picture.
3. Will develop an appreciation for the descriptive skills necessary for a scientist.

Activity: Part 2 Conditions in the Littoral Zone

Watch the Tide pools video from the link below, made available by California Marine Protected Areas:

<http://www.youtube.com/watch?v=wTRIuOA13mU>

Pay attention to any information regarding conditions in the rocky intertidal zone and to adaptations organisms have for survival. After watching, make a list of factors with your partner that might influence your

life if you were an organism that lives in an intertidal area. These might include: salinity, heat, moisture, predation, finding food, sunlight, staying put, etc. Be sure to address that, given the conditions present in each zone, how do you think organisms might survive? You should address the different factors that you listed after watching the video above. The objective of this exercise is for you to brainstorm and to be creative in thinking about adaptations.

Objectives: Students will...

1. Use discussion to generate ideas about how organisms adapt to the environment.
2. Learn specific adaptations for the Rocky Intertidal Zone.

Activity: Part 3 Adapting to Challenge

An introduction to the ideas of challenge, advantage and adaptation to challenge. You will use the following link to gather a cursory knowledge Sea World Educational link: <https://seaworld.org/en/animal-info/ecosystem-infobooks/tide-pools/intertidal-ecology>

Now discuss with your partner factors that organisms living in the intertidal zone have to contend with. Some abiotic factors include changes in temperature, salinity, light, moisture, and wave action. Biotic factors include finding food, avoiding predation, and mating. List these factors on your worksheet. Discuss some of the adaptations mentioned. Obtain one shell sample or marine specimen and think about the factors they have learned about and listed during the discussion. What special features do they think their particular organism might have had to enable it to survive in the intertidal zone? Students could share their results with the class. Ask them to choose one organism or one unique adaptation to explain to the group.

Additional resource: www.enchantedlearning.com/biomes/intertidal/intertidal.shtml

Objectives: Students will ...

1. Consider the various abiotic influences on organisms living at the edge of the ocean.
2. Examine organisms to determine adaptations for survival.
3. Learn that organisms use different strategies for survival.

Background:

On a sandy coast, the substrate is constantly shifting while on a rocky coast it is not. However, on a sandy coast, the sand is able to absorb some of the energy of the waves, but the rocks cannot. How an organism maintains its location will depend on where it lives. Those that can stick will do better in rocky areas, while things that can dig will do better in sandy areas. Storm waves can wash away the sand or will increase the energy present on the rocks, uncovering or dislodging many organisms. This is often reflected by the increase in shells at the beach after high waters. And even the crabs found in many of our rocky areas, although they don't stick or dig, are ideally suited to crawling into crevices where they lodge themselves out of the way of crashing waves, and in such a position as to avoid being pulled out by receding waters. Just try and retrieve one to find out how well they can hide! And although an organism can avoid being washed away, it still has to deal with other influences. For example, if students bury an organism, how does it avoid predation? It won't be able to move quickly but the fact that it is buried gives it some protection. It might get food by sticking out a tongue-type organ that allows it to filter the water.