

Oceanography Short Study Guide

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- _____ 1. Which of the following was the first expedition to use scientific measuring devices to study the ocean?
- a. SEASAT expedition
 - b. *Meteor* expedition
 - c. *Poseidon* expedition
 - d. *Challenger* expedition
- _____ 2. Which of the following correctly describes the order of the steps involved in the formation of sea ice?
- a. ice crystals, pancake ice, slush, pack ice
 - b. slush, ice crystals, pancake ice, pack ice
 - c. ice crystals, slush, pack ice, pancake ice
 - d. ice crystals, slush, pancake ice, pack ice
- _____ 3. After volcanism created Earth's atmosphere, what happened next to lead to the formation of oceans?
- a. Earth's crust cooled.
 - b. Ice caps melted.
 - c. Meteorite strikes stopped.
 - d. Carbon dioxide and other gases formed in the crust.
- _____ 4. Which of the following is NOT true of global sea level?
- a. Global sea level can rise in response to the melting of glaciers.
 - b. Tectonic forces cannot affect global sea level.
 - c. Average global sea level is rising today by 1 to 2 mm per year.
 - d. During an ice age, global sea levels drop.
- _____ 5. Which of the following affects the density of seawater?
- a. salinity
 - b. melting point
 - c. hydrogen bonds
 - d. breakers
- _____ 6. Which of the following is NOT an Atlantic deep-water mass?
- a. Antarctic Bottom Water
 - b. Antarctic Intermediate Water
 - c. Atlantic Bottom Water
 - d. North Atlantic Deep Water
- _____ 7. What is the average surface temperature of the ocean?
- a. -2°C
 - b. 2°C
 - c. 30°C
 - d. 15°C
- _____ 8. How does the formation of sea ice raise the density of nearby water?
- a. The water is chilled under the forming ice.
 - b. Salt ions are concentrated in the water under the ice.
 - c. Salty water migrates toward the forming ice.
 - d. The growing ice sheet puts downward pressure on the water.

Matching

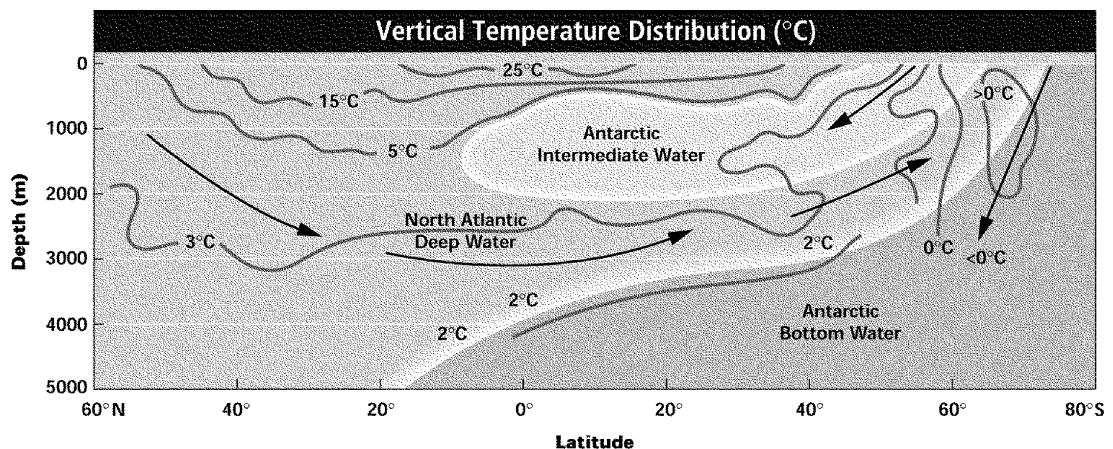
Match each item with the correct description below.

- | | |
|----------------|---------------------|
| a. wave height | f. density currents |
| b. tidal range | g. gyres |
| c. gravitation | h. upwelling |
| d. breakers | i. wavelength |
| e. neap tide | |

