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Oceanic Circulations and Global Heat Transfer 10th Grade Quiz

Sophomores analyze thermohaline layering and heat transport mechanisms during this rigorous unit review or formative assessment on Earth's hydro-atmospheric interactions.

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1. Which mechanism explains why the deep ocean floor remains cold even near the equator, far from the influence of seasonal solar heating?

A. The Coriolis effect pushing warm equatorial water downward
B. Thermohaline circulation sinking cold, salty water at high latitudes
C. High pressure at depth preventing molecular kinetic energy increase
D. The isolation of the bathypelagic zone from the global water cycle

2. The process where deep, nutrient-rich water replaces surface water moved by winds, often boosting primary productivity in coastal regions like California, is called ____.

A. Downwelling
B. Transpiration
C. Sublimation
D. Upwelling

3. Seawater density is inversely proportional to salinity; therefore, as the salt content of a water mass increases, its density decreases.

A. True
B. False

4. If global temperatures rise significantly, freshwater input from melting glaciers in the North Atlantic could potentially disrupt the water cycle and climate by:

A. Increasing the speed of the North Atlantic Drift
B. Lowering the salinity and preventing surface water from sinking
C. Decreasing the rate of sea-ice formation through increased salt content
D. Accelerating evaporation rates due to decreased surface tension

5. In the hydrological cycle, the total amount of water moving between reservoirs remains relatively constant due to the principle of ____.

A. Mass balance
B. Hydrostatic equilibrium
C. Latent heat flux
D. Adiabatic cooling

6. The Agulhas Current, flowing along the coast of South Africa, is an example of an eastern boundary current characterized by cold, shallow water.

A. True

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B. False

7. During the process of advection, how is heat primarily transferred through the Earth's systems?

A. Through direct contact between the ocean and the atmosphere
B. Through the horizontal movement of water or air masses
C. Through electromagnetic waves traveling from the sun
D. Through the vertical rising of heated molecules

8. The transition layer between the warmer mixed surface layer and the colder deep water, where temperature decreases rapidly with depth, is known as the ____.

A. Halocline
B. Pycnocline
C. Thermocline
D. Abyssal plain

9. Rain shadows, such as the Atacama Desert in Chile, are formed when the water cycle interacts with topography, forcing precipitation on the windward side of mountains.

A. True
B. False

10. Specific heat capacity is a property of water that heavily influences global climate. How does the high specific heat of the ocean affect coastal cities compared to inland cities?

A. It causes coastal cities to experience more extreme seasonal temperature swings
B. It allows coastal cities to have more moderate temperatures year-round
C. It prevents the water cycle from occurring effectively near the coast
D. It causes a reduction in atmospheric pressure due to rapid heating