

1) Questions

a) What is the Plasma membrane?

- i) The plasma membrane is a thin layer/membrane that surrounds every living cell. It is the border of the cell which separates the outside environment of the cell, to the inside.

b) What is the meaning of semi permeable?

- i) Semi permeable means that it allows things, like substances, to go through but it also doesn't allow other things to go through. It only lets certain substances pass through.

c) Discuss why the plasma membrane must be a bilayer.

- i) Phospholipids is a kind of amphipathic lipids, and is the major component of cell membranes. A phospholipid molecule is made up of two parts: a hydrophilic phosphate group head and two hydrophobic fatty acid tails. In the cell membrane, two layers of phospholipid lined up. The heads pointed outside and the tails pointed inside of the membrane. The hydrophilic heads combine liquids by a hydrogen bond. Because the hydrophobic tails are long, there is a hydrophobic layer inside. Therefore the lipid bilayer will not dissolve in water.

d) What are some of the “other” molecules in the plasma membrane? Describe their function.

- i) Other molecules that are in the plasma membrane include lipids and proteins such as ion pumps, protein channels, carbohydrates, cholesterol, glycolipids, peripheral proteins, glycerol, glycoprotein, globular protein, etc.

e) What are cilia and flagella?

- i) Cilia and flagella are small hair-like structures that assist in the movement of molecules or cells. (ie. There are cilia cells in the trachea that move debris out of the respiratory system.

2) True or False: Write true if the statement is true or false if the statement is false.

1. Passive transport needs energy.
False
2. Active transport needs energy.
True
3. Carrier proteins change shape when they transport substances.
True
4. Diffusion does not require any help from other molecules.
True

5. Facilitated diffusion does not require any help from other molecules.
False
6. Endocytosis removes large molecules from the cell.
False
7. In diffusion, substances move from an area of lower concentration to an area of higher concentration.
False
8. The sodium-potassium pump is a type of channel protein.
False
9. Ions can easily flow through a carrier protein.
False
10. Diffusion is the osmosis of water.
True
11. Endocytosis and exocytosis are types of vesicle transport.
True
12. Channel proteins form small "holes" in the plasma membrane.
True
13. Transport of substances across the cell membrane helps maintain homeostasis by keeping the cell's conditions within normal ranges.
True
14. Channel proteins and carrier proteins are both transport proteins.
True
15. The plasma membrane controls what enters and leaves the cell
True

3) Critical Reading

1. Explain why passive transport does not require energy.

i) Passive transport does not require energy because the substances will naturally move from their higher concentration gradient to the lower concentration gradient.

2. What is the main difference between diffusion and facilitated diffusion?

i) Diffusion is characterised by small substances that are able to pass through the phospholipid bilayer, whereas in facilitated diffusion there are specialised membrane proteins that allow substances to pass through the membrane.

3. Describe how simple diffusion proceeds. What kind of molecules can move across the membrane by simple diffusion?

i) Simple diffusion works by allowing small, non charged molecules to move across the membrane from areas of high concentration to an area of low concentration.

4. How is water transported across the membrane?

i) Water is transported across the membrane through water-selective protein channels called aquaporins and water can also cross the membrane through simple diffusion.

5. What are the two types of transport proteins? Describe how they function.

i) The two types of transport proteins are called channel proteins and carrier proteins. Carrier proteins allow specific solutes to bind to them and transfer across the membrane, whereas channel proteins allow small molecules and water to quickly diffuse across the membrane.

4) Multiple Choice

1. Controlling what enters and leaves the cell is an important function of the

- (a) nucleus.
- (b) vesicle.
- (c) plasma membrane.**
- (d) Golgi apparatus.

2. During diffusion, substances move from an area of concentration to an area of concentration.

- (a) higher, lower
- (b) lower, higher**
- (c) higher, equal
- (d) lower, equal

3. A channel protein does which of the following?

- (a) Carries ions or molecules across the membrane.**
- (b) Forms tiny holes in the membrane.
- (c) Changes shape as it transports molecules.
- (d) all of the above

4. The sodium-potassium pump

- (a) uses energy to move sodium ions out of the cell and potassium ions into the cell.**
- (b) uses energy to move potassium ions out of the cell and sodium ions into the cell.
- (c) moves sodium ions out of the cell and potassium ions into the cell without using energy.
- (d) moves potassium ions out of the cell and sodium ions into the cell without using energy.

