Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2025**

1 hour 15 minutes

You must answer on the multiple choice answer sheet.

9032476168

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.
- 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 **20** pages. Any blank pages are indicated.

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1 In a photomicrograph of magnification ×5000, a chloroplast measures 25 mm in diameter.

What is the actual diameter of the chloroplast?

A 0.2 μm **B** 0.5 μm **C** 2 μm **D** 5 μm

2 What is a function of Golgi bodies?

A formation of vesicles for endocytosis

B modification of proteins for secretion

C synthesis of ATP

D synthesis of polypeptides

3 A cell in the human body is specialised for synthesis and secretion of lipids.

Which row shows the organelles required by the cell for synthesis **and** secretion of lipids?

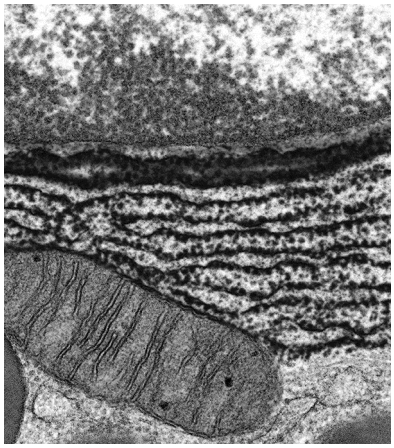
	mitochondria	smooth endoplasmic reticulum	vesicles
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

key

✓ = required

✗ = **not** required

4 The photomicrograph shows part of a cell.



Which row is correct?

	this cell will contain 70S ribosomes	this could be part of a plant cell	the organelles shown could be used to make antibodies
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✗
D	✗	✗	✓

key

✓ = correct

✗ = **not** correct

5 Which statement about viruses is correct?

A They are cells with a capsid made of phospholipids.

B They are cells with a capsid made of protein.

C They are particles with a capsid made of phospholipids.

D They are particles with a capsid made of protein.

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[Turn over

6 Solution X was tested for the presence of non-reducing sugars. It did **not** contain reducing sugars.

Some steps that can be used to test for the presence of biological molecules are listed.

1 Add Benedict's solution to the test-tube.

2 Add dilute hydrochloric acid to the test-tube.

3 Add sodium hydrogencarbonate to the test-tube.

4 Heat the test-tube in a water-bath.

Which order of steps to identify the presence of non-reducing sugars in solution X is correct?

