



Oceanography: Brownies Patch Program

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

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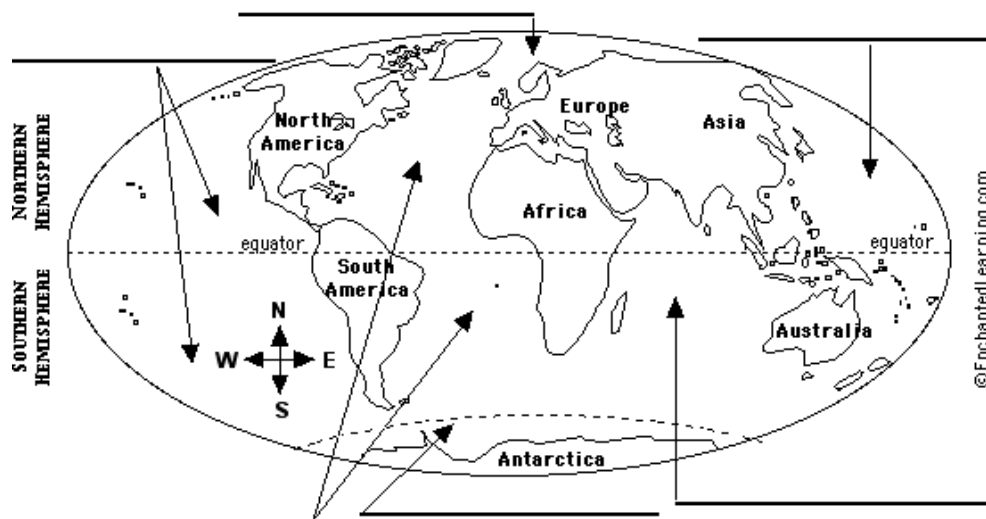
Step 1: Oceans

Why is the ocean blue? The ocean appears blue because it reflects the blue color of the sky. On a grey day, the ocean appears grey.

How much of the earth's surface is covered by water? Estimate the answer by playing catch with an inflatable globe. Record how often the catcher's left thumb lands on water then divide the answer by the number of times the ball was caught. (Approximately 70% of Earth's surface is covered by water and the oceans contain roughly 97% of Earth's water.)

There are five oceans on earth. Learn their names and complete the map.

- **Arctic Ocean:** Borders the North Pole. It is the smallest ocean.
- **Atlantic Ocean:** Borders the eastern coasts of North and South America and western Europe and Africa.
- **Indian Ocean:** Borders eastern Africa, southern Asia, and western Australia.
- **Pacific Ocean:** Borders western coasts of North and South America, eastern Asia, and northeastern Australia. It is the largest ocean.
- **Southern Ocean:** Borders Antarctica and extends to 60 degrees latitude.



Step 2: Sand and Shells

Start a sand or sea shell collection. To collect sand, use small containers like clear film canisters or make sand cards. Be sure to record the location and the date. Remember that if you have sand from the same beach on different dates, they are not always the same.

- **Sand Cards:** Take a 3x5 or 4x6 index card and fold it in half. Cut a small triangle out of the folded side of the card. Unfold the card and put one piece of clear (not invisible) tape over the hole. Pour a small amount of sand onto the tape, shake off the excess and cover it with another piece of tape. Label the card with the location and date.
- **Shell Collection:** Try and collect shells without chips, holes, or missing pieces. Group like shells together and find out the names of the different shells. Shells collected on New England beaches may be different from shells collected from other areas.
 - Try to collect shells from the following groups: clams, mussels, oysters, and snails.
 - Shells you might find in New England include: periwinkles, razor clams, whelk or conch, soft shell clams, quahog shells, jingle shells, Northern Horse mussels, and Eastern oysters.
 - Native Americans made wampum from shells. What kind of shell was used? Why did they make it? How did they use it?

Step 3: Whales

Whales are one of the largest mammals on earth. There are toothed and baleen whales. Find out about the different kinds of whales by doing **one** of the following:

- Go on a whale watch to observe the whales and learn about them from the crew.
- Go to an aquarium or museum of natural history to learn about whales. Ask what the different kinds of whales eat.
- Research whales in books or on the internet.

“Eat” Like a Baleen Whale

Supplies: toothbrushes, tweezers, tea leaves or dried herbs, large pan of water.

Baleen whales have “brushes” in their mouths like brooms. They use their baleen to filter sea water and trap the plankton they eat. Sprinkle the “plankton” (herbs) in the water. Now try and see how much you “can eat” by using the tweezers to collect plankton. Then try the toothbrushes to collect the floating “plankton.” Which way would a large whale prefer to collect their lunch?

