Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/12**

Paper 1 Multiple Choice **February/March 2019**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

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READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

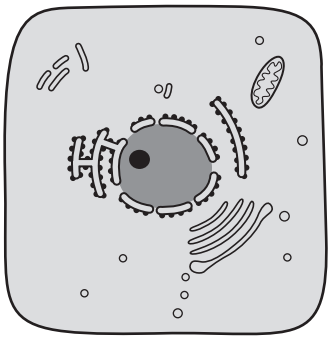
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
Electronic calculators may be used.

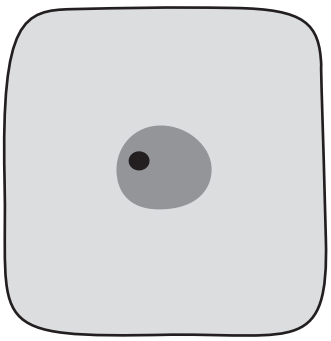
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1 The diagram below was drawn from an electron micrograph of an animal cell.

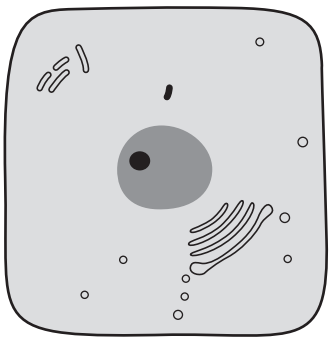


Which diagram would represent the same cell seen under a simple light microscope, using daylight as the only light source?

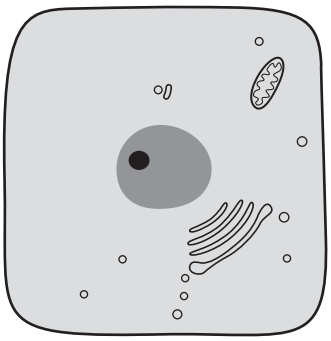
A



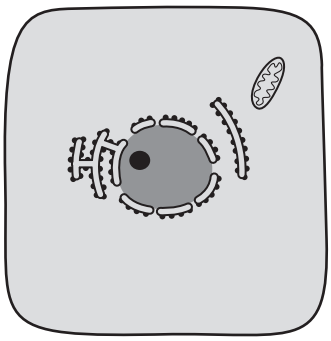
B



C



D



2 The diameter of a red blood cell in a diagram was measured as 2.5 cm.

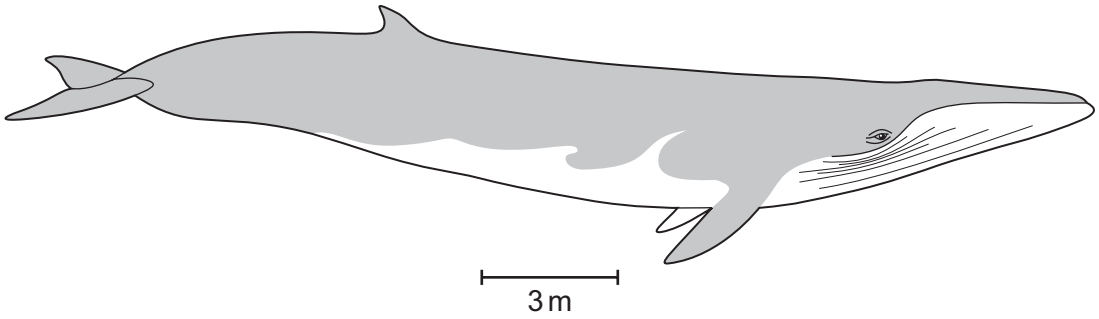
The actual diameter of the red blood cell was 7 μm.

Which calculation would give the correct magnification for the red blood cell in the diagram?

A $\frac{7}{25000}$ **B** $\frac{2500}{7}$ **C** $\frac{25000}{7}$ **D** $\frac{25000}{7000}$

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3 The diagram shows a fin whale drawn to scale.



A student made three statements about the diagram.

1 The magnification is ×0.006.

2 The ratio of actual size to diagram size is 1667 : 1.

3 The fin whale has an actual length of 24 m.

Which statements are correct?