A $1 \rightarrow 4$

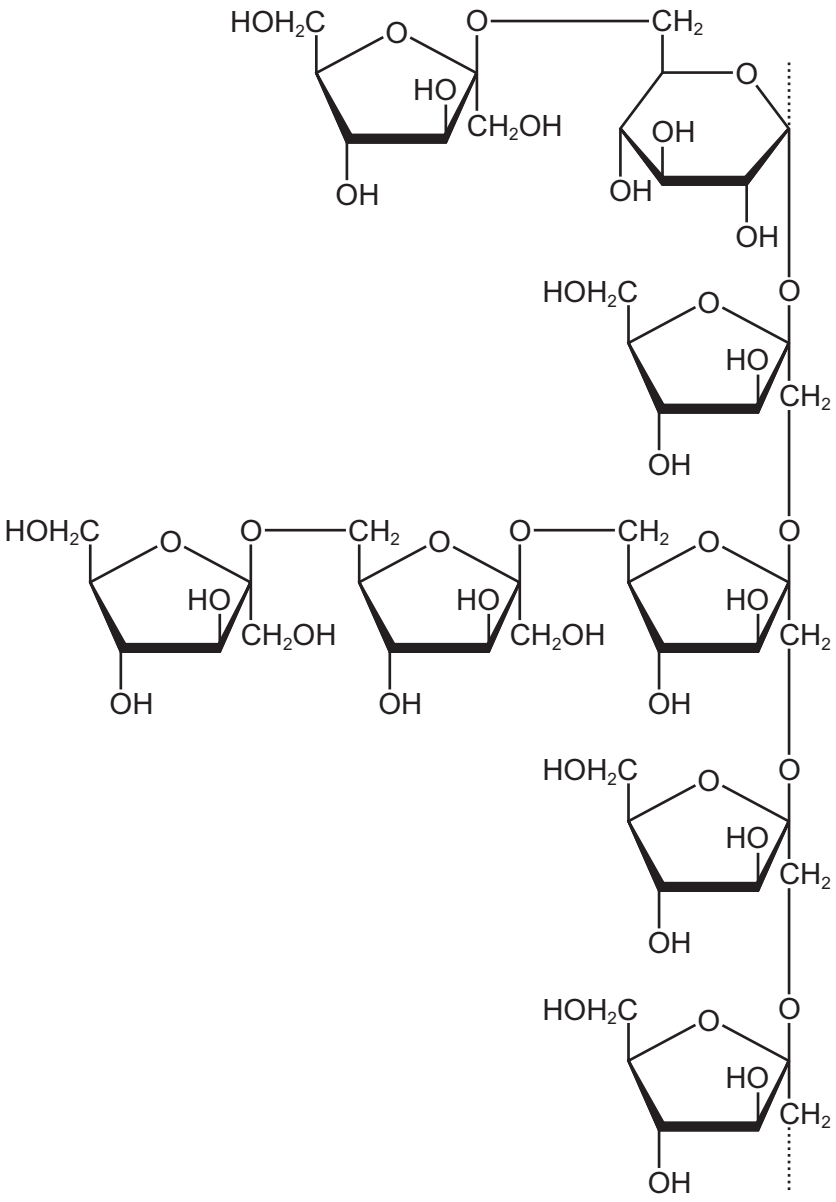
B $2 \rightarrow 3 \rightarrow 1 \rightarrow 4$

C $2 \rightarrow 4 \rightarrow 3 \rightarrow 1 \rightarrow 4$

D $3 \rightarrow 2 \rightarrow 4 \rightarrow 1$

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7 The diagram shows the structure of part of a biological molecule.



Which statements about this biological molecule are correct?

1 It has monomers joined by ester bonds.

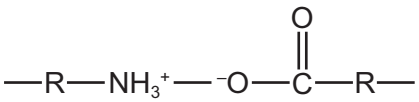
2 It is a macromolecule.

3 It is a polysaccharide.

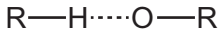
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

