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CAMBRIDGE
International Education

# Cambridge International AS & A Level

**BIOLOGY** **9700/13**

Paper 1 Multiple Choice **May/June 2026**

**1 hour 15 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

**INSTRUCTIONS**

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.

**INFORMATION**

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.

This document has **16** pages.

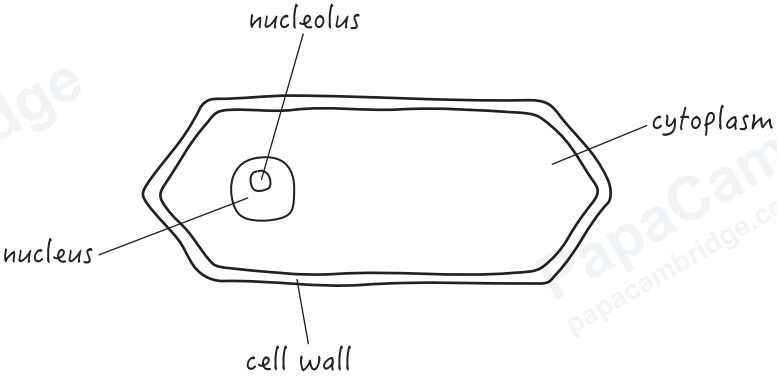

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**[Turn over**

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**1** A student viewed a piece of onion epidermis with a light microscope. They were asked to draw a single cell that they had observed.

The image shows the student's drawing.




Which changes should be made to their drawing?

| | add ribosomes and rough endoplasmic reticulum to the drawing | use a ruler to draw the cell wall with straight lines |
|---|---|---|
| **A** | ✗ | ✗ |
| **B** | ✓ | ✗ |
| **C** | ✓ | ✓ |
| **D** | ✗ | ✓ |

**key**

✓ = change should be made

✗ = change should **not** be made

**2** The actual length of a cell structure is 8 μm.

Which steps are used to calculate the magnification of an electron micrograph of this cell structure?

1 measure the length of the cell structure image on the micrograph in centimetres

2 measure the length of the cell structure image on the micrograph in millimetres

3 divide the image length by 1000

4 multiply the image length by 1000

5 divide by eight

6 multiply by eight

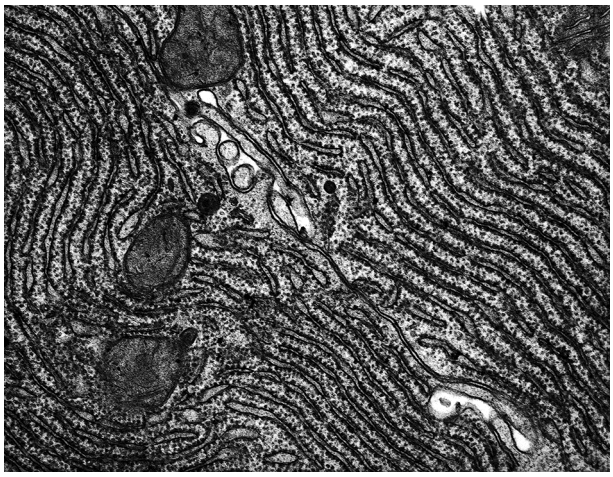
**A** 1, 3 and 6 **B** 1, 4 and 6 **C** 2, 3 and 5 **D** 2, 4 and 5

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**3** The electron micrograph shows part of an animal cell. This part of the cell is producing large quantities of a biological molecule.



What is being produced in this part of the cell?

**A** antibodies

**B** DNA

**C** starch

**D** triglycerides

**4** Many single-celled animals living in fresh water contain vacuoles which contract regularly, expelling excess water.

Why do the cells of plants living in fresh water **not** require these types of vacuoles?