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

4 Which structures are found in both chloroplasts and mitochondria?

1 70S ribosomes

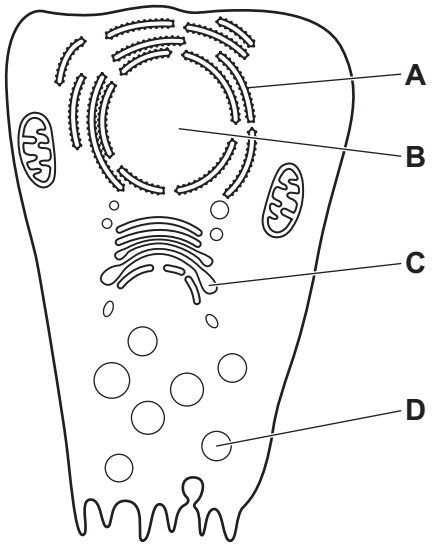
2 80S ribosomes

3 circular DNA

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

5 Radioactively labelled amino acids are introduced into a cell that is actively secreting an enzyme.

In which cell structure will the radioactivity first become concentrated?



6 Ribosomes exist as separate subunits that are bound together during protein synthesis.

What do these subunits consist of?

A mRNA and protein

B mRNA and tRNA

C rRNA and protein

D rRNA and tRNA

7 Four solutions were tested with Benedict's solution. The table shows the colour of the solutions after testing.

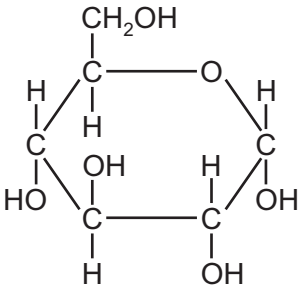
solution	colour
1	green
2	blue
3	brick red
4	yellow

Which row shows solutions that could have given these results?

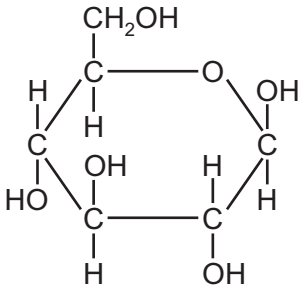
	solution 1	solution 2	solution 3	solution 4
A	0.05% reducing sugar	0.5% non-reducing sugar	1.0% reducing sugar	0.1% reducing sugar
B	0.5% reducing sugar	0.0% reducing sugar	1.0% reducing sugar	0.1% reducing sugar
C	1.0% reducing sugar	1.0% non-reducing sugar	1.5% reducing sugar	0.5% reducing sugar
D	0.05% non-reducing sugar	0.5% reducing sugar	1.0% non-reducing sugar	0.1% non-reducing sugar

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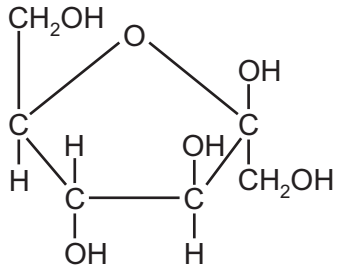
8 The diagram shows a molecule of three hexose sugars.



1



2



3

Which row correctly shows examples of carbohydrates in which these three hexose sugars occur?

	sucrose	cellulose	amylopectin
A	1	2	3
B	1	3	2
C	2	3	1
D	3	2	1

9 Which feature of glycogen distinguishes glycogen from starch?

A All glycogen molecules are highly branched.

B All glycogen molecules are polysaccharides.

C All glycogen molecules contain α-glucose.

D All glycogen molecules contain 1,4-glycosidic bonds.

10 A student wrote four statements about what happens during hydrolysis of a carbohydrate.

1 Disaccharides are formed from monosaccharides.

2 Glycosidic bonds are broken.

3 Molecules of water are released.

4 Monosaccharides can be formed.

Which statements are correct?

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

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11 The table compares three molecules, X, Y and Z, which contain the elements carbon, hydrogen and oxygen only.