8 Which diagram has a covalent bond that joins monomers together to form a biological polymer in eukaryotes?

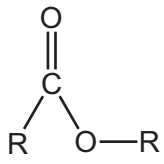
A



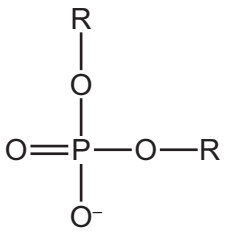
B



C



D



9 Which feature of storage polysaccharides means they do **not** change the water potential of cells?

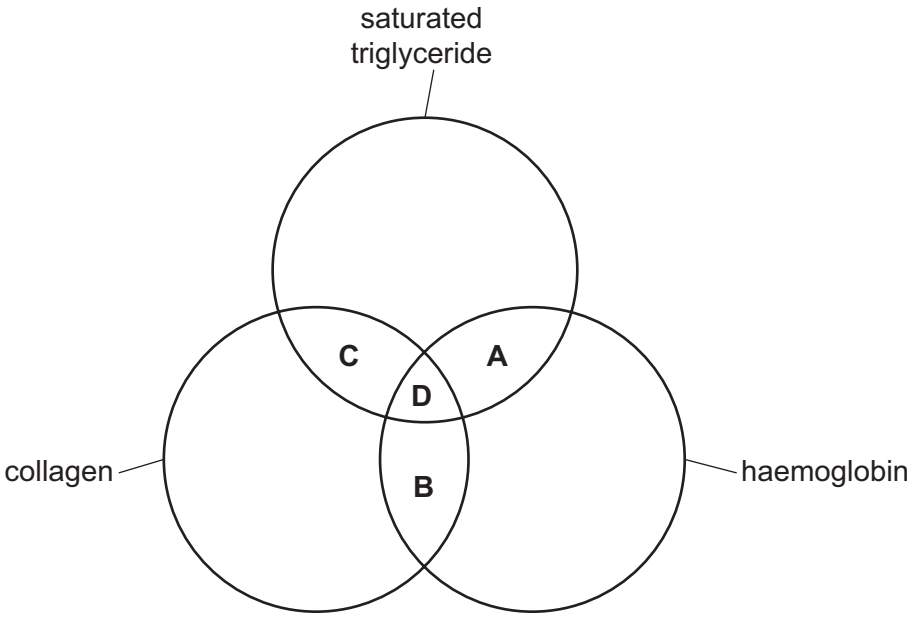
A They are easily hydrolysed.

B They are compact.

C They are insoluble.

D They are branched molecules.

10 Which molecules contain at least four double bonds?



11 In some people a mutation can affect the beta chains in their haemoglobin molecules. As a result polar amino acids on the outer surfaces of the chains are replaced by non-polar amino acids.

What will be the effect on haemoglobin?

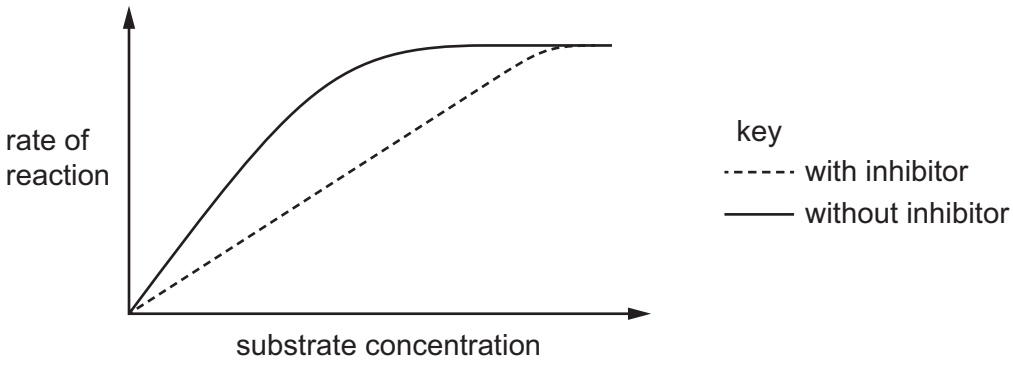
A Haemoglobin will become less soluble.

B Haemoglobin will become more soluble.

C Hydrophobic interactions between amino acids will decrease.

D More hydrogen bonds will form in the molecule.

12 The graph shows the effect of substrate concentration on an enzyme-catalysed reaction with and without a competitive inhibitor.



What is the effect of the competitive inhibitor on V_{max} and K_m?

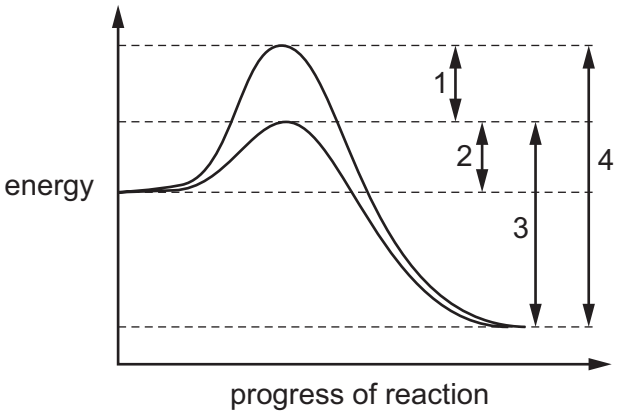
A V_{max} decreases and K_m decreases.