**A** Plant cell walls limit cell size.

**B** Plant cell walls are impermeable to water.

**C** Plant cells have a higher concentration of dissolved solutes than animal cells.

**D** Water movement into plants is controlled by their roots.

**5** Which row is correct for plant cells and for animal cells?

| | **size of cytoplasmic ribosomes** | | **plasmodesmata** | | **microtubules** | |
|---|---|---|---|---|---|---|
| | **plant cell** | **animal cell** | **plant cell** | **animal cell** | **plant cell** | **animal cell** |
| **A** | 70S | 70S | **not** present | **not** present | present | **not** present |
| **B** | 80S | 80S | present | **not** present | **not** present | present |
| **C** | 80S | 80S | present | **not** present | present | present |
| **D** | 70S | 80S | present | present | **not** present | **not** present |

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**6** Four students were asked to study one typical prokaryote cell and one typical eukaryote cell. Each student was asked to compare the prokaryotic cell and the eukaryotic cell by placing a tick by the cell features that the two cells had in common.

Which student correctly identified the common features?

| | **circular, double-stranded DNA** | **lysosome** |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**key**

✓ = common feature

✗ = **not** a common feature

**7** Three food samples are tested with reagents for the presence of different biological molecules. Each sample contains a different biological molecule.

Which row correctly shows the food samples that contain carbohydrate?

| | **food sample that turns reagent black** | **food sample that turns reagent purple** | **food sample that turns reagent green** |
|---|---|---|---|
| **A** | ✓ | ✓ | ✗ |
| **B** | ✗ | ✓ | ✗ |
| **C** | ✗ | ✗ | ✓ |
| **D** | ✓ | ✗ | ✓ |

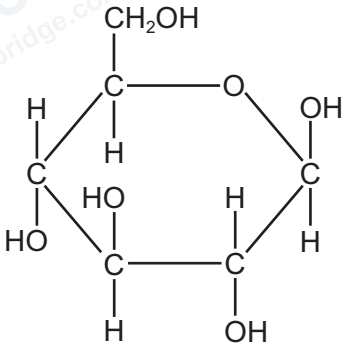
**key**

✓ = food sample that contains carbohydrate

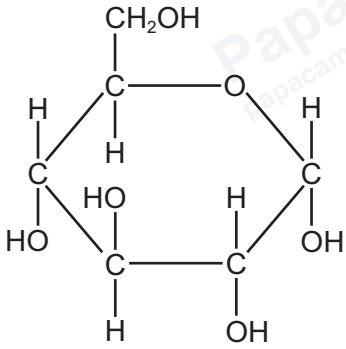
✗ = food sample that does **not** contain carbohydrate

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**8** J and K show the structures of two hexose sugars.




J




K

Which statement is correct?

**A** J is found in amylopectin.

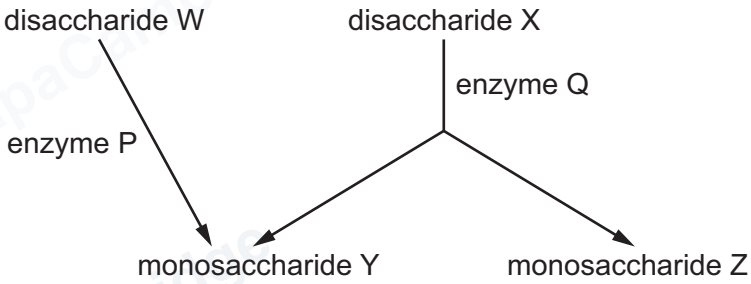
**B** J is found in amylose.

**C** K is found in cellulose.

**D** K is found in glycogen.

**9** Four carbohydrates, W, X, Y and Z, occur naturally in plants.

The diagram shows how enzymes P and Q digest disaccharides W and X, to produce monosaccharides Y and Z.




Which row is correct for W, X, Y and Z?

| | W | X | Y | Z |
|---|---|---|---|---|
| **A** | non-reducing sugar | reducing sugar | fructose | reducing sugar |
| **B** | reducing sugar | non-reducing sugar | reducing sugar | reducing sugar |
| **C** | reducing sugar | non-reducing sugar | reducing sugar | non-reducing sugar |
| **D** | reducing sugar | non-reducing sugar | non-reducing sugar | fructose |

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**10** Which statements about collagen molecules are correct?

