



Oceanography: Juniors Patch Program

Oceanography: the science that deals with oceans, the physics and chemistry of ocean water, marine biology, and the uses of the ocean's resources.

Choose **six** activities, including those marked with an asterisk (*).

1: Oceanographers

Oceanography includes the study of plant and animal life in the oceans, the study of ocean currents, and many other things. Make a display of the different things that oceanographers study.

2: What the Water Carries

Explore and experiment with the way water carries things like sand grains, and what happens to them when they are left behind. Do at least two of the following activities:

- Shake up a jar of water with some sand, gravel, silt, small shells, and/or clay. Observe which things settle first and how the layers of sediment form. Why do you think this happens?
- Make a long trench using wood, metal, or plastic. Place some gravel, sand, silt, small shells, and pieces of wood at one end. Use a hose to simulate a stream. Does the speed of the water affect the amount and size of the material carried by the water? Try raising one end. Does this affect what is carried by the water? What about the amount of water? Try pushing the material up a slope using water, the way oceans do. What do you observe?
- Most ocean water is not perfectly clear. Find out what causes cloudiness in water. You may need to use a filter, plankton net, magnifying glass, or even a microscope.

3: Explore the Shore

Visit the ocean shore! Look closely along the shoreline for debris such as shells, pebbles, plants, bottles, beach glass (pieces of glass that have been polished smooth by the sea), and decaying matter. Where did these things come from? How did they get there, and what is likely to happen to them? What are flotsam and jetsam? Investigate how pollution is affecting harbors, salt marshes, or the ocean. What are the long- and short-term effects of this pollution? Participate in or organize a beach clean-up.

4: Waves *

Do **one** of the following:

- Learn about and describe ocean waves. Where do waves get their energy? What accounts for the different types of waves? How do different types of waves affect the Massachusetts coastline? What accounts for the different kinds of beaches (rocky coasts, barrier islands, marshy areas, etc.)? Draw pictures or make a display to show what you have learned.
- Observe waves in motion. If you cannot go to the coast to observe the following structures, make a model of a beach to help you analyze shorelines. Observe how the effects of waves on the shoreline may be altered by a jetty (a wall that is built out into a body of water), a groin (a short wall built at right angles to the shore to trap moving sand), or a breakwater (a structure protecting the shore from breaking waves). Observe the changes in the behavior of the waves.

5: Plankton *

Do **one** of the following:

- Phytoplankton and zooplankton are microscopic plants and animals. They are eaten by many larger animals. Make a food chain illustrating the importance of plankton to sea life. Expand it into a food web that includes examples of both sea and land creatures.
- Make a plankton net. Tow the net from a dock, wade with it, hold it in a current, or tow it behind a boat for about twenty minutes. Examine what you have caught under a microscope or high-powered magnifying glass. Identify and draw the three most common types of plankton in the sample.

6: George's Bank

Find George's Bank (off the coast of Massachusetts) on a map or nautical chart. Find out why this is such a lush feeding ground for sea life. Why is Gorge's Bank now a protected area?

7: Measuring the Ocean

Do **one** of the following:

- Measure and record the water temperature one foot below the surface of a body of water three or four times daily, at the same times each day, for six consecutive days. Measure and record the air temperature at the same times. Record the cloud cover and roughness of the water surface. Show your findings on a graph. How does water temperature change with respect to air temperature? What other conclusions can you draw?

- Make a tide stick. Take a four-foot stick marked every six inches. Push into sand in shallow water and record where the water level is. Check every half-hour to see how the depth has changed. Chart or graph your results. Learn how to read a tide chart. Find out what the tides are for a particular beach for a week. Visit the ocean shore! Look closely along the shoreline for debris such as shells, pebbles, plants, bottles, sea glass (pieces of glass that have been polished smooth by the sea), and decaying matter. Where did these things come from? How did they get there, and what is likely to happen to them?

8: Endangered in the Ocean

Make a list of some of the endangered species that live in or depend heavily upon the ocean. Research at least one of these species, and include a drawing or picture, a description, why it is endangered, and what, if anything, is being done to protect the species and its habitat.

9: Investigate *

Do **one** of the following:

- Visit an oceanographic research vessel or oceanographic institute. Make a list of at least four new things that you learned as a result of your visit.
- Visit an aquarium. Discover at least three things about ocean creatures that you did not know before. Share what you learn with others.
- Visit a tide pool. Find out what creatures and plants inhabit it. Create a poster, model, storyboard, or play to show what you have learned.

10: Careers *

Do **one** of the following:

- Make a list of careers that relate to oceanography. Learn about the different types of training and education needed to do these jobs.
- Arrange to meet a professional in the field of oceanography. Meet with this person at their place of employment, or have them come to a troop meeting.
- Research a scientist who has made an important contribution in the field of oceanography. If possible, interview the scientist in person, or by phone, letter, or email.

Resources:

- Enchanted Learning (enchantlearning.com): info, coloring books, and connect-the-dots pages
- Sea Education Association (sea.edu)
- National Oceanic Atmospheric Administration (noaa.gov/education)

- SeaWorld and Busch Gardens have educational materials, including a collection of books for grades K-3 and 4-8.
- The Marine Mammal Center (marinemammalcenter.org/education)
- Woods Hole on Cape Cod has an aquarium, and is home to the Woods Hole Oceanographic Institute (WHOI), which has an exhibit center with information about deep sea explorations and short videos about the sea.
- The National Sea Shore on Cape Cod has a visitor's center with exhibits, self-guided tours, and videos about the sea and a geologic history of Cape Cod.

Congratulations you've now completed your Oceanography: Juniors patch. Patches are available for purchase in [GSEMA shop](#).