B V_{max} stays the same and K_m decreases.

C V_{max} stays the same and K_m increases.

D V_{max} decreases and K_m stays the same.

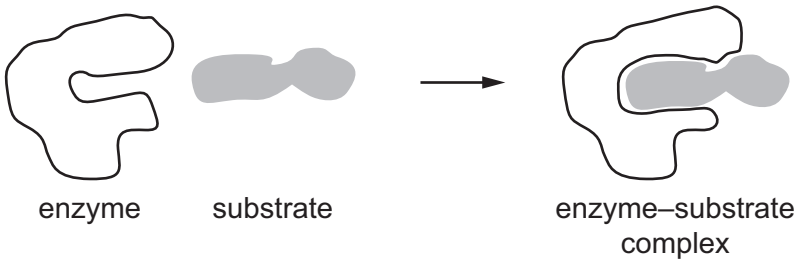
13 The graph shows energy changes in a chemical reaction.



What is the activation energy when an enzyme is added?

A 1 + 2 **B** 2 only **C** 3 – 2 **D** 4

14 The diagram shows an enzyme, its substrate and an enzyme–substrate complex.



Which statement explains how this substrate is able to enter the active site of this enzyme?

A Contact between the substrate and the enzyme causes a change in the enzyme shape.

B The shape of the active site and the shape of the substrate are complementary.

C The substrate within the active site forms hydrogen bonds with amino acids.

D When the enzyme–substrate complex forms, the tertiary structure of the enzyme changes.

15 What are the main roles of glycolipids in cell surface membranes?

1 to help cells to attach to each other to form tissues

2 to act as antigens for cell-to-cell recognition

3 to increase fluidity for the cell surface membrane

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

16 A sample of healthy plant cells taken from the same tissue is placed in a beaker containing distilled water.

The cells change in size.

What would explain this change in size?

A Water will leave the cells by active transport.

B Water will enter the cells by osmosis.

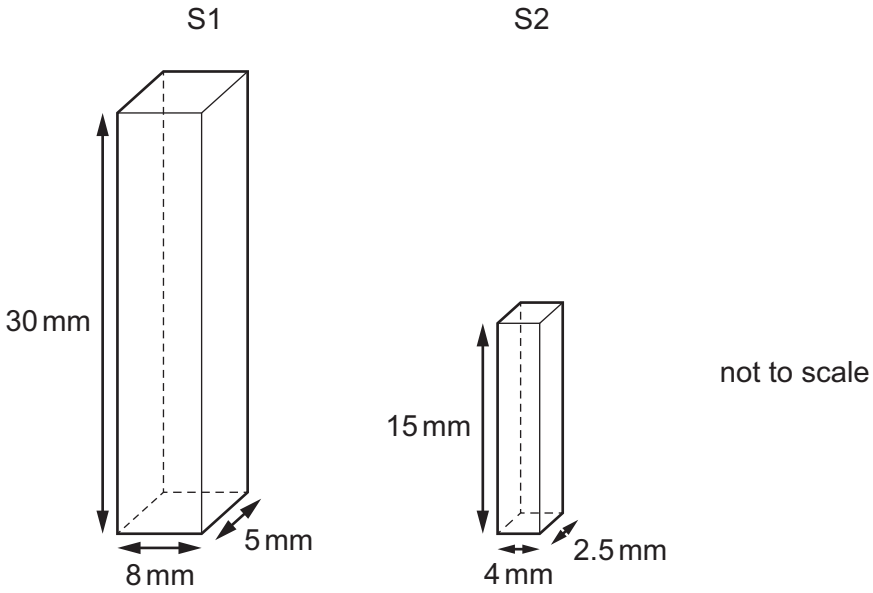
C Solutes will enter the cells by active transport.

D Solutes will leave the cells by osmosis.