1 Both α-helices and β-pleated sheets occur within the molecules.

2 Large numbers of hydrogen bonds stabilise the molecules.

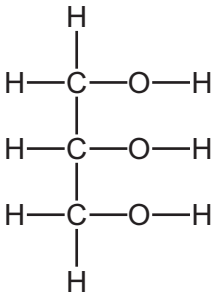
3 Repeated amino acid sequences determine the tertiary structure.

**A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

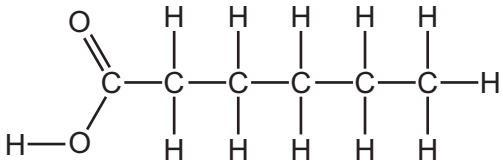
**11** A triglyceride was hydrolysed, producing four different molecules.

Which molecule is a saturated fatty acid?

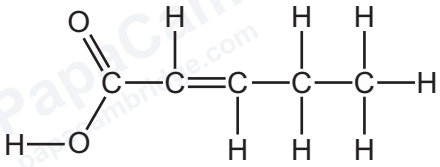
**A**



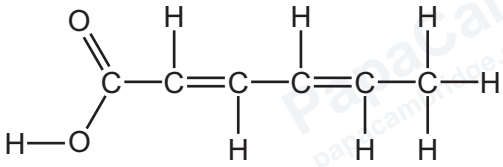
**B**



**C**

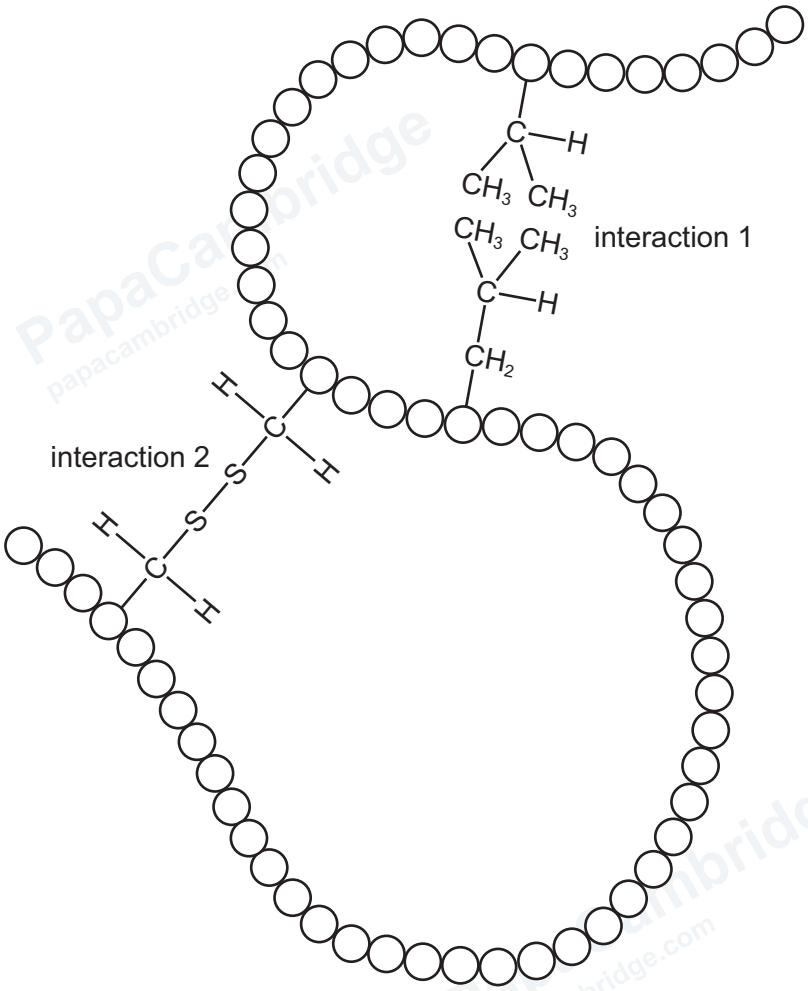


**D**



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**12** The diagram represents part of a protein molecule showing some R-groups and their interactions.