The percentage of carbon, hydrogen and oxygen atoms in each molecule is shown.

molecule	% carbon	% hydrogen	% oxygen
X	25.0	50.0	25.0
Y	28.5	47.7	23.8
Z	34.6	61.6	3.8

Which row correctly identifies molecules X, Y and Z?

	molecule		
	X	Y	Z
A	monosaccharide	disaccharide	polysaccharide
B	monosaccharide	polysaccharide	triglyceride
C	polysaccharide	triglyceride	monosaccharide
D	triglyceride	monosaccharide	polysaccharide

12 Which statements about the differences between phospholipids and triglycerides are correct?

1 Phospholipids have hydrophobic regions but triglycerides do not.

2 The fatty acids in a phospholipid are always saturated but in a triglyceride they may be saturated or unsaturated.

3 Phospholipids are polar molecules but triglycerides are non-polar.

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

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13 An investigation was carried out into the effect of different treatments on the permeability of the cell surface membranes and tonoplasts of beetroot cells. Beetroot cell vacuoles contain a red pigment. This pigment is unable to pass out of the cells because it cannot diffuse through the tonoplasts or cell surface membranes.

1 cm^3 cubes were cut from beetroot tissue and washed in running water for 20 minutes to remove any pigment released from damaged cells.

The cubes were then placed in test-tubes with different contents and observed for five minutes.

Which row shows a correct explanation for the observation recorded for one of the treatments?

	treatment	observation	explanation
A	dilute hydrochloric acid	contents of test-tube stay clear	membrane proteins have been denatured
B	ethanol	contents of test-tube turn red	lipids, including membrane phospholipids, have dissolved
C	water at 20 °C	contents of test-tube stay clear	membrane proteins have been denatured
D	water at 80 °C	contents of test-tube turn red	lipids, including membrane phospholipids, have dissolved

14 Which levels of protein structure can determine the specificity of an enzyme?

1 primary

2 secondary

3 tertiary

4 quaternary

A 1, 2, 3 and 4

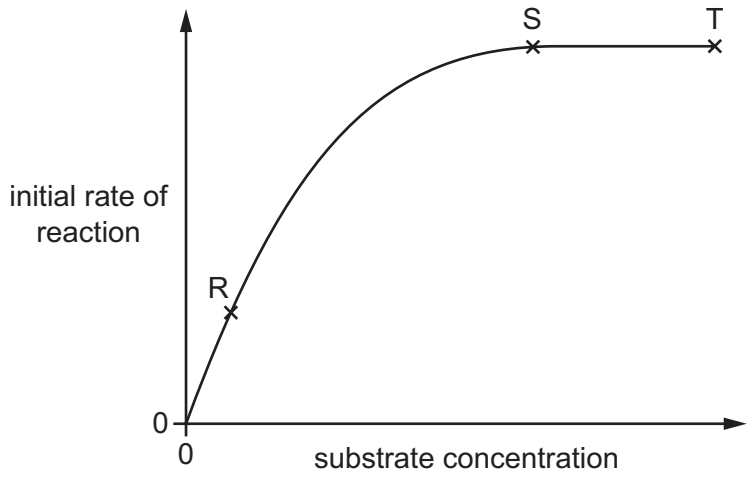
B 1, 2 and 3 only

C 1, 2 and 4 only

D 3 and 4 only

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15 The graph shows the effect of substrate concentration on the initial rate of an enzyme-catalysed reaction. The enzyme concentration is constant.



Which statement about the graph is correct?

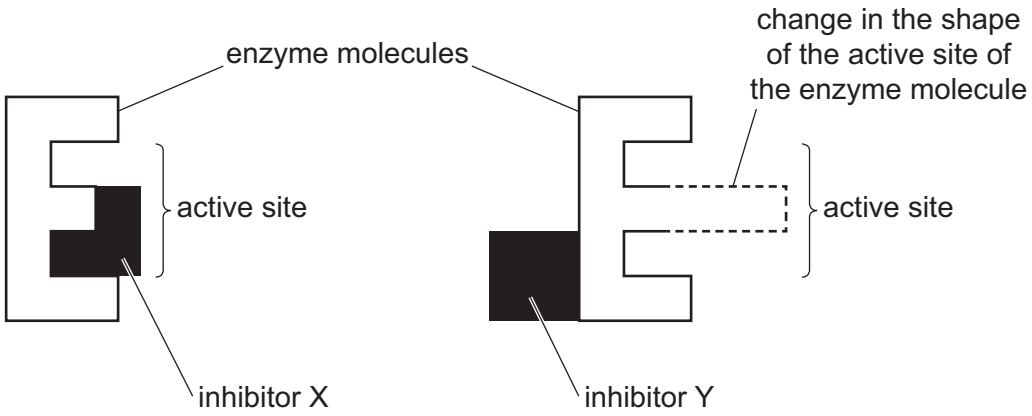
A Between R and S the number of enzyme molecules is limiting the rate of reaction.