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17 A student studying surface area to volume ratio and diffusion made a cuboid, S1, using agar stained blue with a pH indicator. The dimensions of S1 are shown in the diagram.

The student made a second agar cuboid, S2. Each dimension of S2, (the length, the width and the height), was half that of S1.



The student placed each cuboid in a test-tube and covered it in acid. The time taken for each cuboid to completely change colour was recorded. All variables other than the size of the cuboids were standardised.

Which row shows the surface area to volume ratio of S1 and the time taken for S1 to change colour completely in acid compared to the time taken for S2 to change colour completely?

	surface area to volume ratio of S1	time taken for S1 to change colour completely in acid compared to S2
A	0.72 : 1	S1 takes less time than S2
B	0.72 : 1	S1 takes more time than S2
C	1.4 : 1	S1 takes less time than S2
D	1.4 : 1	S1 takes more time than S2

18 Two test-tubes, labelled X and Y, were set up containing equal volumes of solution X or solution Y respectively.

A large number of type P cells and a large number of type Q cells were added into test-tube X and also into test-tube Y.

After a few minutes, samples of the solutions were taken and the cells were observed with a microscope.

- In solution X, all of cell type P had burst and cell type Q had **not** burst.
- In solution Y, **no** cells had burst.

Which row correctly identifies cell type Q and solutions X and Y?

	cell type Q	solution X	solution Y
A	red blood cells	5% NaC*l* solution	distilled water
B	goblet cells	5% glucose solution	distilled water
C	liver cells	distilled water	5% glucose solution
D	root hair cells	distilled water	5% NaC*l* solution

19 A human muscle cell contains 46 chromosomes.

How many centromeres will be present in a cell during the stages of the mitotic cell cycle?

	early prophase	metaphase	anaphase
A	46	46	92
B	46	92	92
C	46	46	46
D	92	46	46

20 Telomeres become shorter during each cell cycle of a specialised cell.

In which phase of the cell cycle do telomeres shorten?

A cytokinesis

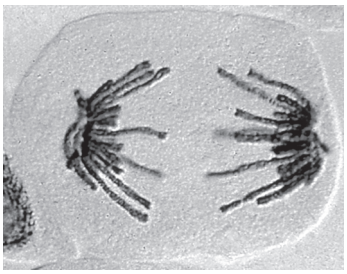
B G_1

C S

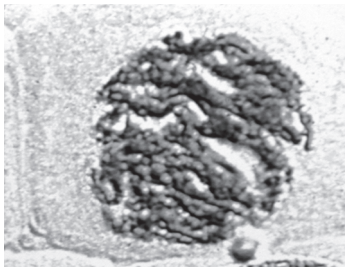
D G_2

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21 The photomicrographs show stages of mitosis.



1



2



3



4



5

What is the correct order for the stages of mitosis?

A $2 \rightarrow 3 \rightarrow 5 \rightarrow 1 \rightarrow 4$

B $2 \rightarrow 4 \rightarrow 1 \rightarrow 5 \rightarrow 3$

C $3 \rightarrow 2 \rightarrow 5 \rightarrow 4 \rightarrow 1$

D $5 \rightarrow 1 \rightarrow 4 \rightarrow 3 \rightarrow 2$

22 The gene that codes for protein R is 130 kb long.

Protein R is 220 kDa in mass.

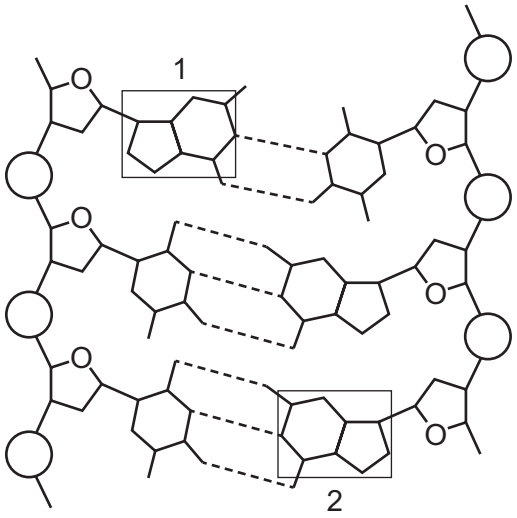
The typical mass of an amino acid is 110 Da.