Which row is correct for interactions 1 and 2?

| | interaction 1 | interaction 2 |
|---|---|---|
| **A** | covalent bond | hydrogen bond |
| **B** | hydrogen bond | disulfide bond |
| **C** | hydrophobic interaction | covalent bond |
| **D** | peptide bond | ionic bond |

**13** Organisms that live in a lake benefit from a stable temperature.

Why will the temperature of the water in the lake change slowly as the air temperature increases?

**A** A small amount of heat energy is needed to increase the temperature of water.

**B** A large amount of heat energy is needed to increase the temperature of water.

**C** The evaporation of water requires a large amount of chemical energy.

**D** The evaporation of water requires a small amount of chemical energy.

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**14** Which statement about enzymes is correct?

**A** Intracellular enzymes react with substrates to form enzyme–substrate complexes inside cells.

**B** Intracellular enzymes are globular proteins that are secreted to catalyse reactions outside cells.

**C** Extracellular enzymes are fibrous proteins that catalyse reactions outside prokaryotic and eukaryotic cells.

**D** Extracellular enzymes lower the activation energy of reactions that take place inside cells.

**15** An investigation into the rate of an enzyme-catalysed reaction was carried out. During the investigation, the concentration of the substrate was kept higher than the concentration of the enzyme.

During this investigation, which changes in the variables would always lead to an increase in the rate of the reaction?

1 increase in enzyme concentration

2 increase in pH

3 increase in temperature

**A** 1 and 2 **B** 1 and 3 **C** 1 only **D** 2 and 3

**16** Which calculation can be used to estimate $V_{max}$ for an enzyme?

**A** (rate of reaction at $K_m$)$^2$

**B** (rate of reaction at $K_m$) $\times$ 0.5

**C** (rate of reaction at $K_m$) $\times$ 2

**D** (rate of reaction at $K_m$)$^{-2}$

**17** Which type of bond in phospholipids has a role in increasing the fluidity of cell surface membranes?

**A** C–C **B** C=C **C** C–O **D** C=O

**18** Which row correctly shows the transport processes for which ATP is needed?

| | **exocytosis** | **facilitated diffusion** | **osmosis** |
|---|---|---|---|
| **A** | ✓ | ✓ | ✗ |
| **B** | ✗ | ✓ | ✓ |
| **C** | ✓ | ✗ | ✗ |
| **D** | ✗ | ✗ | ✓ |

**key**

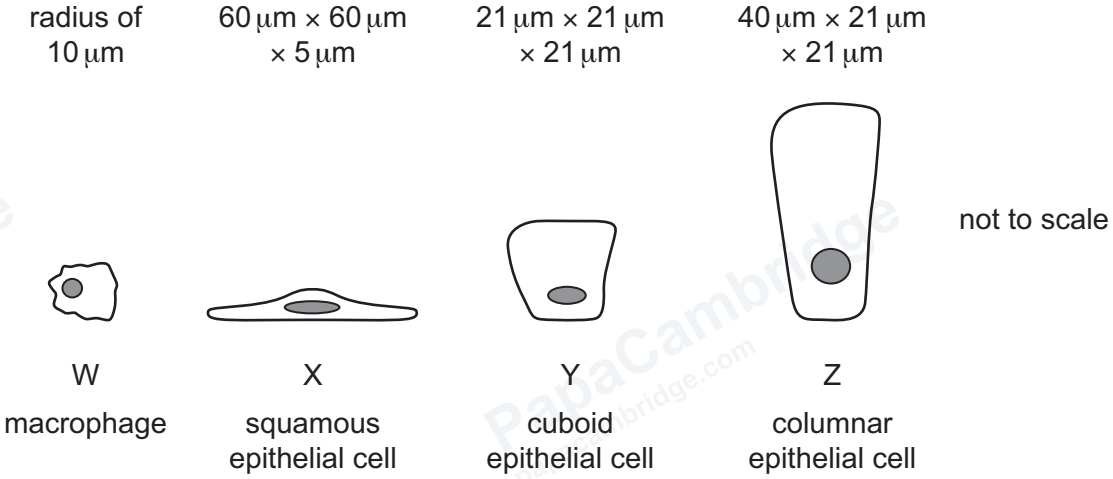
✓ = ATP is needed

✗ = ATP is **not** needed

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**19** Macrophages and epithelial cells (squamous, cuboid and columnar) are found in the gas exchange system.