5. Osmosis

- (a) is the diffusion of water.**
- (b) is the diffusion of water and other small molecules.
- (c) is the diffusion of water and small ions.
- (d) is the diffusion of small molecules and ions.

6. Types of passive transport include which of the following?

- (1) simple diffusion, (2) osmosis, (3) facilitated diffusion, (4) active transport, and (5) vesicle transport.
- (a) 1 and 2
- (b) 1, 2, and 3**
- (c) 4 and 5
- (d) 1, 2, 3, 4, and 5

7. Endocytosis and exocytosis

- (a) are both a type of vesicle transport.
- (b) move very large molecules either in or out of the cell.
- (c) are both a form of active transport.
- (d) **all of the above**

8. Which of the following needs energy?

(1) Passive, (2) active transport, (3) exocytosis, and (4) osmosis.

- (a) 1 only
- (b) 2 only
- (c) **2 and 3**
- (d) 2, 3, and 4

5) Vocabulary 1

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|---|----------------------------------------------------------------------------------------|
| H | 1. Transport across a membrane without any additional energy requirement |
| G | 2. The diffusion of water |
| D | 3. Type of vesicle transport that moves a substance into the cell |
| E | 4. Type of vesicle transport that moves a substance out of the cell |
| J | 5. Special proteins in the membrane that aid diffusion |
| B | 6. Membrane protein that forms a small hole that allows ions to pass through |
| I | 7. An active transport protein |
| F | 8. Diffusion with the help of transport proteins |
| C | 9. The movement of a substance across a membrane without any help from other molecules |
| K | 10. The transport of very large molecules, such as proteins |
| A | 11. Transport across a membrane in which energy is required |

6) Vocabulary II

Fill in the blank with the appropriate term.

1. By moving substances into and out of cells, **homeostasis** , the process of keeping stable conditions inside a cell, is maintained.
2. A **carrier** protein changes shape as it carries ions or molecules across the membrane.
3. Exocytosis is the type of **vesicle** transport that moves a substance out of the cell.
4. **Passive** transport is movement across the plasma membrane that does not require an input of energy.
5. The sodium-potassium **pump** is involved in the active-transport of ions.
6. Facilitated diffusion needs the help **transport** of proteins
7. **Concentration** refers to the number of particles of a substance per unit of volume.
8. **Endocytosis** is the type of vesicle transport that moves a substance into the cell.
9. Energy for active transport is supplied by molecules of **ATP**.
10. **Osmosis** is the diffusion of water.

11. During active transport, a substance is moving from an area of **low** concentration to an area of **high** concentration.
12. Moving molecules in and out of the cell is an important role of the **Plasma membrane**.

7) Critical Writing

Thoroughly answer the question below.

Use appropriate academic vocabulary and clear and complete sentences.

“Discuss passive and active transport. Describe the main differences between these two types of transport, and provide examples of each type”

Both passive and active transport are common ways to transport substances through plasma membranes.

Passive transport occurs when a diffuse from high concentration to low concentration crosses the cell membrane, thus it doesn't require energy. There are two main types of passive transport:

1. **Diffusion**. Only water molecules / non-polar molecules (such as gas. CO₂, N₂, etc.) / small uncharged polar molecules (such as alcohol) can directly diffuse through the cell membrane. Urea molecules also can diffuse if there is sufficient time.
2. **Facilitate diffusion** (by channels or carriers). Channel proteins transport molecules, it can open/close in the center, like a gate (such as GLUTs for glucose transport). Carrier proteins transport ions, it can change the shape and allow ions to pass through, like switch or Kim-wipe boxes.

Active transport is easier to remember. Active transport occurs when substances go from low concentration to high concentration, thus it requires energy (ATP).

3. Only **primary & secondary active transport**. Or we can summarise into ion pumps (such as Na-K pump), exocytosis and endocytosis.