



Oceanography

Scouts BSA · STEM

Name

Started

Completed

Oceans cover most of the Earth and affect weather, food, and life everywhere. You'll learn how seawater moves, what lives in it, and how scientists study it. You don't need to live near the coast to explore the ocean.

Requirements

Every official requirement, in plain language. Check the official wording when you sign off (scouting.org/merit-badges/oceanography/). Tips and examples are ideas, not extra requirements.

- ☐ **1** Name four branches of oceanography, and give at least five reasons it matters for people to learn about the oceans

Tip: Think about all the ways oceans affect your life, even if you live far inland, like weather and food.

Example: List the four main branches, physical, chemical, biological, and geological, with one real question each studies. Then give five reasons the ocean matters to people, even inland, like rain from ocean moisture, seafood, shipping, oxygen made by plankton, and medicines found in sea life.

- ☐ **2** Explain salinity, temperature, and density, and how oceanographers measure each in seawater. Discuss ocean circulation and currents, and describe how the oceans affect weather and climate

Tip: Try a simple test with salt water and fresh water, like seeing which one an egg floats in.

- ☐ **3** Describe what ocean waves are like, then do 3a through 3d

Tip: Watch videos of waves and tides and explain what causes each. Learn how to escape a rip current.

Example: Explain rip currents with a drawing of water rushing back out between sandbars, and show how to escape: stay calm, swim parallel to shore, then angle back in. Compare that with a tsunami, which comes from an earthquake, not wind.

- ☐ **3a** Tell how a storm surge, a tsunami, a tidal wave, and a tidal bore differ from each other

- ☐ **3b** Explain how sea, swell, and surf are different

- ☐ **3c** Explain what makes breakers form

- ☐ **3d** Explain what a rip current is, how to stay out of one, and what to do if one catches you

- ☐ **4** Draw a cross-section of the sea floor labeling a trench, canyon, rift valley, seamount, guyot, and oceanic ridge. Compare ocean depths with the heights of mountains on land, and show 4a through 4c

Tip: Draw the ocean floor from the shore out to the deep, and label each feature.

Example: Draw a cross-section from the beach out: the continental shelf, slope, and abyssal plain, plus a canyon, a seamount, a flat-topped guyot, an oceanic ridge with its rift valley, and a trench. Add a depth scale and compare the deepest trench with Mount Everest.

- ☐ **4a** Show what the continental shelf is

- ☐ **4b** Show what the continental slope is

- ☐ **4c** Show what the abyssal plain is

- ☐ **5** List the chief salts, gases, and nutrients found in seawater and describe some key properties of water. Tell how ocean life changes seawater's chemistry, and how evaporation and rainfall change its saltiness

Tip: Let a dish of salt water dry on a sunny windowsill and look at what's left. Then think about where those salts come from and how rain or a hot, dry day changes how salty the sea gets.

- ☐ **6** Describe some properties of seawater that matter to living things. Define benthos, nekton, and plankton and name some plants and animals in each group. Describe phytoplankton's role and importance in the ocean food chain

Tip: Make a chart that sorts sea creatures into bottom dwellers, swimmers, and drifters, and note how each one's body handles salt, pressure, or cold.

7 Hands-on ocean project: Choose 1 of 6

Tips for this section: Choose a project you'll enjoy, like building a model or doing a simple experiment at home.

Example for this section: Build a wave tank from a long plastic bin: make waves with a paddle, watch them bounce off the end and bend around a block, then add a jetty or breakwater made of stones and see how the pattern changes. Or build a plankton net from old tights and a wire hanger.

- ☐ **7a** Build a plankton net and use it for about 20 minutes (towed from a dock or rowboat, while wading, or held in a current). Keep the sample, look at it under a microscope or strong magnifier, and identify its three most common plankton types. A lake or stream is fine

- ☐ **7b** Build several clay-or-plaster-and-wood models of a volcanic island showing an atoll developing, starting as a fringing reef, then a barrier reef. Describe Darwin's theory of how coral reefs form

- ☐ **7c** For five days in a row, four times a day, measure water temperature at the surface, middle, and bottom of a body of water, plus air temperature, cloud cover, and roughness. Make a Secchi disk for turbidity. Graph the results and explain how water and air temperature relate

- ☐ **7d** Build a model of how littoral currents, tides, and waves move sediment near shore. Include high and low waterlines, a low-tide terrace, a berm, and coastal cliffs, and show how offshore bars build up and wash away

- ☐ **7e** Build a wave generator and use it to show wave reflection and refraction, and how groins, jetties, and breakwaters change those patterns

- ☐ **7f** With approval from your counselor and permission from a parent or guardian, follow online satellite images of one location for three weeks. Tell your counselor what you learned

8 Report, visit, or speech: Choose 1 of 3

Tips for this section: If you can, visit an aquarium or marine center. If not, read an oceanography book, or give a short talk to your troop on why oceanography matters or on ocean careers.

Example for this section: A five-minute speech to your troop on why oceanography matters could use coral reefs as the example: how scientists track the warm water that bleaches reefs, and why that matters for fish and coastlines. Get your counselor's OK on your outline, use a photo or two, and practice twice.

- ☐ **8a** Read a book about oceanography that your counselor approves and write a 500-word report on it

8b Visit a marine site: Choose 1 of 2

- ☐ **8b1** Visit an oceanographic research ship and write a 500-word report about the visit

- ☐ **8b2** Visit an oceanographic institute, marine laboratory, or marine aquarium and write a 500-word report about the visit

- ☐ **8c** Give your troop a five-minute prepared speech on why oceanography is important or on careers in oceanography. Get your counselor's approval of your outline first

- ☐ **9** Describe four ways marine scientists study the ocean, the geology beneath it, and the life in its waters

Tip: Look up how scientists use ships, buoys, satellites, and underwater robots to study the sea.

Example: Describe research ships taking water samples, floats that drift and record temperature and salinity, satellites measuring sea surface height, and remotely operated vehicles filming the deep sea floor.