



# Oceanography

## Merit Badge Requirements

- 1) Name four branches of oceanography. Describe at least five reasons why it is important for people to learn about the oceans.
- 2) Define salinity, temperature, and density, and describe how these important properties of seawater are measured by the physical oceanographer. Discuss the circulation and currents of the ocean. Describe the effects of the oceans on weather and climate.
- 3) Describe the characteristics of ocean waves. Point out the differences among the storm surge, tsunami, tidal wave, and title bore. Explain the difference between sea, swell, and surf. Explain how breakers are formed.
- 4) Draw a cross-section of underwater topography. Show what is meant by:
  - A) Continental shelf
  - B) Continental slope and
  - C) Abyssal plainsName and put on your drawing the following: seamount, guyot, rift valley, canyon, trench, and oceanic ridge. Compare the depths in the oceans with the heights of the mountains on land.
- 5) List the main salts, gases, and nutrients in seawater. Describe some important properties of water. Tell how the animals and plants of the ocean affect the chemical composition of seawater. Explain how differences in evaporation and precipitation affect the salt content of the oceans.
- 6) Describe some of the biologically important properties of seawater. Define benthos, nekton, and plankton. Name some of the plants and animals that make up each of these groups. Describe the place and importance of phytoplankton in the oceanic food chain.
- 7) Do ONE of the following:
  - A) Make a plankton net. Tow the net by a dock, wade with it, hold it in a current, or tow it from a rowboat. Do this for about 20 minutes. Save the sample. Examine it under a microscope or high-power glass. Identify the three most common types of plankton in the sample. \*This may be done in lakes or streams.
  - B) Make a series of models (clay or plaster and wood) of a volcanic island. Show the growth of an atoll from a fringing reef through a barrier reef. Describe the Darwinian theory of coral reef formation.
  - C) Measure the water temperature at the surface, midwater, and bottom of a body of water four times daily for five consecutive days. You may measure depth with a rock tied to a line. Make a Secchi disk to measure turbidity (how much suspended sedimentation is in the water). Measure the air temperature. Note the cloud cover and roughness of the water. Show your findings (air and water temperature, turbidity) on a graph. Tell how the water temperature changes with air temperature.
  - D) Make a model showing the inshore sediment movement by littoral currents, tidal movement, and wave action. Include such formations as high and low waterlines, low tide terrace, berm, and coastal cliffs. Show how the offshore bars are built up and torn down.
  - E) Make a wave generator. Show reflection and refraction of waves. Show how groins, jetties, and breakwaters affect these patterns.
  - F) Track and monitor satellite images available on the Internet for a specific location for three weeks. Describe what you have learned to your counselor.
- 8) Do ONE of the following:
  - A) Write a 500-word report on any good book about oceanography approved by your counselor.
  - B) Visit one of the following:
    - 1) An oceanographic research ship or
    - 2) An oceanographic institute.Write a 500-Word report about your visit
  - C) Explain to your troop in a 5-minute prepared speech "Why Oceanography Is Important" or describe "Career Opportunities in Oceanography." (Before making your speech, show your speech outline to your counselor for approval.
- 9) Describe four methods that marine scientists use to investigate the ocean, underlying geology, and organisms living in the water.

**Requirement 1**

What are four branches of oceanography?

\_\_\_\_\_

Give 5 reasons why it is important for people to learn about the oceans:

1) \_\_\_\_\_  
\_\_\_\_\_

2) \_\_\_\_\_  
\_\_\_\_\_

3) \_\_\_\_\_  
\_\_\_\_\_

4) \_\_\_\_\_  
\_\_\_\_\_

5) \_\_\_\_\_  
\_\_\_\_\_

**Requirement 2**

Define the following terms and also list how these are measured by an oceanographer:

Salinity: \_\_\_\_\_

How Measured: \_\_\_\_\_

Temperature: \_\_\_\_\_

How Measured: \_\_\_\_\_

Density: \_\_\_\_\_

How Measured: \_\_\_\_\_

Give a brief summary, or discuss on paper, the circulation and currents of the ocean: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Give a brief summary, or discuss on paper, the effects of the oceans on weather and climate: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



### Requirement 4

Draw a cross-section of underwater topography.