B Between R and S the number of product molecules is limiting the rate of reaction.

C Between S and T the number of enzyme molecules is limiting the rate of reaction.

D Between S and T the number of substrate molecules is limiting the rate of reaction.

16 The diagram represents the reversible interaction between the active site of an enzyme and different inhibitors, X and Y.



Which row correctly identifies the type of inhibition shown by inhibitor X and inhibitor Y?

	X	Y
A	competitive	competitive
B	competitive	non-competitive
C	non-competitive	competitive
D	non-competitive	non-competitive

17 Which statements about the movement of water in and out of cells are correct?

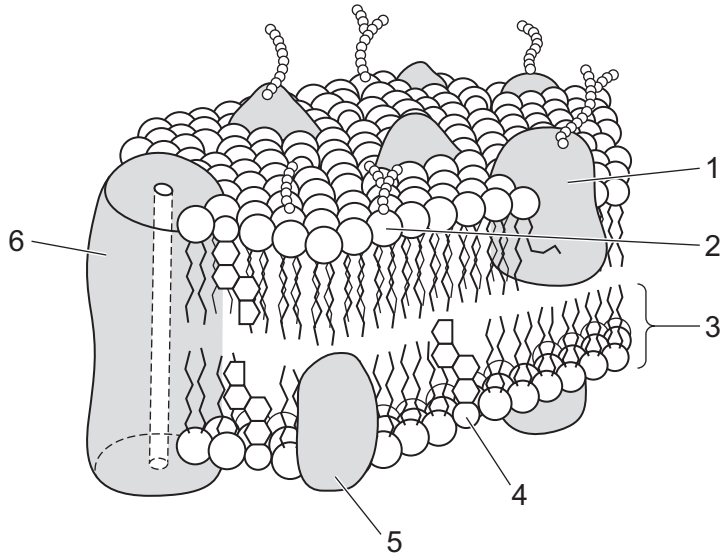
1 Water moves from regions of more negative water potential to regions of less negative water potential.

2 Water can cross cell membranes by passing through channel proteins.

3 Water can pass through cellulose cell walls.

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

18 The diagram shows part of a cell surface membrane.



Which row correctly identifies functions of two of the numbered molecules?

	molecule	function	molecule	function
A	1	acts as an antigen	4	stabilises the membrane
B	2	acts as a receptor	5	active transport
C	3	facilitated diffusion	4	regulates the fluidity of the membrane
D	6	active transport	5	acts as an enzyme

19 During mitosis in animal cells, which process occurs after prophase?

A Centrioles move towards the poles of the cell.

B Centromeres attach to spindle microtubules.

C Chromatids join to form chromosomes.

D Chromosomes condense and become visible.

20 Embryonic stem cells are able to replicate continuously.

What happens to the telomeres during repeated mitotic cell cycles of embryonic stem cells?

A Their lengths increase.

B Their lengths decrease.

C They are completely lost.

D They stay the same length.

21 A length of DNA was analysed and sequenced. 24% of its nitrogenous bases were adenine.

Which percentage of the bases will be cytosine?

A 24 **B** 26 **C** 48 **D** 76

22 Rifampicin is an antibiotic used to treat tuberculosis (TB).

It works by inhibiting RNA polymerase in bacteria.

Which processes are directly inhibited by this antibiotic?

