

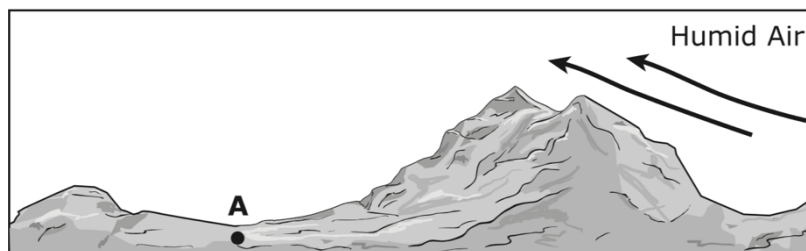
## Answers to the Study Guide for Ocean Currents and Climate

True or False:

- F 1. Water loses heat faster than land or air.
- T 2. The equator gets more energy from the sun than the poles.
- F 3. Coastal weather is hotter in the summer than weather inland at the same latitude.
- T 4. The Global Ocean Conveyor Belt moves heat (thermal energy) and nutrients.
- T 5. Parts of the ocean have more salt than other parts.
- F 6. The top water in the ocean is warmer and saltier than the bottom water in the ocean.
- T 7. Water circulates in the ocean because the density of water changes with temperature and salt concentration.
- F 8. When upwelling occurs a lot of organisms that live in the ocean die from lack of food.
- F 9. Mountains cause deserts to form because all the precipitation runs off due to their steep slopes.
- T 10. Large bodies of water help to keep temperatures of nearby land milder than it would be otherwise.

Answer the following questions:

A, D, E 11. A student studies the diagram shown. The arrows in the diagram represent a typical flow of wind over a mountain.



The student correctly explains the expected atmospheric conditions in the diagram. Which 3 statements should be part of the student's explanation?

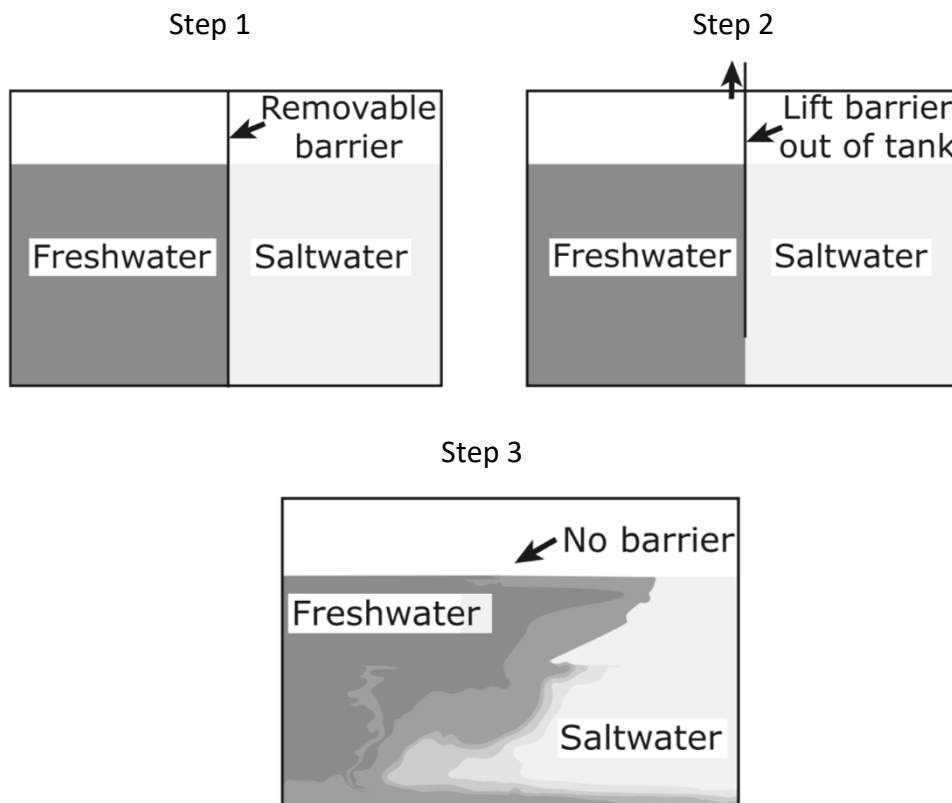
- a. Warm air rises up the mountain.
- b. Rain occurs often at location A.
- c. The humid air travels up the mountain and falls back down the other side.
- d. Location A is a dry location.
- e. The humid air cools as it is rising to the top of the mountain and turns to clouds.

