

Biomedical Admissions Test (BMAT)

Section 2: Biology

Questions by Topic

B1 - Cells

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B1: Cells - Question by Topic

(Mark Scheme and explanations at the end)

1 The following statements are about the cytoplasm.

- 1 The cytoplasm contains food reserves and cell organelles.
- 2 The cytoplasm is a jelly-like region with dissolved fat molecules, proteins, suspended salt ions and sugar molecules.
- 3 The cytoplasm is the place where chemical reactions take place and so enzymes needed for chemical reactions are present in the cytoplasm.
- 4 The cytoplasm is a jelly like region with suspended fat molecules and proteins and dissolved salt ions and sugar molecules.
- 5 Chloroplasts are present in the cytoplasm of both plant and animal cells.

Which of these statements are correct?

- A 1, 2, 3 and 4
- B 1, 2, 3 and 5
- C 1, 2 and 4
- D 1, 3 and 4
- E 1, 2 and 5
- F 2 and 4
- G 1 and 4
- H 2 and 5



2 The following statements are about the cell membrane.

- 1** The cell membrane is present in plant and animal cells.
- 2** The cell membrane is a partially permeable layer surrounding the cytoplasm.
- 3** The cell membrane is a jelly-like region surrounding the cell.
- 4** The cell membrane controls the movement of substances in and out of the cell.
- 5** The cell membrane allows oxygen, water and carbon dioxide into the cell.

Which of these statements are correct?

- A** 1, 2, 3 and 4
B 1, 2, 3 and 5
C 1, 2 and 4
D 1, 3 and 4
E 1, 2 and 5
F 2 and 4
G 1 and 4
H 2 and 5



- 3** Differentiation is a process that most eukaryotic cells go through once they have finished growing and dividing and become specialised cells. Specialised cells have a particular shape. Certain chemical reactions and processes take place in the cytoplasm enabling specialised cells to carry out their specific function. These comments are about specialised cells.
- 1** Red blood cells absorb gases for which they have a large surface area due to their biconcave shape. They contain a nucleus and haemoglobin to carry oxygen effectively.
 - 2** Sperm contain many mitochondria in the mid section in order to provide energy for sperm to swim.
 - 3** Egg cells contain a large food store for the development of the embryo.
 - 4** The sperm cell contains a nucleus in the mid section with the genetic information of the father.

Which of these statements are correct?

- A** 1, 2, 3 and 4
- B** 1, 3 and 4
- C** 2, 3 and 4
- D** 3 and 4
- E** 2 and 3
- F** 1 and 4
- G** 3 only



Answers and Explanations

1 The answer is D

- 1 is correct - as the cytoplasm sub-cellular component that contains **food reserves**, such as **glycogen** in **animal cells** and **starch** in **some plant cells**. The cytoplasm contains the **cell organelles**, such as mitochondria, the nucleus, the endoplasmic reticulum etc.
- 2 is incorrect - the cytoplasm does contain fat molecules and proteins as well as salt ions and sugar molecules. However option 2 is incorrect as **fat molecules and proteins are suspended** in the cytoplasm, not dissolved. **Salt ions and sugar molecules are dissolved** in cytoplasm, not suspended.
- 3 is correct - because the cytoplasm contains the enzymes that are necessary to carry out chemical reactions, which take place in the cytoplasm.
- 4 is correct - this is because it correctly states that fat molecules and proteins are suspended in the cytoplasm, whereas salt ions and sugar molecules are dissolved in the cytoplasm.
- 5 is incorrect - as chloroplasts are double membraned organelles **only present in the cytoplasm of plant cells**. Chloroplasts contain pigments such as chlorophyll in order to convert light energy to chemical energy through photosynthesis.

Since **1**, **3** and **4** are the only correct statements, **D** must be the correct answer.

Exam Tip - When thinking of subcellular components in plant and animal cells you need to remember certain key differences between the two. There are certain sub-cellular components that are only part of plant cells, these are:

- Cell wall
- Chloroplast
- Vacuole

Exam Tip - Make sure you read the options carefully, as in this question option 1 and 4 are very similar however it is essential to know that it is fat molecule and proteins that are suspended not dissolved, and salt ions and sugar molecule are dissolved not suspended.





2 The answer is C.

- 1 is correct - as the cell membrane is an essential part of animal and plant cells.
- 2 is correct - the cell membrane is **partially permeable** and **surrounds the cytoplasm** of plant and animal cells. The cell membrane is partially permeable to enable the movement of substances in and out of the cell.
- 3 is incorrect - this is because the cytoplasm is the jelly-like region of the cell, not the cell membrane. The cell membrane surrounds the cytoplasm.
- 4 is correct - as the cell membrane is partially permeable hence controls which substances can enter and leave the cell.
- 5 is incorrect - as the cell membrane does enable substances to enter and leave the cell, oxygen and water are let into the cell, however **carbon dioxide** is a **waste product of respiration**, hence the cell membrane allows carbon dioxide to **leave**.

Since **1**, **2** and **4** are the only correct statements, **C** must be the correct answer.

Exam Tip - When answering questions about animal and plant cells, it is essential to remember that some subcellular components are only part of the plant cell and not the animal cell. These are:

- Cell wall
- Chloroplast
- Vacuole



3 The answer is E

- 1 is incorrect - it is correct that red blood cells have a **biconcave shape** to **increase the surface area** for diffusion however red blood cells **do not have a nucleus**, this allows red blood cells to carry more oxygen. Red blood cells contain haemoglobin which aids in the transport of oxygen.
- 2 is correct - sperm cells require a lot of energy to use their tail in order to swim to the egg. Therefore sperm cells have a large amount of mitochondria, which is present in the middle section.
- 3 is correct - this is because the egg cell does contain a large amount of food storage for the development of the embryo once fertilisation has taken place.
- 4 is incorrect - as the sperm cell does contain a nucleus with the genetic information of the father however the **nucleus** is in the **head section** of the sperm, the middle section contains the mitochondria.

Since **2** and **3** are the only correct statements, **E** must be the correct answer.

Exam Tip - When answering questions it is really important that you read the question carefully, as the question is asking you to find which **statements are correct**, unlike other questions which may ask you to identify the incorrect statements. If this were the case F would be the correct answer as option 1 and 4 are incorrect.

