Osmosis Simulator

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

> Open **peebedu.com** and navigate to **Osmosis Simulator**. Click the **Dive Into Osmosis!** button to begin. Read the introduction popup, which describes the three types of solutions — hypotonic, isotonic, and hypertonic — and how each affects cell volume.

Free Response Questions

Question 1 — Conceptual Analysis

> **Simulation Task:** *In the Osmosis Simulator, move the Solute Concentration slider to* **10** *and observe the red blood cell. Note the direction of water particle movement, the label that appears, and the Cell Mass reading. Then move the slider to* **50** *and compare. Record the Cell Mass at each setting.*

(A) (1 pt) **Describe** the relationship between the relative solute concentrations inside and outside a cell and the direction of net water movement across the membrane.

(B) (1 pt) **Explain** why a red blood cell increases in mass when placed in a solution with a lower solute concentration than its cytoplasm.

(C) (1 pt) **Predict** what would happen to a red blood cell placed in pure water.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

> **Simulation Task:** *In the Osmosis Simulator, set the Solute Concentration slider to* **90** *and observe the cell's response. Note the direction of water particle movement and the Cell Mass value. Then move the slider to* **50** *(isotonic) and observe how the cell recovers. Finally, move the slider to* **10** *and compare all three conditions.*

(A) (1 pt) **Describe** the process by which organisms control their internal solute composition and water balance in response to changes in the external environment.

(B) (1 pt) **Explain** why water molecules continue to cross the membrane in both directions even when the cell is in an isotonic solution and the cell's size remains constant.

(C) (1 pt) **Represent** the process of osmosis by drawing three side-by-side diagrams of a cell in a hypotonic, an isotonic, and a hypertonic solution, using arrows to indicate the net direction of water movement and labeling the relative solute concentrations inside and outside the cell in each.

Draw your diagram here.

(D) (1 pt) **Explain** why water molecules are able to cross the plasma membrane of a red blood cell in small amounts without a transport protein.

2.7.B.1, 2.7.B.2