The approximate dimensions of these cells are shown.




The surface area to volume ratio for cell W is 0.30 : 1.0 and for cell X is 0.47 : 1.0.

Which cells have the most similar surface area to volume ratios?

**A** W and X **B** W and Y **C** X and Z **D** Y and Z

**20** Which row is correct for the use of mitosis in plants and animals?

| | **growth of individual cells** | **repair of individual cells** | **replacement of damaged or dead cells** |
|---|---|---|---|
| **A** | no | no | yes |
| **B** | no | yes | yes |
| **C** | yes | yes | yes |
| **D** | yes | no | no |

**21** A cell has just completed telophase.

What is the correct sequence of events for the next mitotic cell cycle of this cell?

**A** cytoplasm division → DNA replication → nuclei division

**B** cytoplasm division → nuclei division → DNA replication

**C** DNA replication → nuclei division → cytoplasm division

**D** nuclei division → DNA replication → cytoplasm division

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**22** Chemical R prevents the centrioles from moving towards the opposite poles in mitosis.

A cell is treated with chemical R.

Which stage of mitosis will this cell reach but **not** complete?

**A** anaphase

**B** metaphase

**C** prophase

**D** telophase

**23** Which row is correct for guanine?

| | has a double ring structure | is a purine | has three hydrogen bonds between guanine and its complementary base |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✗ | ✓ |
| **C** | ✗ | ✓ | ✗ |
| **D** | ✗ | ✗ | ✓ |

**key**

✓ = correct

✗ = **not** correct

**24** Many genes code for more than one polypeptide. This is possible because different mRNA molecules are formed from the primary transcript.

Which statement describes how this happens?

**A** All the exons are removed, and the introns are joined together in different combinations each time.

**B** Different numbers of introns are removed, and the remaining exons and introns are joined together.

**C** All introns are removed, and the exons are joined together in different combinations each time.

**D** Different numbers of exons are removed, and the remaining exons and introns are joined together.

**25** Which bonds are formed by DNA polymerase during DNA replication?

**A** glycosidic

**B** phosphodiester

**C** hydrogen

**D** peptide

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**26** Rifampicin and chloramphenicol are drugs used to treat infections.

Rifampicin inhibits RNA polymerase. Chloramphenicol inhibits ribosomal activity.

Which row gives the processes that are inhibited by each drug?

| | rifampicin | chloramphenicol |
|---|---|---|
| **A** | transcription | translation |
| **B** | translation | transcription |
| **C** | translation | translation |
| **D** | transcription | transcription |