1 DNA replication

2 transcription

3 ATP synthesis

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

23 Which terms describe the method by which water is transported within xylem vessel elements?

1 mass flow

2 cohesion-tension

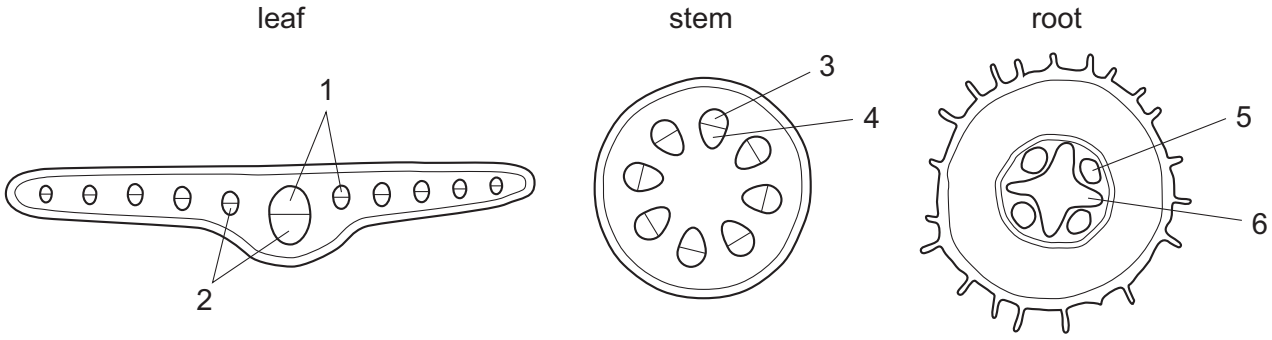
3 osmosis

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

24 Which combination of features is characteristic of a phloem sieve tube element as it is loaded from a source?

	water potential of the phloem sieve tube element	lignification of the cell wall
A	less negative than source	absent
B	less negative than source	present
C	more negative than source	absent
D	more negative than source	present

25 The diagrams show transverse sections of parts of a plant with some transport tissues labelled from 1 to 6.



Which row shows tissues that mainly transport water and tissues that mainly transport sucrose?

	mainly transport water	mainly transport sucrose
A	1 and 3	4 and 6
B	1 and 6	3 and 5
C	2 and 3	4 and 5
D	3 and 5	2 and 6

26 Which properties of lignin are important for the function of xylem vessels in the stem of a tall plant, such as a tree?

1 It is inflexible so does not bend easily.

2 It is not permeable to water.

3 It is strong to resist collapse under pressure.

4 It has weaker adhesion to water molecules than cellulose.

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

27 A heating sleeve was placed around the trunk of a small tree at a height of 1 m above the ground. This allowed a narrow region of the tree trunk to be heated to 60 °C.

How will heating this region to 60 °C affect the transport of phloem sap and xylem sap between the roots and leaves?

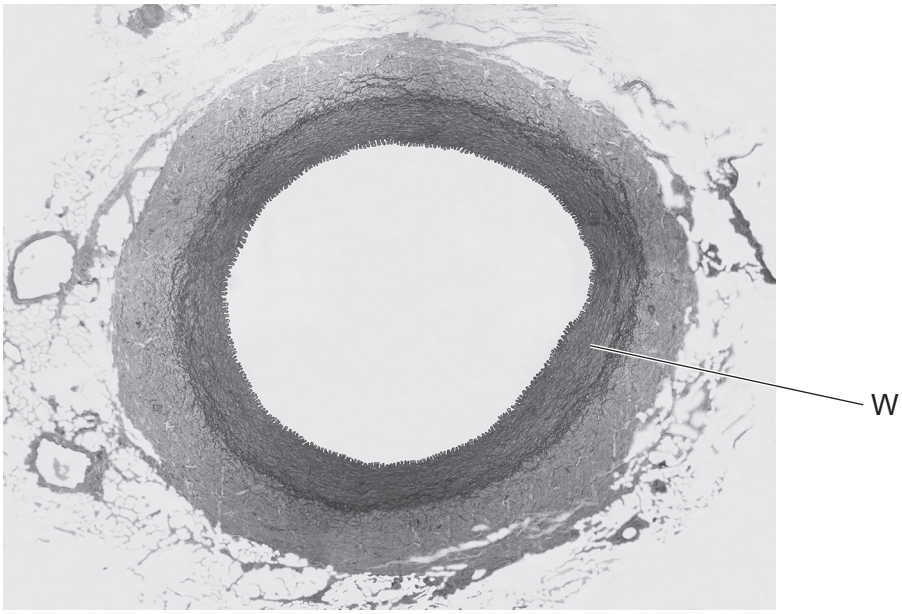
	movement of phloem sap	movement of xylem sap
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = transport continues

