

STEM AT HOME ACTIVITY GUIDE: Tide Pool Experiment



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STEM AT HOME GUIDE: Tide Pool Experiment Background Knowledge

Aim: Experiment with high and low tides to create your own ocean tide pool to explore aquatic ecosystems.

Problem & Career Focus: Marine science, or oceanography, is the study of seawater, the ocean tides, ocean floor, marine plants, and marine animals. This study focuses on the interactions between the ocean environment and its organisms. In this experiment you will learn about the importance of tide pools to ocean plants and animals! Using the scientific method, your task is to work with your team of scientists: marine biologists, zoologists, and marine geoscientists to explore the effects of marine life based on high and low tides.

Educational Standards Correlations: Earth's Systems, Ecosystems, Life Science

Scientific Method: Scientists use the scientific method to guide their experimentation with different materials! With your team: ask questions, discuss what you observe, and use your problem-solving skills as you create your potions! Use the scientific method steps to guide your exploration during the Tide Pool Experiment.



Investigating Questions

- How does high and low tide affect sea life in a tide pool?
- What changes do you observe in your tide pool based on the tide changes?
- What effects would waves have in a tide pool?

Materials

- Aluminum pan or shallow plastic bin
- Lots of rocks and stones in different sizes
- Sand
- Miniature toy sea creatures (or make your own with playdough)
- Pitcher/large cup
- Water

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Background Knowledge

Vocabulary:

Tide Pool: Shallow pools of seawater that form on rocky shores of the ocean; most are separate bodies of water from the larger ocean.

High Tide: Ocean water rising to its highest level; there are 2 high tides in a day

Low Tide: Ocean water falling to its lowest level; there are 2 low tides in a day

Gravity: Tides are the rise and fall of ocean and sea levels due to gravity- the combined effects of forces by the Moon and the Sun.

STEM Career Connections:

Marine Biologist

Are scientists that study marine life and organisms in the ocean/sea.

They: research, protect, observe, and/or manage marine animals, plants, and microbes.

Zoologist

Are scientists that study different species of animals in their habitats.

They: research how animals and humans interact with ecosystems.

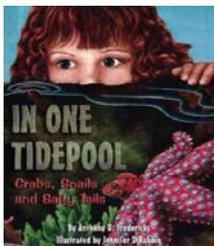
Marine Geoscientist

Study of the Earth beneath the oceans.

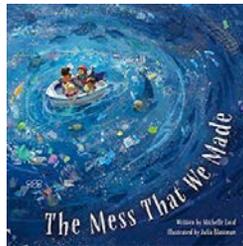
They: study the topography, structure, and geological processes of the ocean floor to discover how the Earth and oceans were formed.

Literacy Connections:

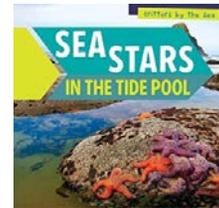
In One Tidepool: Crabs, Snails, and Salty Tails
 by Anthony D. Fredericks



The Mess That We Made
 by Michelle Lord



Sea Stars in the Tide Pool
 by Jo Marie Anderson



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Real World Applications

Over 70% of the Earth's surface is covered by oceans and seas. These bodies of water play a very important role in the health of our planet including the atmosphere through gas exchange, global air, and heat circulation. Our behaviors as humans have direct impacts to ocean ecosystems, especially pollution.

How Can Sensory Bins Be Used for Science?

Sensory bins assist with new scientific discoveries and concepts quite easily for young students. In this experiment, your team will explore **tides** and their effects in a tide pool ecosystem.

Tide Pools

When high tide comes onto an ocean shore, it brings water, plants, and animals with it. When the tide takes the water back out to the ocean (at low tide), some water gets trapped in low spots in rocks or sand on the beach. The trapped water forms a little pool, called a tide pool, that becomes a home for many ocean creatures and plants.



Tide Pool Ecosystems

Tide pools are mini ecosystems that support marine animal and plant life. The constant wave action supplies the tide pool with nutrients and oxygen, which makes food abundant. Many different types of marine animals can live in a tide pool depending on its size. Such as: starfish, anemones, sea urchins, a wide variety of fish and even sand sharks!].

Everyday Science: Gravity

High and low tide are affected by the tidal force and gravity on Earth from the Moon and Sun. Gravity is also the reason we stay on the surface of the Earth, instead of floating off.