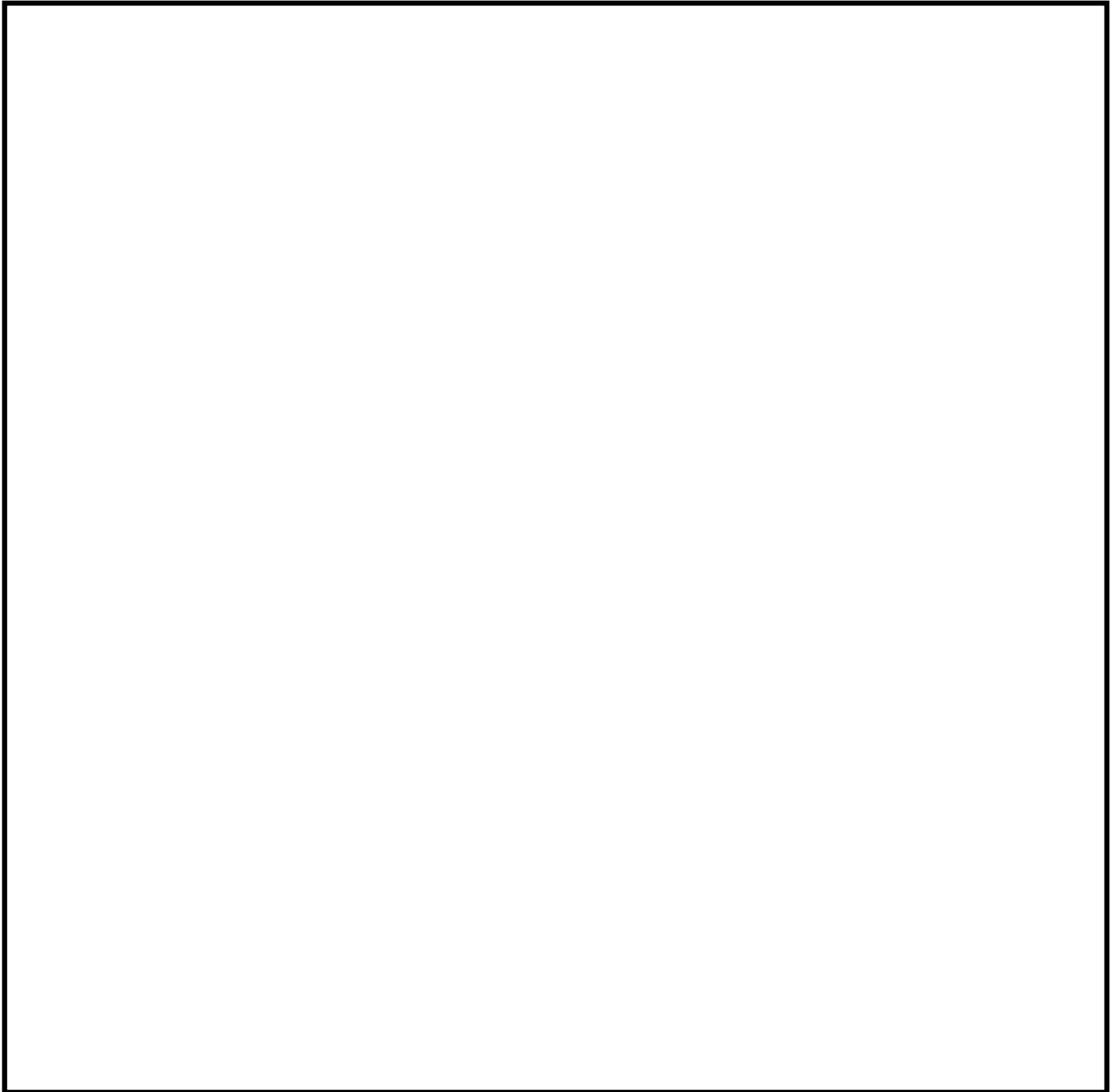
In your drawing, show what is meant by:

- A) Continental Shelf      B) Continental Slope      C) Abyssal Plains

Put the following in your drawing and label them:

- A) Seamount      B) Guyot      C) Rift Valley      D) Canyon      E) Trench      F) Oceanic Ridge

Compare the depths in the oceans with the heights of the mountains on land.