**27** Which types of gene mutation may result in a change in the sequence of amino acids in a polypeptide?

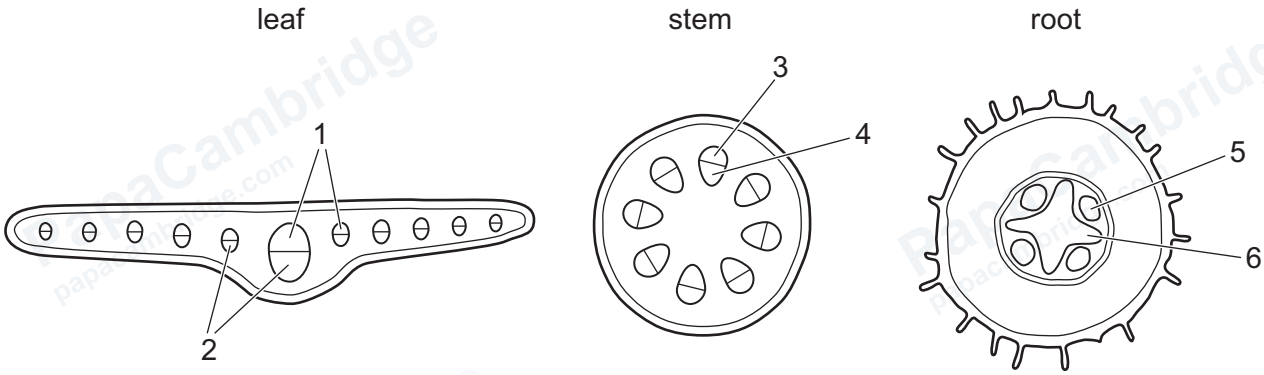
1 substitution

2 deletion

3 insertion

**A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

**28** The diagrams show transverse sections of parts of a plant.




Which tissues transport sucrose?

**A** 1, 3 and 6 **B** 1, 4 and 5 **C** 2, 3 and 5 **D** 2, 4 and 6

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**29** What is correct about the uptake and transport of water in plants?

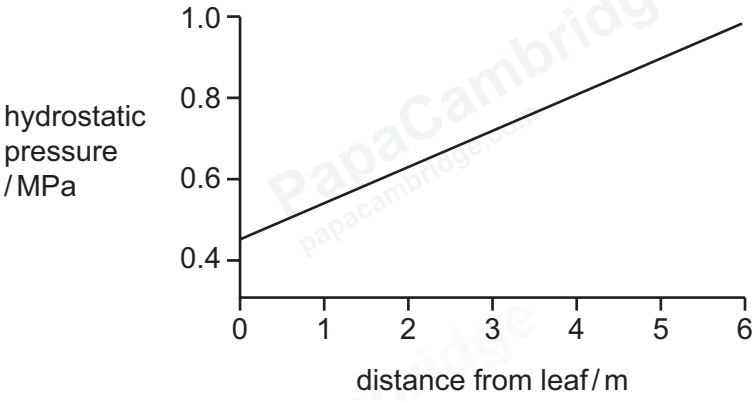
1 Water transported by the symplast pathway enters root hair cells down a water potential gradient.

2 Water is transported in xylem by the symplast and apoplast pathways to reach the leaves.

3 Water transported by the apoplast pathway through plasmodesmata must pass through cell surface membranes of endodermal cells.

**A** 1 and 3 **B** 1 only **C** 2 and 3 **D** 3 only

**30** The graph shows how hydrostatic pressure in a phloem sieve tube element of a large plant varies depending on the distance from the leaf.




What describes the movement of sucrose in this sieve tube element?

| | source | sink | direction of sucrose movement |
|---|---|---|---|
| **A** | leaf | roots | from roots to leaf |
| **B** | leaf | roots | from leaf to roots |
| **C** | roots | leaf | from roots to leaf |
| **D** | roots | leaf | from leaf to roots |

**31** Which statement about the blood vessels associated with the heart is correct?

**A** Blood passes through the right atrioventricular valve to enter the aorta.

**B** The pulmonary vein transports oxygenated blood to the right atrium.

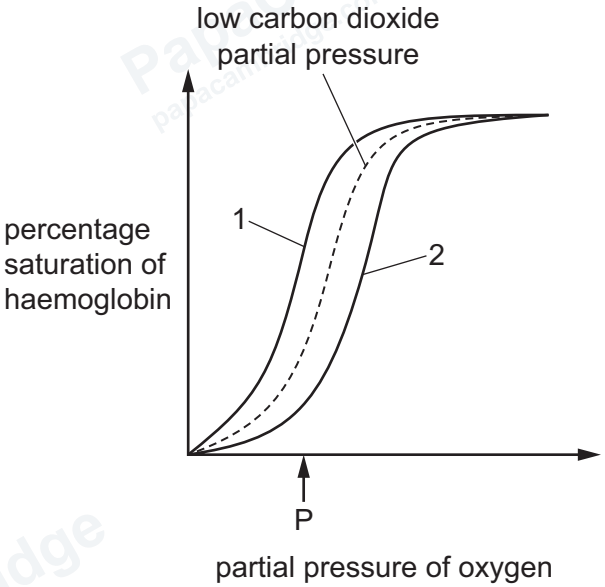
**C** The vena cava transports blood through the right atrioventricular valve into the right atrium.