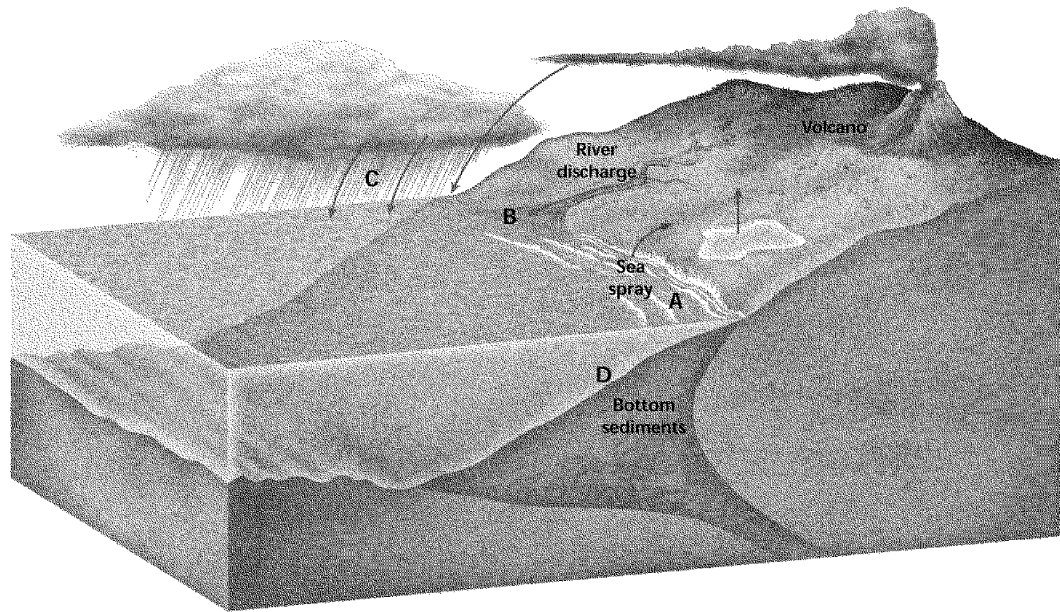
- ____ 9. Vertical movement of nutrient-rich ocean water
- ____ 10. Determines the speed with which waves move through deep water
- ____ 11. The difference between the levels of high and low tide
- ____ 12. Collapsing waves
- ____ 13. Basic cause of tides

Short Answer

14. How have scientists been able to infer the age of oceans by examining lava flows?
15. What is the thermocline?
16. Explain the main cause of ocean layering.
17. Which force would cause an object floating in the middle of the ocean to move forward: ocean waves, surface currents, or density currents? Explain your answer.
18. In the diagram below, why are the three water masses distributed as shown?



Use the diagram below to answer the following questions.



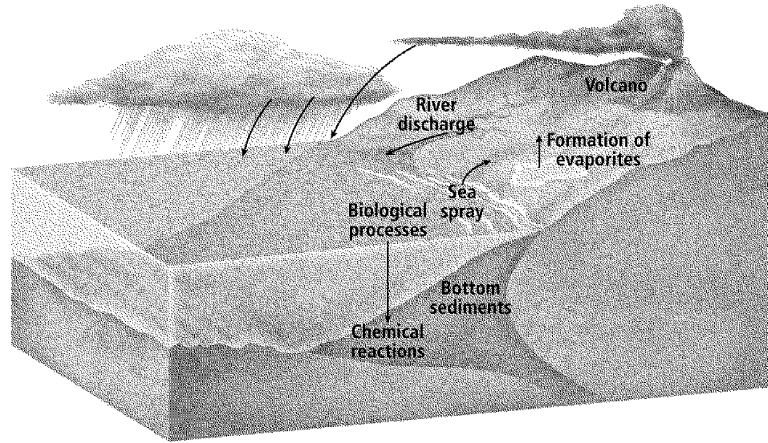
- 19. At what location is the salinity of the water most likely the lowest? Why?
- 20. At what location would the density of the water most likely be the highest? Why?

Describe the concept or process that is shown in each diagram.

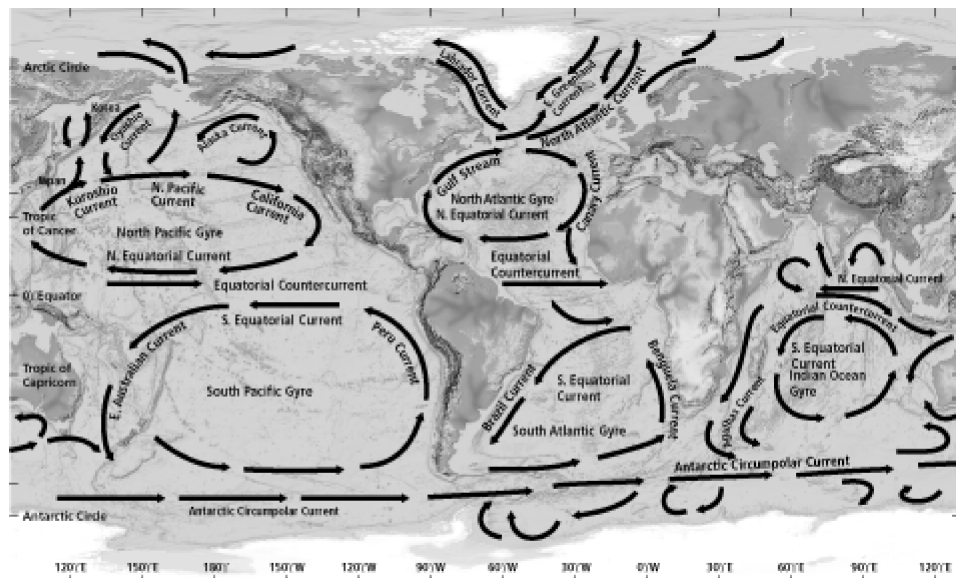
- 21. Cause of Tides



22. Sources of Sea Salt



Use the diagram of Earth's gyres to answer the following questions.



