



BIOLOGY 2020

Unit 3

Key Topic Test 1 – Plasma Membranes

Recommended writing time*: 45 minutes

Total number of marks available: 45 marks

SOLUTIONS

SECTION A: Multiple-choice questions (1 mark each)

Question 1

Answer: D

Explanation:

A is incorrect as the layer is not rigid, B is incorrect as the proteins do not form a bilayer, C is incorrect as the bilayer is not rigid. D is correct as proteins can move through the flexible phospholipid bilayer.

Question 2

Answer: B

Explanation:

A is incorrect as the tails are hydrophobic. C is incorrect as although water is polar the answer is not relevant to the question. D is incorrect as the heads contain phosphate not lipids

Question 3

Answer: C

Explanation:

Cholesterols function is to slightly immobilise the membrane and make it less soluble to small water-soluble molecules. Therefore, it decreases flexibility and makes the membrane less permeable to water based solutions

Question 4

Answer: A

Explanation:

B is incorrect as amino acids are organised into polar holes to allow water through, C is incorrect as carrier proteins are not involved in endocytosis, D is incorrect as channel proteins transport small molecules

Question 5

Answer: A

Explanation:

B is incorrect as the membrane does not act as a barrier to oxygen, C is incorrect as recognition proteins are not involved in transport, D is incorrect as hydrophilic heads allow the movement of water-based molecules.

Question 6

Answer: C

Explanation:

A and B are incorrect as oxygen and carbon dioxide move across the membrane via diffusion without the need for transport proteins. D is incorrect as endocytosis is not required for any of the listed molecules to move across the membrane

Question 7

Answer: B

Explanation:

Membranes are used to control the movement of substances. If the membrane breaks, the controlled movement of substances cannot occur and the substances required for ATP production would not be able to be transported to the site of ATP production on the cristae.

Question 8

Answer: B

Explanation:

ATP is required to move molecules like ions against a concentration gradient through a carrier protein. C is incorrect as facilitated diffusion can use carrier proteins but moves with the concentration gradient and therefore does not require ATP

Question 9

Answer: B

Explanation:

Exocytosis of proteins requires energy in the form of ATP to move vesicles and fuse the vesicles with the plasma membrane therefore mitochondria produces ATP for export of the Golgi vesicles. A and D are incorrect as ribosomes are involved in protein synthesis not protein transport. C is incorrect as exocytosis is a process not an organelle

Question 10

Answer: A

Explanation:

Endocytosis requires ATP to form a vesicle around the pathogen. B is incorrect as blebs are formed during apoptosis. C is incorrect as bacterial pathogens are not larger than WBCs. D is incorrect as enzymes are not required during endocytosis and do not require ATP to work

Question 11

Answer: B

Explanation:

The Golgi act to package proteins into secretory vesicles to send out of the cell through the plasma membrane via exocytosis

Question 12

Answer: D

Explanation:

Transport vesicles move proteins from the endoplasmic reticulum to the Golgi where the proteins are packaged into secretory vesicles in preparation for exocytosis

Question 13

Answer: A

Explanation:

Proteins are large molecules that cannot move through proteins channels so are moved via bulk transport out of the cell via exocytosis.

Question 14

Answer: D

Explanation:

ATP produced in mitochondria is required for endocytosis (bulk transport) to form a vesicle around the large object entering the cell.

Question 15

Answer: C

Explanation:

The head on the phospholipid is polar and hydrophilic. Another term that can be used to describe hydrophilic is lipophilic referring to compounds that are not soluble in lipids

SECTION B: Short-answer questions

Question 1

- a.** Semi permeable allows the movement of some molecules through the membrane while inhibiting the passage of others (1). In this context this means that water can move through the membrane while restricting the movement of other molecules (eg salt ions) (1)
2 marks
- b.** The hydrophobic (non-polar) centre of the cell membrane allows the movement of hydrophobic and small non-polar molecules (1) while inhibiting the movement of large, polar molecules or ions. (1)
2 marks
- c.** Ions are moved across the membrane against a concentration gradient via active transport (1) using ATP to move the ions through a carrier protein (1)
2 marks
- d.**
2 marks
- e.** The structures are
- i.** Cholesterol
 - ii.** Glycoprotein
 - iii.** Carrier protein
 - iv.** Channel protein
- 4 marks

Question 2

a.

Molecule	Example	Method of crossing membrane
Ions	Sodium, Calcium	Protein channel down concentration gradient or carrier protein against concentration gradient
Large Polar	Glucose	Carrier protein
Small Nonpolar	Oxygen, carbon dioxide	Diffusion through membrane
Small polar	Water	Protein channel (fast) Through aquaporins in the membrane (slow)

8 marks

- b.** Exocytosis (1) which is a form of bulk (active) transport that requires ATP produced by mitochondria to form the vesicle and move the protein through the membrane (1)
2 marks
- c.** Phagocytosis
1 mark

Question 3

- a. Secretory vesicles are formed at the Golgi (1) to transport proteins to the membrane for exocytosis. (1) Transport vesicles are formed at endoplasmic reticulum (1) to transport proteins from the endoplasmic reticulum to the Golgi (1)

4 marks

b.

Name of organelle	Function
Golgi	Site where proteins are modified and packaged into vesicles for export
Mitochondria	Provide ATP for active transport
Endoplasmic reticulum	Transport proteins and manufacture lipids in the cell

3 marks

- c. Proteins could be enzymes which if exposed to the cell contents may interact with molecules and cause unintended reactions (1). The protein needs to be packaged at the Golgi or moved to the plasma membrane for exocytosis. If not in a vesicle the proteins would not be moved to the appropriate place instead diffusing through the cytosol (1).

2 marks

Total 45 marks