✗ = transport stops

28 The photomicrograph shows a section through a structure found in mammals viewed using a light microscope.



×60

What are the main components of layer W?

A collagen fibres only

B elastic fibres and collagen fibres

C smooth muscle and elastic fibres

D squamous epithelial cells forming an endothelium

29 Which row correctly identifies the locations in which a type of molecule or cell can be present?

	type of molecule or cell	blood	lymph	tissue fluid
A	antigens	✓	✗	✗
B	glucose	✓	✗	✓
C	lymphocyte	✗	✓	✓
D	neutrophil	✓	✓	✓

key

✓ = can be present

✗ = cannot be present

30 Which statements about the formation of haemoglobinic acid are correct?

1 It is linked to the action of carbonic anhydrase.

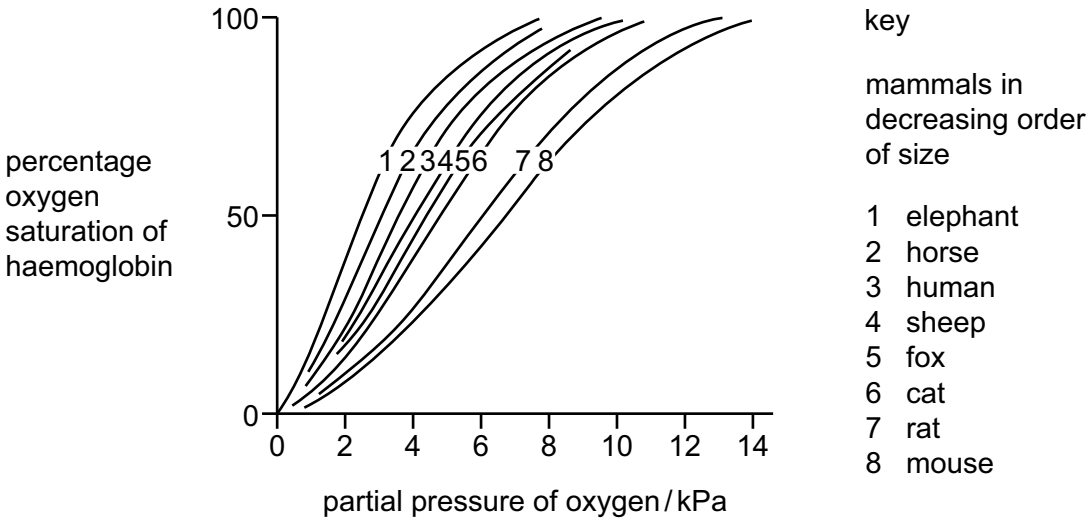
2 It prevents blood from becoming too acidic by removing excess hydrogen ions.

3 It can only occur when oxygen associates with haemoglobin.

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

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31 The graph shows the oxygen dissociation curves of haemoglobin for eight species of mammal.



Which conclusion is consistent with the data shown in the graph?

A The haemoglobin of larger mammals will combine with oxygen at a lower partial pressure of oxygen than that of smaller mammals.

B The haemoglobin of larger mammals will release oxygen at a higher partial pressure of oxygen than that of smaller mammals.

C The metabolic activity of the mammal is directly proportional to the ability of its haemoglobin to release oxygen.

D The size of the mammal is directly proportional to the ability of its haemoglobin to release oxygen.