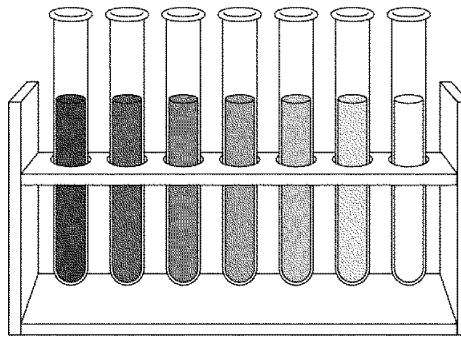
23. What would be the likely effect on the currents near Japan and Korea if the prevailing midlatitude winds blew from east to west instead of west to east?

Problem

Your Earth science class is conducting an experiment to determine the salt concentrations in an estuary, a place where a freshwater river flows into the salty seawater of an ocean. You have been told that in the inland portion of an estuary, the less-dense river water overrides the denser seawater.

You have collected seven samples of water from different locations in the estuary. You have also collected a sample of pure river water and a sample of pure seawater. You make concentrated samples by boiling each estuary sample until it is reduced to 250 mL. Then you fill seven test tubes halfway with each concentrated sample. Next, you make reference samples in seven more test tubes. The table shows the contents of each reference test tube.

Study the illustration and table and answer the questions that follow.



Reference Samples

Test Tube	Percentage of River Water	Percentage of Seawater
1	100	0
2	80	20
3	60	40
4	50	50
5	40	60
6	20	80

24. Knowing that river water is usually brownish in color and seawater is clear, how could you use the river water/seawater samples to determine the composition of the estuary water samples?
25. Would the method described in question 1 provide a precise measurement of the ratio of river water to seawater in the estuary samples? Why or why not?
26. What property of seawater might you use to determine the actual ratio of river water to seawater in the estuary samples? Explain your answer.

Name: _____

ID: A

27. Would you expect the concentration of salt to be the same or different in each estuary sample?
Explain your answer.
28. How might estuary samples taken from deep water affect your results?

Oceanography Short Study Guide Answer Section

MULTIPLE CHOICE

1. D
2. D
3. A
4. B
5. A
6. C
7. D
8. B

MATCHING

9. H
10. I
11. B
12. D
13. C

SHORT ANSWER

14. Some ancient lava flows have glassy crusts that form only when lava is cooled rapidly under water. If a scientist knows how old the lava is, he or she can infer that oceans have existed or at least that long.
15. The thermocline is a transitional temperature layer in the ocean beneath about 100 m. The thermocline is characterized by temperatures that decrease rapidly with depth.
16. Density differences is the main cause of ocean layering because cold water, which is more dense than warm water, sinks to the bottom, while less-dense warm water is found near the surface.
17. The force of surface currents would cause a floating object to move forward. Surface currents are movements of water in the upper few hundred meters of the ocean and are caused by wind. Therefore, a floating object would be carried along by the water. Density currents are deep ocean water movements and would not have an effect on an object floating at the surface. Ocean waves would cause the object to bob up and down, but would not move the object forward because as an ocean wave passes, only the energy moves steadily forward. The water itself moves up and down in a circular pattern and returns to its original position.
18. Antarctic Bottom Water is the coldest and densest water in the Atlantic Ocean. North Atlantic Deep Water is warmer and less dense and thus will override Antarctic Bottom Water. Antarctic Intermediate Water, the warmest and least dense of the three masses, overrides the other two.
19. The salinity is probably lowest at B because fresh river water is flowing into the ocean at that location.

20. The density is probably highest at D because it is the deepest point on the diagram. Ocean water decreases in temperature with depth, and as temperature decreases, density increases.
21. High tides are caused mainly by the gravitational pull of the Moon on Earth's ocean waters.
22. Volcanic eruptions send gases into the atmosphere. These gases contribute chloride and sulfate ions to seawater.
23. The ocean currents would flow in a west-to-east direction, too.

PROBLEM

24. You could compare the colors of the actual estuary samples with the colors of the samples made with river water and seawater. The reference sample that most closely matches the estuary sample in color will help determine the ratio of river water to seawater in the estuary sample.
25. No; a visual comparison would only give an approximate idea of the percentages in each sample. The amount of salt present in each sample would have to be measured to determine the actual ratio.
26. Density; because the salt content of seawater makes its density higher than that of freshwater, the densities of the samples could be calculated to determine the actual ratio of river water to seawater in each sample.
27. There should be variations in the samples because the concentration of river water would decrease as it mixed with more and more ocean water.
28. The salt concentration should be higher in deep water samples because salt water is denser and heavier and most likely layered below the less-dense freshwater.