**Requirement 5**

List the main salts, gases, and nutrients in seawater

Salts: \_\_\_\_\_

Gases: \_\_\_\_\_

Nutrients: \_\_\_\_\_

Describe some important properties of water: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

How do the animals and plants of the ocean affect the chemical composition of seawater? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Explain how the differences in evaporation and precipitation affect the salt content of the oceans: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Requirement 6**

Describe some of the biologically important properties of seawater: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Define the following AND name some of the plants and animals that make up each group:

Benthos: \_\_\_\_\_

Plants: \_\_\_\_\_

Animals: \_\_\_\_\_

Nekton: \_\_\_\_\_

Plants: \_\_\_\_\_

Animals: \_\_\_\_\_

Plankton: \_\_\_\_\_

Plants: \_\_\_\_\_

Animals: \_\_\_\_\_

Describe the place and importance of phytoplankton in the oceanic food chain: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

### Requirement 7

You have been given six options for this requirement. Select and complete one of them.

If you selected *Option A*:

Make a plankton net\*. Tow the net by a dock, wade with it, hold it in a current, or tow it from a rowboat. Do this for about 20 minutes. Save the sample. Examine it under a microscope or high-power glass. Identify the three most common types of plankton in the sample. \*This may be done in lakes or streams.

Describe the area that you towed your plankton net: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

List the three types of plankton that you identified in your sample:

\_\_\_\_\_

If you selected *Option B*:

Make a series of models (clay or plaster and wood) of a volcanic island. Show the growth of an atoll from a fringing reef through a barrier reef. Describe the Darwinian theory of coral reef formation.

What models did you build? \_\_\_\_\_

What materials were used to build your models? \_\_\_\_\_  
\_\_\_\_\_

\_\_\_ Once you have completed your models, show them to your counselor.

Describe the Darwinian theory of coral reef formation: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected *Option C*:

Measure the water temperature at the surface, midwater, and bottom of a body of water four times for 5 consecutive days. You may measure depth with a rock tied to a line. Make a Secchi disk to measure turbidity (how much suspended sedimentation is in the water). Measure air temperature. Note the cloud cover and roughness of the water. Show your findings (air and water temperature, turbidity) on a graph. Tell how the water temperature changes with air temperature. Give a brief summary of this process, how you did it and your results: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected **Option D**:

Make a model showing the inshore sediment movement by littoral currents, tidal movement, and wave action. Include such formations as high and low waterlines, low tide terrace, berm, and coastal cliffs. Show how the offshore bars are built up and torn down.

\_\_ Once you have built this model completely, take it to your counselor for approval and discussion.

Give a brief summary of your experience building this model: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected **Option E**:

Make a wave generator. Show reflection and refraction of waves. Show how groins, jetties, and breakwaters affect these patterns.

\_\_ Once you have built this model completely, take it to your counselor for approval and discussion.

Give a brief summary of your experience building this model: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If you selected **Option F**:

Track and monitor satellite images available on the Internet for a specific location for three weeks. Describe what you have learned: \_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### **Requirement 8**

You have been given three options for this requirement. Select and complete one of them.

If you selected **Option A**:

Write a 500-word report on any good book about oceanography approved by your counselor.

Complete your 500 word report on a separate sheet of paper and turn it in to your counselor. Have your counselor initial here when you have completed this requirement.

Counselors Initials: \_\_\_\_\_



Scout Name: \_\_\_\_\_ Unit #: \_\_\_\_\_ Date: \_\_\_\_\_

## Requirement 9

Describe four methods that marine scientists use to investigate the ocean, underlying geology, and organisms living in the water.

Method #1: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Method #2: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Method #3: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Method #4: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_