-OR-

Make a “Blubber Glove”

Supplies: large can of vegetable shortening and two plastic bags with press seals (not zippers).

Place the shortening into one bag. Turn the second bag inside out and put your hand into the bag. Insert it into the first bag and seal the outer and inner bags together sandwiching the shortening between the two bags to create the glove. Spread the shortening so it will insulate your hand when in the glove. Whales and other marine mammals use blubber to keep warm in the ocean. Place one hand inside a plastic bag and the other inside the glove. Put both hand into ice water. Which hand is warmer?

Step 4: Communication

How do sea creatures communicate? The ocean is actually a noisy place. You may have heard about whale songs or dolphins speaking.

Fishy Love, or How Not to be Lunch

Supplies: small wooden blocks or film canisters half filled with rice, beans, or other items to make noise, two blindfolds, and two canisters with items that make a distinctive noise like washers or paper clips. (You could also use party noise makers.)

Stand in a circle to represent the ocean. Blindfold one Girl Scout and give another one of the special noise makers. Have the blindfolded girl try and find “lunch,” which is the girl with the noise maker.

For the next round, give the girls in the circle noise makers. Blindfold both girls in the circle and give them both special noise makers. Now have all the girls use their noise makers while the two “fish” in the center look for love in all the wrong places before finding each other.

Light does not penetrate very far into the ocean, so sound is how the males and females find each other since they often live quite far apart.

Step 5: Waves

Observe waves in motion. What causes waves? The winds cause waves on the surface of the ocean and on lakes. The wind transfers some of its energy to the water through friction between the air molecules and water molecules. Stronger winds (like storm surges) cause larger waves.

Waves of water do not move horizontally, they only move up and down (a wave does not represent a flow of water). You can observe a demonstration of this by watching a floating buoy bob up and down with a wave. It does not move horizontally with the wave.

You can make your own miniature waves by blowing across the surface of a pan of water. Or, suspend corks at different levels in an aquarium or large plastic container. Use your hand to make waves at the surface and observe which ones are moved by waves and which stay still. See what happens if you make larger waves.

Tsunamis (sometimes called tidal waves) are different from surface waves. Find out what causes tsunamis.

Step 6: Tides

What causes the tides? Tides are periodic rises and falls of large bodies of water. Tides are caused by the gravitational interaction between the earth and the moon. This gravitational attraction of the moon causes the ocean to bulge out in the direction of the moon. Another bulge occurs on the opposite side since the earth is also being pulled toward the moon and away from the water on the far side. Since the earth is rotating while this is happening, two tides occur each day.

Learn how to read a tide chart for a beach near you. When is high tide? When will the tide be at its lowest? How much do the times change each day? Will the high tide be earlier or later tomorrow? You can also research spring and neap tides.

Step 7: Explore the Shore

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?

Horseshoe Crabs are often found along the North Atlantic shore. Don't hurt them—they may still be alive and will return to the ocean with the next tide. They are one of the oldest living animals on earth and are called living fossils because their appearance has not changed in 360 million years.



Try to find both living and nonliving things along the shore or in tide pools. You'll need a pencil. When you find an item, check it off. Do your best not to harm, move, or take any of these things. Animals or plants may depend upon them. Small nonliving items may be kept as mementos of your shore visit.

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|--|---|--|
| <input type="checkbox"/> sea glass | <input type="checkbox"/> "green heads" | <input type="checkbox"/> oyster shell |
| <input type="checkbox"/> drift wood | <input type="checkbox"/> barnacles | <input type="checkbox"/> sand dollar |
| <input type="checkbox"/> buoy | <input type="checkbox"/> crabs | <input type="checkbox"/> periwinkle shells |
| <input type="checkbox"/> lighthouse | <input type="checkbox"/> minnows | <input type="checkbox"/> jingle shell |
| <input type="checkbox"/> tern | <input type="checkbox"/> starfish or sea star | <input type="checkbox"/> cockle shell |
| <input type="checkbox"/> seagull | <input type="checkbox"/> jellyfish | (slipper or boat shell) |
| <input type="checkbox"/> sand piper | <input type="checkbox"/> surf clam | <input type="checkbox"/> algae (seaweed) |
| <input type="checkbox"/> "mermaid's purse"
(skate egg case) | <input type="checkbox"/> razor clam | <input type="checkbox"/> sand fleas |
| | <input type="checkbox"/> mussel shell | |

Resources:

- Enchanted Learning (enchantedlearning.com): information, 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: Brownies patch. Patches are available for purchase in [GSEMA shop](#).