**D** The pulmonary artery transports deoxygenated blood when it has passed through a semilunar valve.

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**32** The graph shows haemoglobin saturation at different partial pressures of oxygen at three different partial pressures of carbon dioxide.

The dotted line represents the relationship at a low partial pressure of carbon dioxide in a person at rest.




Which row correctly identifies the line representing the Bohr shift for the same person when they are exercising, and states its effect on the oxyhaemoglobin concentration in a red blood cell at the partial pressure of oxygen at P?

| | **line representing the Bohr shift** | **effect of the Bohr shift on oxyhaemoglobin concentration in a red blood cell at partial pressure of oxygen at P** |
|---|---|---|
| **A** | 1 | oxyhaemoglobin concentration is higher |
| **B** | 1 | oxyhaemoglobin concentration is lower |
| **C** | 2 | oxyhaemoglobin concentration is higher |
| **D** | 2 | oxyhaemoglobin concentration is lower |

**33** What is the correct order of structures for an electrical impulse during the next cardiac cycle after diastole?

**A** atrioventricular node → Purkyne tissue → sinoatrial node

**B** atrioventricular node → sinoatrial node → Purkyne tissue

**C** sinoatrial node → atrioventricular node → Purkyne tissue

**D** sinoatrial node → Purkyne tissue → atrioventricular node

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**34** Which statement is correct?

**A** Alveoli have goblet cells to produce mucus to trap pathogens from the air.

**B** Cartilage in the bronchi keeps the bronchi open and allows air to flow through freely.

**C** Complete rings of cartilage in the bronchioles make sure that air can reach the alveoli.

**D** During exercise, muscles in the bronchioles and alveoli relax to allow a greater flow of air.

**35** Which row is correct for blood entering and leaving the capillaries at an alveolus?

| | **partial pressure of oxygen in the blood of capillaries leaving an alveolus** | **blood vessel that contains blood immediately after it has left the capillaries at an alveolus** |
|---|---|---|
| **A** | higher than the partial pressure of oxygen in the capillaries supplying blood to an alveolus | pulmonary arteriole |
| **B** | lower than the partial pressure of oxygen in the capillaries supplying blood to an alveolus | pulmonary arteriole |
| **C** | higher than the partial pressure of oxygen in the capillaries supplying blood to an alveolus | pulmonary venule |
| **D** | lower than the partial pressure of oxygen in the capillaries supplying blood to an alveolus | pulmonary venule |

**36** Penicillin causes the disruption of the bacterial cell .....1..... . However, the ongoing use of this antibiotic as a medicine has caused some populations of bacteria to become .....2..... to penicillin.

Which row correctly identifies the missing words at 1 and 2?