C 12. Which statement correctly describes one way ocean currents affect a region?

- a. Deep ocean currents push into estuaries, creating sand deposits that form barrier islands.
- b. Cold ocean currents along the equator increase evaporation rates, creating circular winds that produce tropical storms.
- c. Warm ocean currents keep coastal air temperatures warm, creating moderate climate conditions in coastal regions.
- d. Deep ocean currents move water from polar seas toward the equator, creating drafts of cold air that blow over polar regions.

D 13. In the winter, seawater evaporates and precipitates as snow on top of sea ice. The snow freezes and the sea ice becomes thicker. When the water evaporates from the sea, it leaves behind saltier water because the salt does not evaporate. As a result, icebergs and sea ice are freshwater bodies. Sea ice has an albedo of about 60%. Therefore, sea ice reflects about 60% of the sun's radiation and absorbs about 40%. In the summer, the ice begins to crack and pieces of it fall into the ocean. When a piece of sea ice falls into the sea, it melts. Since the sea ice is freshwater, it results in a concentration of freshwater on the surface of the ocean near the sea ice.

The students want to investigate how the cycle of sea ice formation helps make ocean currents. In their investigation they build a model. The model is a fish tank that contains freshwater and saltwater separated by a removable barrier. The freshwater has blue food coloring in it and the saltwater has yellow food coloring in it. At Step 1 the barrier is in place and the different types of water are separated. During Step 2 the barrier is quickly removed. Step 3 shows the water mixing immediately after the barrier has been removed.



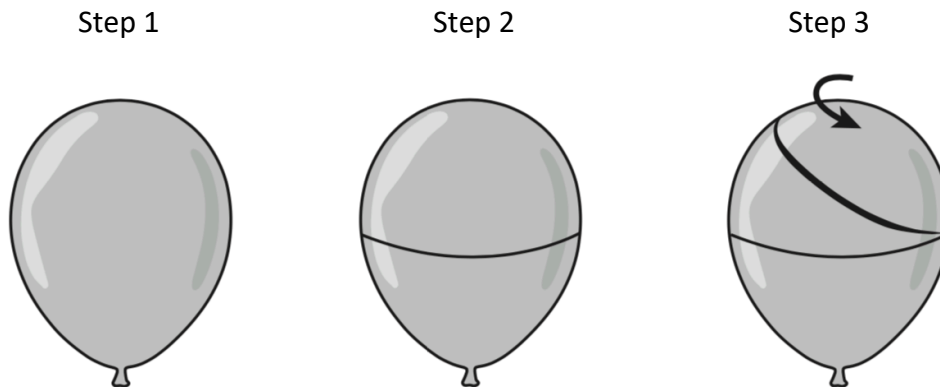
Which argument supports the evidence from Step 3 of the investigation?

- a. Freshwater is rising because it has a higher albedo.
- b. Freshwater is rising because it is colder.
- c. Saltwater is sinking because its volume is increasing.
- d. Saltwater is sinking because it is more dense.

**A** 14. Based on the investigation, which effect does the salt concentration of seawater have on ocean currents?

- a. Ocean currents are the strongest when the salt concentration difference between freshwater and saltwater is greatest.
- b. Ocean currents are the strongest when the salt concentration difference between freshwater and saltwater is lowest.
- c. Ocean currents are the strongest when freshwater meets another body of freshwater.
- d. Ocean currents are the strongest when the difference in albedo of saltwater and freshwater is greatest.

**B, E** 15. Students are demonstrating the movement of wind. In Step 1, they blow up a balloon, trying to make it as round as possible. In Step 2, they draw a line around the middle of the balloon to represent the equator. In Step 3, one student spins the balloon. While the balloon spins, another student draws a line from the middle of the balloon to the top.



In which 2 ways can this model represent the Coriolis effect?

- a. Warm air rising causes cooler air to sink to the surface.
- b. Rotation of Earth causes the wind to appear to curve.
- c. Wind at the equator is denser than wind at the poles.
- d. Cool air flows faster than warmer air as it moves across Earth.
- e. The amount the wind appears to curve depends on the speed of Earth's rotation.