Name: \_\_**Ms. Franckowiak’s Answer Key**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_\_\_\_

**Diffusion/Osmosis, Cell Membranes, Cell Structure, and Body Systems**

**Biology GT Test—66 points**

The table below describes the preparation of two different solutions. Use this table to answer questions 1-3.

|  |  |  |  |
| --- | --- | --- | --- |
| **Test Tube** | **Amount of Water** | **Amount of NaCl** | **Amount of Glucose** |
| A | 10 mL | 3g | 7g |
| B | 10mL | 7g | 3g |

1. Which test tube has the highest concentration of NaCl? \_\_**B**\_\_\_\_\_\_ (1 pt)
2. Which test tube has the highest concentration of glucose? \_\_**A**\_\_\_\_ (1 pt)
3. Which test tube has the highest concentration of water? \_**both are equal**\_\_\_ (1 pt)
4. Using the concept of diffusion, explain what happens when you add a few drops of food coloring to a beaker of water. (3 pts)  
   \_**When you first add the food coloring, the drops are highly concentrated in a small volume of water. As time passes, the molecules of dye will move from the areas of high concentration to the rest of the beaker where the dye is less concentrated. This movement of molecules is diffusion. Eventually, the dye will be evenly dispersed throughout the beaker.**
5. In each diagram, the circle represents a cell with a semi-permeable membrane and the square represents a beaker containing a solution of water and glucose. In each figure, draw arrows indicating the direction of the **net** movement of water. (3 pts)

No net movement

70% H2O

70% H2O

30% glucose

30% glucose

Fig B

80% H2O

40% H2O

20% glucose

60% glucose

Fig A

60% H2O

90% H2O

40% glucose

10% glucose

Fig C

1. Why is a hypotonic solution dangerous for a cell? (2 pts)  
   \_**In a hypotonic solution, water will move into the cell and the cell could burst.**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. True or **false**: Water molecules do not move when a cell is in an isotonic solution. (1 pt)  
   Defend your answer (2 pts): \_\_**In an isotonic solution, water molecules will still move back and forth across the membrane, but the movement of water molecules into the cell will be equal to the movement of water molecules out of the cell.**
3. Muscle cells need a lot of glucose to stay energized. This means that for muscle cells, the intracellular concentration of glucose is much higher than the extracellular concentration of glucose. However, these cells are still able to bring glucose into the cytoplasm. How does this happen? (2 pts)  
     
   A) Facilitated diffusion  
   B) Ion channels  
   C) Passive transport  
   **D) Active Transport**
4. True or **false**: Facilitated diffusion requires energy. (1 pt)  
   Defend your answer (2 pts):  
   \_**In facilitated diffusion, molecules are moving down their concentration gradient. This does not require energy. However, they do need a protein channel in order to get across the cell membrane.**
5. In the following list, put a circle around anything that would need a transmembrane protein in order to get across the cell membrane (2 pts):