Interesting Facts About Tide Pools:

- Many animals that live in a tidal pool have hard shells to protect them from harsh waves.
- Some creatures in tidal pools can have vibrant colors- like pink, orange, or purple.
- Some fish spend most of their lives in their tide pool, guarding them as their home, and even laying eggs in them.
- You can see larger marine life in sizable tide pools: sharks, octopus, a variety of crabs and more.

Check out these video links!

Searching Tide Pools

https://www.youtube.com/watch?v=ZINXI_NEKQQ

Exploring Tide Pool Creatures!

<https://www.youtube.com/watch?v=YovsSiy1x3I>

The Intertidal

<https://www.youtube.com/watch?v=DR1gP5S6Bsk>

STEM AT HOME GUIDE: Tide Pool Experiment Activity Directions

Aim: Experiment with high and low tides to create your own ocean tide pool to explore aquatic ecosystems.

Instructional Video: <https://youtu.be/QRR1c6dODNU>

Investigating Questions

- How does high and low tide affect sea life in a tide pool?
- What changes do you observe in your tide pool based on the tide changes?
- What effects would waves have in a tide pool?

Materials

Aluminum pan or shallow plastic bin
 Lots of rocks and stones in different sizes
 Sand
 Miniature toy sea creatures (or make your own with playdough)
 Pitcher/large cup
 Water

Instructions

Make sure to perform the experiment as a family team. This activity can get messy, so make sure you have paper towels to clean up messes. Or, if it's a nice day, enjoy the experiment outside. This experiment is structured to allow creativity flow. Allow your team to experiment freely with different combinations of solids and liquids to observe the results.

- Start by creating a hypothesis with your group about what will happen to your marine animals during high and low tide.
- Then, fill your aluminum pan or bin with rocks. Arrange them so there are multiple layers.
- Add sand to the bottom of the pan and around the rocks.
- Place your marine toy animals and plants in the tide pool model.
- Before adding water, make a prediction which animals will be underwater first.
- Begin to add water one pitcher at a time. Make observations. Continue adding water until you reach high tide. Make observations.



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- Start dropping your water level to simulate low tide, discuss which animals are exposed to air first (Make hypotheses about the marine animal body parts or movements sea creatures need to make to stay underwater during low tide).
- Draw conclusions and discuss with your team what you observed throughout the experiment.

Extra Challenge:

-Create waves in your tide pool. What does your family team observe?

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Photo Guide



Step 1: Fill your aluminum pan or bin with rocks. Arrange them so there are multiple layers.



Step 2: Add sand to the bottom of the pan and around the rocks. Place your marine toy animals and plants in the tide pool model.



Step 3: Before adding water, make a prediction which animals will be underwater first. Begin to add water one pitcher at a time.



Step 4: Make observations. Continue adding water until you reach high tide.



Step 5: Start dropping your water level to simulate low tide, discuss which animals are exposed to air first.

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Photos Courtesy of: Buggy and Buddy

STEM AT HOME GUIDE: Tide Pool Experiment Extension Activity

Arctic Animals: Blubber Science

Materials:

Large bowl
 2 plastic/Ziploc bags

Ice Cubes
 Duct tape

Cooking Shortening (Crisco)
 Food Coloring (optional)

Instructions

An adult should assist with using the materials in this experiment. **WARNING-** this activity can get messy! Similar to tide pool marine animals, arctic animals must adapt to their environment based on physical characteristics of their bodies. In this experiment you will explore how blubber keeps polar bears warm in the arctic ecosystem.

- Begin by filling a bowl with ice and water. Add food coloring if desired (blue will appear similar to the cold, Arctic water).
- Next, have your team place their hand briefly in the water. Make observations and discuss. How do humans stay warm in cold weather? What adaptations do animals have to keep warm in cold climates?
- Now, let's get messy. Fill one plastic bag with the cooking shortening. Using another bag, place this one inside the bag that has the shortening in it.
- Seal the tops with duct tape so water can't get into the bags (There should be room to place your hand inside the bag)
- With your hand inside the bag, move the shortening around so it covers the surface of the bag where your hand is (this is similar to a polar bear's fat, called blubber).



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- Put both bag covered hands inside the ice water. Make observations and discuss.

Fun Facts:

-Polar bears have two types of fur.

-Their skin is black which helps keep them warm by absorbing the sun's rays.

-Polar bears blubber layers of skin can be 4.5 inches thick.

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