Name _____ Date _____

Cell Membrane Transport Unit Review: Diffusion, Osmosis and Active Transport

Directions: Answer each question; one group of questions uses a table of results from potato cores.

1. How are the phospholipid molecules arranged in the membrane that surrounds a cell?

A. In two layers, with the tails facing the water on each side and the heads pointing inward

B. In two layers, with the heads facing the water on each side and the tails pointing inward

C. In one layer, with the heads facing outward and the tails facing the cytoplasm

D. In one layer, with the heads facing the cytoplasm and the tails facing outward

2. Which two of these substances can pass straight through the phospholipid bilayer, with no help from a membrane protein?

☐ A. Oxygen ☐ B. Carbon dioxide ☐ C. Sodium ions

☐ D. Starch ☐ E. Glucose

3. Use the word bank to complete these sentences about how particles diffuse.

Word bank
higher • energy • membrane • gradient • lower

In diffusion, the net movement of particles is from an area of _____ concentration to an area of _____ concentration. Particles moving this way are moving down their concentration _____.

4. Identical drops of food coloring are added at the same moment to a cup of hot water and a cup of cold water. Which prediction about how quickly the color spreads through each cup is correct?

A. It spreads faster in the cold water, because the particles there are closer together.

B. It spreads faster in the hot water, because the particles there move faster.

C. It spreads at the same speed in both, because only concentration affects diffusion.

D. It spreads only in the hot water, because diffusion cannot happen in cold water.

5. A tube is split into two sides by a membrane that lets water through but not sugar, and both sides start with the same volume. Side 1 holds a 5 percent sugar solution, and side 2 holds a 10 percent sugar solution. Which statement describes the movement that will happen across the membrane?

A. There is no net movement, because the membrane blocks the sugar.

B. There is a net movement of sugar from side 2 to side 1.

C. There is a net movement of water from side 2 to side 1.

D. There is a net movement of water from side 1 to side 2.

6. Match each part of the cell membrane to the job it does there.
Write the letter of the matching answer on each line.

1. _____ Channel protein
2. _____ Carrier protein
3. _____ Cholesterol (in animal cells)
4. _____ Carbohydrate chain on the outer surface

A. Forms a tunnel that lets certain ions or water molecules pass
B. Stores the instructions for making the cell's proteins
C. Serves as a marker that helps cells recognize each other
D. Helps keep the membrane from getting too fluid or too stiff
E. Binds a particular molecule and changes shape to move it across

7. Glucose, which is more concentrated in the blood than inside a red blood cell, enters the cell through a carrier protein, and the cell spends no ATP to move it. Which kind of membrane transport is this?

A. Active transport
B. Osmosis
C. Facilitated diffusion
D. Simple diffusion

8. Sodium ions are far more concentrated outside a nerve cell than inside it, yet a membrane pump moves still more sodium ions out of the cell. Why must the pump use energy from ATP to do this?

A. Every membrane protein uses ATP to move particles.
B. It moves sodium ions down their concentration gradient.
C. Sodium ions are too large to pass through a channel protein.
D. It moves sodium ions against their concentration gradient.

9. Limp lettuce leaves turn crisp after soaking in a bowl of tap water, which is hypotonic to the leaf cells. Which statement explains what happens inside the leaf cells as they soak?

A. Water leaves by osmosis, and the empty cell walls stiffen the leaf.
B. Water enters by osmosis, and each cell swells and presses against its wall.
C. Water enters by osmosis, and the cells burst and flood the leaf.
D. Salt enters by diffusion, and the extra salt makes each cell stiff.

10. A paramecium is a single-celled organism that lives in pond water, which is hypotonic to its cytoplasm. Its contractile vacuoles collect water and squeeze it out of the cell, over and over. What would most likely happen if its contractile vacuoles stopped working?

A. Water would keep leaving by osmosis, and the cell would shrink and could collapse.
B. Nothing would change, because pond water and the cytoplasm are in balance.
C. Water would keep entering by osmosis, and the cell would swell and could burst.
D. Salt would keep entering by diffusion, and the cell would shrink and could collapse.

Potato Cores in Salt Solutions

In an investigation, 30 potato cores of the same size were cut from one potato. Five cores were placed in each of six salt solutions, 100 mL each, at room temperature. After 24 hours,

the cores were blotted dry and weighed again, and the results are shown in the table.

Total mass of five potato cores before and after 24 hours in each salt solution

Salt in solution (g per 100 mL)	Mass before (g)	Mass after 24 hours (g)	Change in mass (%)
0 (distilled water)	12.50	14.15	+13.2
0.5	12.40	13.09	+5.6
1.0	12.60	12.35	−2.0
2.0	12.45	11.16	−10.4
3.0	12.55	10.46	−16.7
4.0	12.50	9.95	−20.4

11. According to the table, which of these salt solutions was hypotonic to the potato cells?

A. 2.0 g of salt per 100 mL
B. 1.0 g of salt per 100 mL
C. 0.5 g of salt per 100 mL
D. 4.0 g of salt per 100 mL

12. A salt solution that is isotonic to these potato cells would cause no change in their mass. Based on the table, in which range does that salt concentration most likely fall?

A. Between 3.0 and 4.0 g per 100 mL
B. Between 0.5 and 1.0 g per 100 mL
C. Between 0 and 0.5 g per 100 mL
D. Between 1.0 and 2.0 g per 100 mL

13. Which explanation fits the result for the cores in the 3.0 g per 100 mL solution?

A. The solution was hypertonic, so salt moved out of the cells by osmosis.
B. The solution was isotonic, so the cells pumped water out using ATP.
C. The solution was hypotonic, so water moved out of the cells by osmosis.
D. The solution was hypertonic, so water moved out of the cells by osmosis.

14. Which claim about the potato cores in this investigation do the results support?

A. The cores lost mass in every solution that contained any salt.
B. Each step up in salt concentration gave a lower percent change in mass, from +13.2 to −20.4.
C. Cores from any plant would show these same changes in mass.
D. Solutions stronger than 1.0 g of salt per 100 mL killed the potato cells.