(1000 base pairs = 1 kb, 1000 Da = 1 kDa)

Which row is correct?

	approximate length of introns in this gene / base pairs	approximate length of mRNA for this gene / base pairs
A	6000	6000
B	6000	130 000
C	124 000	6000
D	124 000	130 000

23 The diagram shows a section of DNA. Two of the bases in this section are labelled 1 and 2.



Which row correctly identifies the bases 1 and 2?

	base 1	base 2
A	purine	adenine
B	purine	guanine
C	pyrimidine	adenine
D	pyrimidine	guanine

24 Which row describes the role of the enzymes DNA polymerase and DNA ligase?

	DNA polymerase	DNA ligase
A	adds nucleotides in a 5′ to 3′ direction	joins sections of DNA together on the lagging strand
B	adds nucleotides in a 3′ to 5′ direction	joins sections of DNA together on the leading strand
C	adds nucleotides in a 3′ to 5′ direction	joins sections of DNA together on the lagging strand
D	adds nucleotides in a 5′ to 3′ direction	joins sections of DNA together on the leading strand

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25 The table shows some of the DNA triplet codes for some amino acids.

amino acid	DNA triplet code	amino acid	DNA triplet code
arginine	GCA	glycine	CCA
arginine	GCC	glycine	CCG
arginine	GCG	glycine	CCT
asparagine	TTA	lysine	TTC
asparagine	TTG	lysine	TTT
cysteine	ACA	proline	GGA
cysteine	ACG	proline	GGC
STOP	ATC	valine	CAC

The base sequence on the template DNA strand coding for part of a polypeptide is shown.

CCA TTC ACG GCG TTA GCA

Two mutations occur in this sequence during DNA replication.

Which mutated DNA would result in two different amino acids?

A CCA ATC ACG GCG TTG GCA

B CCA TTC ACA GCA TTA GCA

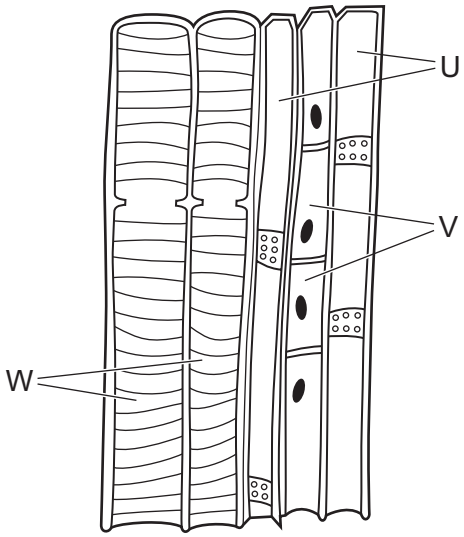
C CCA TTC ACG CCG TTA GCC

D CCA TTC ACG GCG TTC GGA

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[Turn over

26 The diagram shows a vertical section through part of the stem of a dicotyledonous plant. Three types of structures are labelled.