32 The statements list some of the events in the cardiac cycle. They are not in the correct order.

1 The impulse travels through Purkyne tissue.

2 The ventricles contract.

3 The atrioventricular node delays the impulse for a fraction of a second.

4 The muscle tissue of the sinoatrial node contracts.

5 The wave of excitation sweeps upwards from the base of the ventricles.

6 A wave of excitation sweeps across the atria.

7 The atria contract.

Which statement describes the second of these events to occur in the cardiac cycle?

A 1 **B** 4 **C** 6 **D** 7

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33 Which statement about typical bronchioles is correct?

A They have cartilage and ciliated cells.

B They have goblet cells and smooth muscle.

C They have smooth muscle and cartilage.

D They have smooth muscle and ciliated cells.

34 Tobacco smoke contains substances that affect the functioning of the human body.

substance		effect	
w	nicotine	1	decreases oxygenation of haemoglobin
x	carbon monoxide	2	increases risk of cancer
y	tar	3	increases risk of blood clotting

What shows the substances matched with their correct effects?

A w-1, x-2, y-3

B w-1, x-3, y-2

C w-2, x-1, y-3

D w-3, x-1, y-2

35 Which two diseases are transmitted by airborne droplets?

A cholera and malaria

B malaria and measles

C measles and tuberculosis (TB)

D tuberculosis (TB) and cholera

36 Which features do the causative agents of measles, malaria and tuberculosis (TB) have in common?

	cytoplasm	the ability to produce ATP	surface antigens
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = have in common

✗ = do not have in common

37 What explains why most viruses that cause diseases in humans are unaffected by antibiotics?

A Viral antigens do not bind to antibiotics.

B Viral nucleic acids are protected by a protein coat.

C Viruses contain no ribosomes or mRNA.

D Viruses reproduce inside living eukaryotic cells.

38 Why does the white blood cell count increase in people with leukaemia?

A More antibodies are required so there are more B-lymphocytes.

B More lymphocytes are produced in bone marrow.

C More memory cells are produced in plasma.

D More T-lymphocytes are required to stimulate the immune system.

39 Where are antibodies found during an immune response?

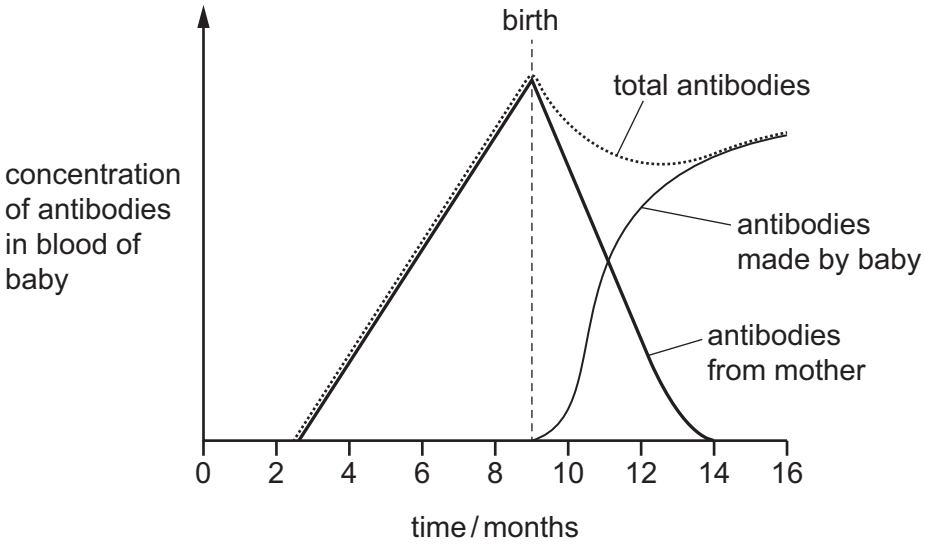
	on the surface of pathogens	on the surface of memory cells
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = antibodies found

✗ = antibodies not found

40 The graph shows the changes that occur in the concentration of antibodies in the blood of a baby before birth and during the first few months after birth.



Which description about the changes in immunity during the first few months after birth is correct?

A active artificial immunity decreases, active natural immunity increases

B active natural immunity decreases, active artificial immunity increases

C passive artificial immunity decreases, active natural immunity increases

D passive natural immunity decreases, active natural immunity increases

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