**protein**, O2, **glucose**, **K2+**, H2O, **Cl—**, CO2

1. Draw a phospholipid and label the hydrophobic and hydrophilic regions. (3 pts)

Hydrophilic

Hydrophobic

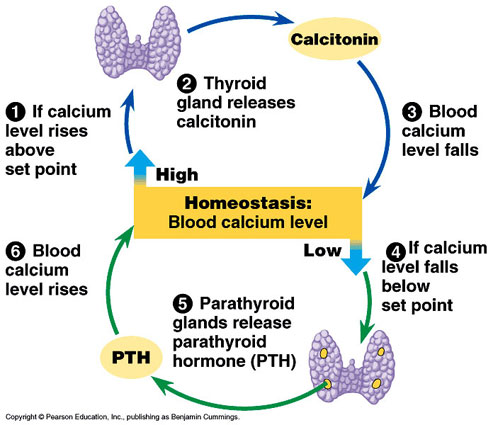
1. Why is cholesterol important for the cell membrane? (2 pt)  
   **A) Cholesterol helps stabilize the membrane.**B) Cholesterol is actually toxic to the membrane.  
   C) Cholesterol makes the cell membrane more fluid.
2. Plant cells are eukaryotic. (2 pt)  
   **A) Always**B) Sometimes  
   C) Never
3. Prokaryotic cells have a nucleus. (2 pt)  
   A) Always  
   B) Sometimes  
   **C) Never**
4. Muscle cells have an especially large quantity of mitochondria. Explain why. (2 pts)  
   \_**The mitochondria is where most of the ATP for a cell is produced. ATP is used to provide energy for the cell. Muscle cells require a lot more ATP than most cells, and they need a lot of mitochondria to supply this ATP.**
5. All living cells need ribosomes because: (2 pts)  
   A. Actually, not all living cells need ribosomes; prokaryotic cells get by without them  
   B. Ribosomes make ATP and all cells need ATP for energy  
   **C. Ribosomes make protein and all cells need protein**  
   D. Ribosomes copy the DNA and all cells have DNA  
   E. Ribosomes break down waste and all cells produce waste
6. Mitochondria are found in (2 pt)  
   A) Plant cells  
   B) Animal cells  
   **C) Both**D) Neither
7. Which of the following organelles/cell structures is not used for movement? (2 pt)  
   A) Pseudopodia  
   **B) Vacuole**C) Flagella  
   D) Cilia
8. \_**Chloroplasts**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are organelles that are found in plant cells; they contain \_**chlorophyll**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the pigment that absorbs \_\_\_\_\_\_**sunlight**\_\_\_\_\_\_\_\_\_\_. (2 pts)
9. Prokaryotic cells have (2 pt)  
   A) Cellulose but no cell wall  
   B) Two membranes and no cell wall  
   C) A cell wall without a cell membrane  
   D) A single cell membrane without a cell wall  
   **E) A cell wall without cellulose**
10. If waste, toxins, and broken cell parts are building up inside of a cell, there is most likely a problem with which organelle? (2 pt)  
    A) Vacuole  
    **B) Lysosome**  
    C) Golgi complex  
    D) Pseudopodia
11. List two characteristics of mitochondria that provide evidence for the theory that they were once free-living prokaryotic cells. (2 pts)  
    \_**Have their own DNA**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
    \_**Can self-replicate**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use the information below to answer questions 22-23:

The hormone insulin increases the amount of glucose that gets transported into cells and that gets stored as glycogen. The hormone glucagon causes glycogen to break down, releasing glucose into the bloodstream.

1. A decrease in blood glucose levels would lead to (2 pts)  
   A. Increased insulin  
   **B. Increased glucagon**  
   C. Increased transport of glucose into cells  
   D. Increased glycogen synthesis
2. If a person cannot produce insulin, then they will (2 pts)  
   A. Have low blood glucose levels  
   C. Have a lot of glycogen  
   **D. Have very low glucagon production**  
   E. Have high levels of glucagon

Use the diagram below to answer questions 23-25.



1. Which body system is responsible for maintaining blood calcium levels? (Complete sentence not required) (2 pts)  
   **Endocrine system**
2. This is an example of (1 pts)   
   **A. Negative feedback**   
   B. Positive feedback
3. Explain your answer to question 26. Be specific. (4 pts)  
   **In this example, high blood calcium levels stimulate the release of calcitonin. Calcitonin has the effect of reducing blood calcium. Since the response (calcitonin) counteracts the stimulus (high blood calcium levels), this is an example of negative feedback.**
4. Why aren’t positive feedback systems used to maintain homeostasis? (3 pts)  
   \_**Positive feedback mechanisms result in an increase in the original stimulus. This cycle of continued increases does not keep conditions within a set range. Negative feedbaxk maintains homeostasis by enabling the body to “correct” unbalanced conditions.**\_\_
5. Fill in the following table: (6 pts)

|  |  |
| --- | --- |
| **Body System** | **Main Function** |
| **Endocrine** | Produce hormones that affect other parts of the body |
| **Nervous** | Coordinates actions through the transmission of signals and information |
| Circulatory System | **Transports O2, CO2, nutrients, and waste** |
| Respiratory System | **Gas exchange—brings in O2 and releases CO2** |
| Digestive System | **Breaks down food and absorbs nutrients** |
| **Excretory** | Remove waste |