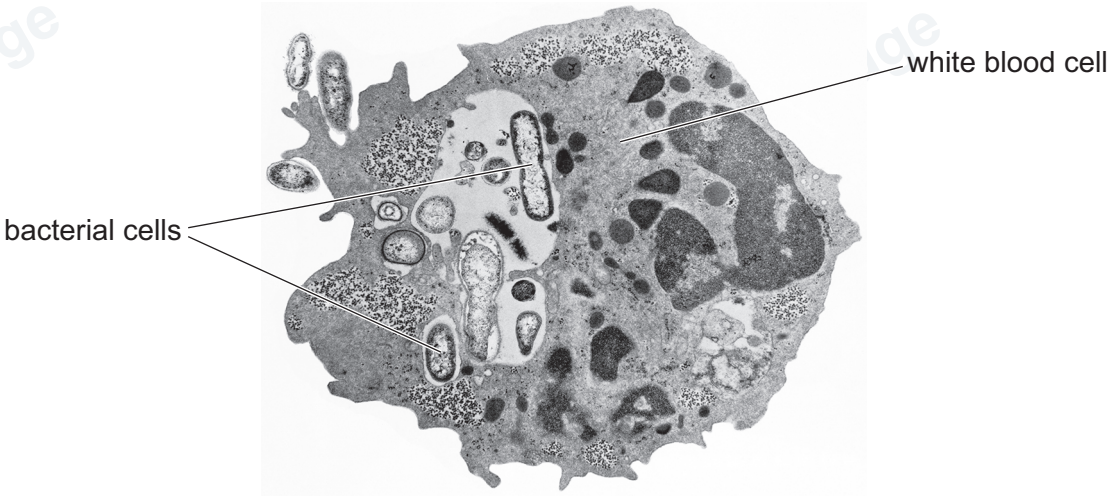
| | **1** | **2** |
|---|---|---|
| **A** | membrane | immune |
| **B** | membrane | resistant |
| **C** | wall | immune |
| **D** | wall | resistant |

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**37** Which row correctly matches a disease to its method of transmission?

| | name of disease | method of transmission |
|---|---|---|
| **A** | cholera | receiving a blood transfusion from an infected person |
| **B** | HIV/AIDS | from contaminated dust in homes of infected people |
| **C** | malaria | from infected mother during breast feeding of infants |
| **D** | TB | from infected cows through unpasteurised milk |

**38** The electron micrograph shows a human white blood cell and a few bacterial cells.




Which statement describes how this white blood cell acts on the bacterial cells?

**A** It is a B-lymphocyte that releases antibodies which bind to bacterial cell antigens for increased phagocytosis.

**B** It is a neutrophil that traps bacterial cells in phagocytic vacuoles to be digested by enzymes.

**C** It is a T-helper cell that releases cytokines after its receptors bind to bacterial cell antigens.

**D** It is a T-killer cell that attaches to bacterial cells and releases toxic substances to kill them.

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**39** Which statements about the defence in the body against infectious disease are correct?

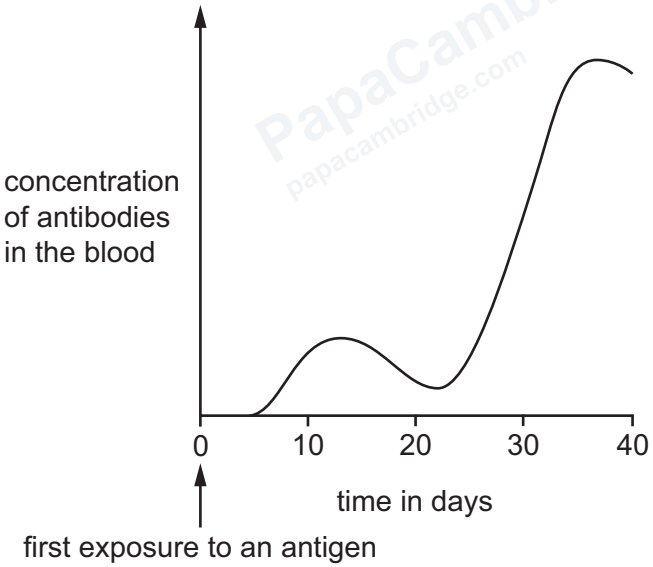
1 In passive immunity, the plasma cells of a person produce antibodies but no memory cells against specific antigens.

2 A specific immune response involves activation of B-lymphocytes and T-lymphocytes following recognition of, and binding to, a specific antigen.

3 Following invasion by microorganisms, natural active immunity can be gained by initiating an immune response.

**A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

**40** The graph shows the concentration of antibodies produced in response to an antigen.




Which statement is correct?

**A** It takes 25 days to achieve active immunity.

**B** Memory cells for this antigen are present in the body within 20 days.

**C** T-helper lymphocytes are activated on day 12.

**D** The second exposure to the antigen occurred on day 25.

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