**Name:** _____ **Date:** _____

# Answer Key: Conquer the Blue Planet: Freshmen Ocean Systems Challenge

Students trace global energy transfers and phase changes that drive Earth's hydraulic engine and regulate maritime climates.

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**1. Which specific property of water allows the Mediterranean Sea to retain heat longer than the surrounding landmasses, regulating coastal temperatures?**

**Answer:** B) High specific heat capacity

Specific heat capacity is the amount of heat energy required to raise the temperature of a substance. Water requires more energy to heat up and takes longer to cool down than land, buffering coastal climates.

**2. The process by which plants release water vapor into the atmosphere through their leaves is known as _____.**

**Answer:** C) Transpiration

Transpiration is a critical biological component of the water cycle where moisture is carried through plants from roots to small pores on the underside of leaves.

**3. Thermohaline circulation is primarily driven by differences in water density caused by variations in temperature and salinity.**

**Answer:** A) True

The 'Global Conveyor Belt' is driven by density; cold, salty water is denser and sinks, while warmer, less salty water rises and moves to take its place.

**4. In the open ocean, what is the primary source of the salts—such as sodium and chloride—that contribute to the sea's salinity?**

**Answer:** B) Chemical weathering of continental rocks

Rainwater is slightly acidic and breaks down rocks on land. These ions are carried by rivers and streams into the ocean, where they accumulate over millions of years.

**5. The transition layer between warmer surface water and colder deep water, where temperature decreases rapidly with depth, is called the _____.**

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**Answer:** C) Thermocline

The thermocline is a distinct layer in a large body of water where the temperature changes more rapidly with depth than it does in the layers above or below.

**6. When sea ice forms in the Arctic, the salt is pushed out of the ice crystals, making the surrounding water less salty and less dense.**

**Answer:** B) False

This is false because while the salt is excluded from the ice (brine rejection), it actually makes the *surrounding* water much saltier and denser, causing it to sink.

**7. Which phenomenon occurs when surface winds push warm water away from a coastline, allowing cold, nutrient-rich water to rise from the depths?**

**Answer:** C) Upwelling

Upwelling is vital for marine ecosystems as it brings nitrates and phosphates from the deep ocean to the surface, supporting massive blooms of phytoplankton.

**8. In the water cycle, _____ occurs when water vapor loses thermal energy and changes state into liquid water droplets, forming clouds.**

**Answer:** B) Condensation

Condensation is the phase change from gas to liquid. It happens when air cools to its dew point, causing water vapor to collect around nuclei like dust or sea salt.

**9. What happens to the density of seawater as its salinity increases?**

**Answer:** C) Density increases

Salinity adds mass (dissolved salts) to a specific volume of water, thereby increasing its density compared to fresh water.

**10. Surface currents in the Northern Hemisphere generally circulate in a clockwise direction due to the Coriolis Effect.**

**Answer:** A) True

Because of Earth's rotation, the Coriolis Effect deflects moving objects/fluids to the right in the Northern Hemisphere, creating clockwise gyres.

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