What are the structures U, V and W?

	companion cells	phloem sieve tube elements	xylem vessel elements
A	U	W	V
B	V	U	W
C	U	V	W
D	W	V	U

27 Which features of xylem vessels help to reduce the resistance to water flow?

1 Lignin forms an incomplete secondary wall.

2 There are **no** cross walls between the vessel elements.

3 The xylem vessels form narrow tubes.

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

28 What causes water to move from the root hair cells to the endodermis?

A diffusion through cell walls and osmosis down a water potential gradient in the cytoplasm

B diffusion through the symplast and osmosis and root pressure through the apoplast

C osmosis from cell vacuole to cell vacuole and active transport into the endodermis

D osmosis through the intercellular spaces and diffusion in cell walls and cytoplasm

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29 Which changes occur as carbohydrate is moved into a sink?

	water potential of the sieve tube element becomes	volume of liquid of the sieve tube element
A	lower	decreases
B	lower	increases
C	higher	decreases
D	higher	increases

30 Which statement correctly compares blood plasma and tissue fluid in a healthy person?

A Blood plasma contains more protein than tissue fluid.

B Both blood plasma and tissue fluid contain red blood cells.

C Tissue fluid contains white blood cells whereas blood plasma does **not** contain lymphocytes.

D Tissue fluid is formed from blood plasma and is **not** returned to blood plasma.

31 The body maintains an average normal blood pH of 7.4.

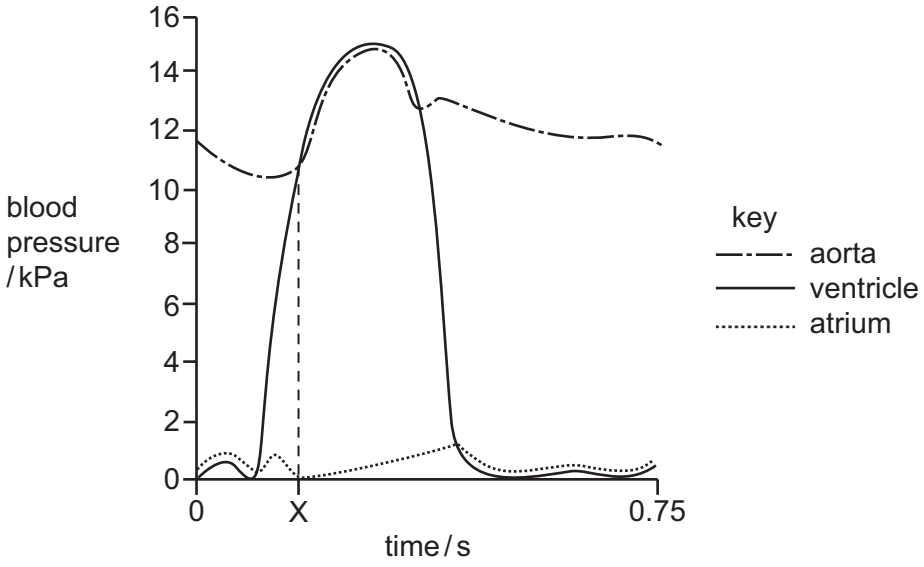
Which row describes the conditions that would increase the dissociation rate of haemoglobin the most during periods of intense exercise?

	blood pH	blood CO_2 partial pressure / kPa
A	7.2	5.6
B	7.2	9.5
C	7.6	5.6
D	7.6	9.5

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[Turn over

32 The graph shows changes in blood pressure during one cardiac cycle.



What is happening at time X?

	aortic semilunar valve	atrium
A	closing	emptying
B	closing	filling
C	opening	emptying
D	opening	filling

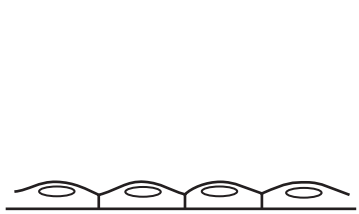
33 How many times must a carbon dioxide molecule pass through a cell surface membrane to travel from the tissue fluid into the blood plasma?

(Assume there are no pores between the cells the carbon dioxide molecule must pass through.)

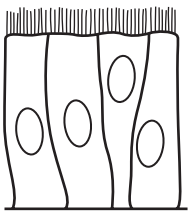
A 1 **B** 2 **C** 3 **D** 4

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34 Two types of epithelial cells, 1 and 2, occur in the mammalian gas exchange system in a healthy human.



