Oceanic Circulation:

What Keeps the Ocean in Motion?

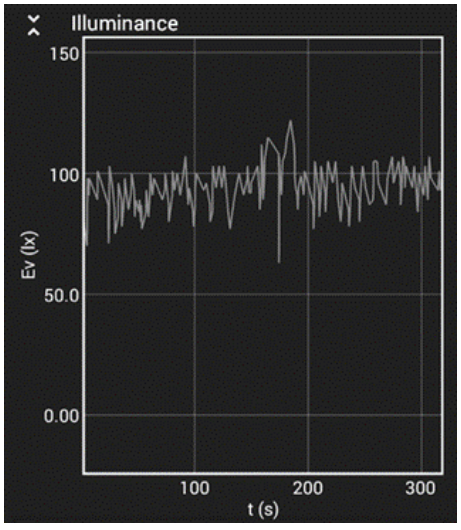
Student quiz—*Answer key*

Directions: Circle the best answer for the multiple-choice question below. Write your answer for the other question.

1. In your own words, explain in one sentence which factors drive ocean currents and the global ocean conveyor belt?

   The global ocean conveyor belt is driven by differences in water densities as a result of temperature (and salinity) differences in the ocean.

2. Someone shows you the following graph as a result of the same experiment that you performed in class. What experimental condition(s) fit the data shown?



   A. Both cups have the same water temperature.

   B. Hot water is top layer; cold water is lower layer.

   C. Water in the bottom cup is warmer than the upper cup.

   D. Water in the bottom cup is less dense than the top cup.

   a. A and B

   b. B and D

   c. C and D

   d. A and D

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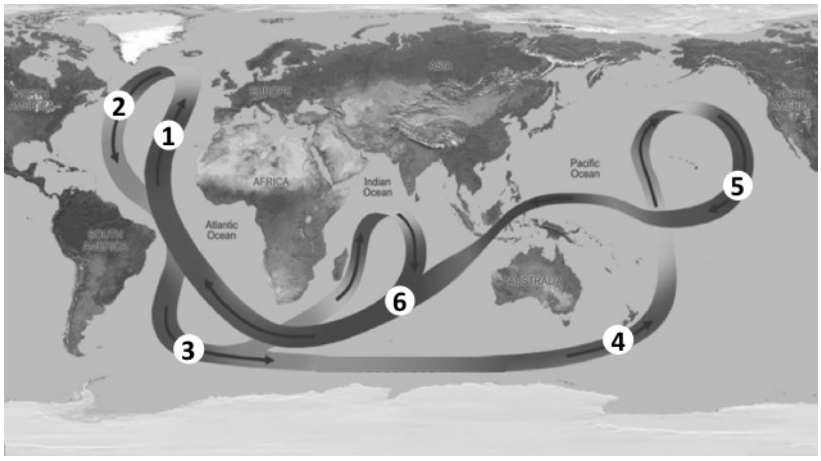
Directions: Circle the best answer for the multiple-choice question below. Write your answer for the other question.

3. Why is oceanic circulation important for our planet?
   a. Oceanic circulation prevents the mixing of nutrients, heat, and oxygen.
   b. Oceanic circulation causes the rotation of the Earth.
   c. Oceanic circulation distributes heat around the globe to regulate weather and climate.
   d. Oceanic circulation keeps polar ice from melting.

4. Use the image below and follow the numbers to explain how the global ocean conveyor belt works. Describe which parts of the ocean currents are cold, warm, on the surface (less dense), or at the bottom of the ocean (denser).



Currents begin near the pole in the North Atlantic (1) where the surface of the ocean gets cooled by arctic temperatures. This water, now denser, will sink to the bottom of the ocean floor (2). This creates a current, as warm surface water has to move in to replace the sinking water. The cold, deep water moves all the way to Antarctica (3/4), and then to the Indian and Pacific Oceans (5/6). Once the water reaches these warmer regions, it warms up, becomes less dense, and rises to the surface (5/6). Eventually, it finds its way back to the North Atlantic where the whole cycle begins again (1).

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Directions: Circle the best answer for the multiple-choice question below.

5. What could happen if, due to climate change, temperatures in the polar regions increase significantly?
    a. Surface water at the poles would not get cold and dense enough to sink to the ocean floor.
    b. The global ocean conveyor belt would slow down and could potentially stop.
    c. Ocean currents would not be able to distribute heat globally anymore, which would change our weather and climate.
    d. All of the above.