1



2

Which row shows the function and distribution of these types of epithelial cells?

	cell type 1	cell type 2
A	absorption in bronchi	secrete mucus in alveoli
B	exchange surface in alveoli	secrete mucus in bronchi
C	absorption in bronchi	move mucus in alveoli
D	exchange surface in alveoli	move mucus in bronchi

35 Which tissues would be seen in a photomicrograph of the wall of the trachea?

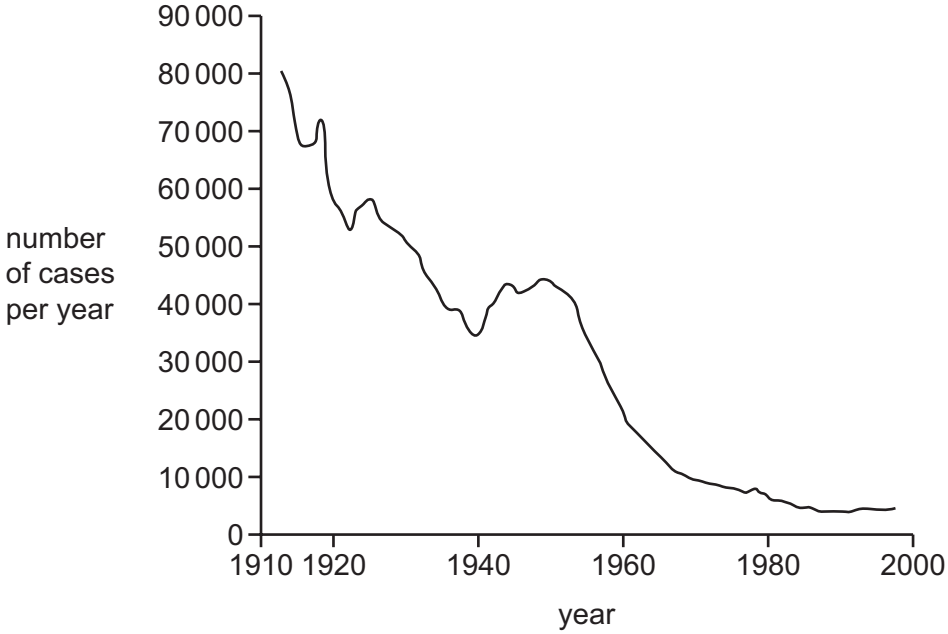
	elastic fibres	smooth muscle
A	✗	✓
B	✓	✗
C	✓	✓
D	✗	✗

key

✓ = present

✗ = **not** present

36 The graph shows the decrease in cases of tuberculosis (TB) in a country between 1910 and 2000.



Which factors could have contributed to the fall over this period?

1 pasteurisation of milk

2 the provision of new housing to reduce overcrowding

3 removing large pools of stagnant water

4 identification of contacts of people infected with TB

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

37 The pathogens for some diseases are transmitted by vectors.

Which disease is transmitted with the help of a vector that could be controlled by the removal of pools of water?

A cholera

B HIV/AIDS

C malaria

D tuberculosis

38 How does penicillin affect bacteria?

A It inhibits DNA replication by binding to nucleotides.

B It inhibits translation by preventing tRNA binding to ribosomes.

C It is a competitive inhibitor of an enzyme in cell wall synthesis.

D It is a competitive inhibitor of an enzyme in protein synthesis.

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39 The hybridoma method is used for the production of monoclonal antibodies.

Which two types of cell are used in this method?

A stem cell and B-lymphocyte

B stem cell and T-lymphocyte

C tumour cell and B-lymphocyte

D tumour cell and T-lymphocyte

40 What describes a non-specific immune response?

A activation of killer T-lymphocytes by infected cells

B cloning of B-lymphocytes to form plasma cells

C ingestion of a bacterial cell by a neutrophil

D recognition of antigens on the cell surface of macrophages

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