Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/12**

Paper 1 Multiple Choice **May/June 2019**

1 hour

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

9874289435

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.

This document consists of **18** printed pages and **2** blank pages.

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1 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?

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

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

step 3 divide the image length by 1000

step 4 multiply the image length by 1000

step 5 divide by 8

step 6 multiply by 8

A steps 1, 3 and 6

B steps 1, 4 and 6

C steps 2, 3 and 5

D steps 2, 4 and 5

2 What is the typical resolution of a microscope using daylight as a light source with a ×10 eyepiece lens and a ×40 objective lens?

A 0.20 nm **B** 200 nm **C** 100 μm **D** 400 μm

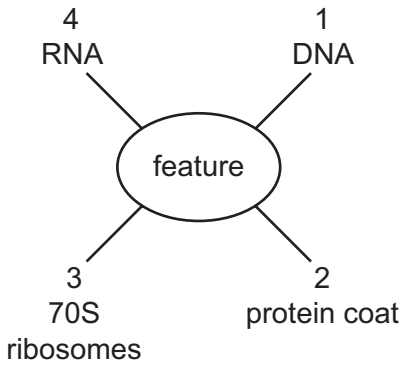
3 Two different types of cell, P and Q, were broken up using ultrasound and their contents analysed. Both types of cell contained small circular DNA. The circular DNA from P all carried the same base sequence, but those from Q were of two types, with different base sequences.

What may be concluded about the identity of cell types P and Q?

	P	Q
A	heart muscle fibres	root cortical cells
B	lymphocytes	mature red blood cells contaminated by bacteria
C	mature red blood cells	phloem sieve tube element
D	root cortical cells	leaf mesophyll cells

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4 Which features shown in the diagram can be present in viruses?



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

5 After boiling a sample of milk with Benedict's solution, a yellow colour is observed.

Which conclusion about the sample of milk is correct?

A Reducing sugars are not present.

B Reducing sugars are present.

C There is a high concentration of fructose.

D There is a low concentration of sucrose.

6 Which of the statements about polysaccharides can be used to describe amylose and cellulose?

1 contains 1,4 glycosidic bonds

2 contains 1,6 glycosidic bonds

3 polymer of glucose

A 1 and 2

B 1 and 3

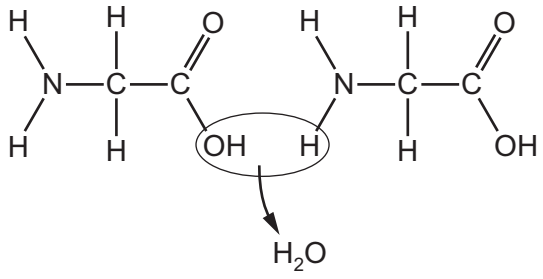
C 1 only

D 2 and 3

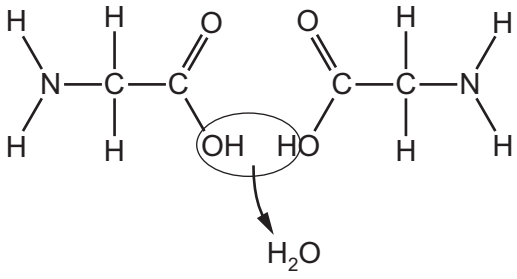
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7 Which diagram shows the formation of a peptide bond?

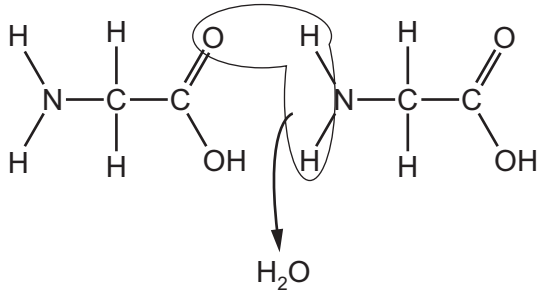
A



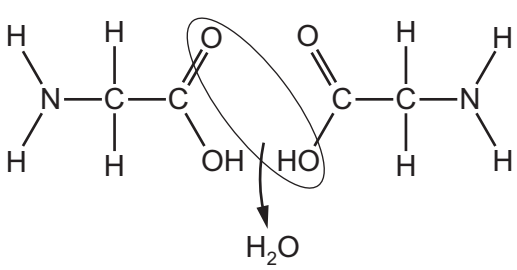
B



C



D



8 In enzyme-catalysed reactions, the position of the amino acids found at the active site is important.

During the synthesis of enzymes, amino acids are brought together in the correct position to form the active site.

Which levels of protein structure **must** be involved in forming the active site?

	level of protein structure			
	primary	secondary	tertiary	quaternary
A	✓	✓	✓	✓
B	✓	✓	✓	✗
C	✗	✓	✓	✓
D	✗	✓	✗	✓

key

✓ = involved

✗ = not involved

9 Which features affect the tensile strength of collagen?

1 the helical structure of collagen chains

2 the small R group of the amino acids in collagen

3 the insoluble nature of collagen

4 the bonds between collagen molecules

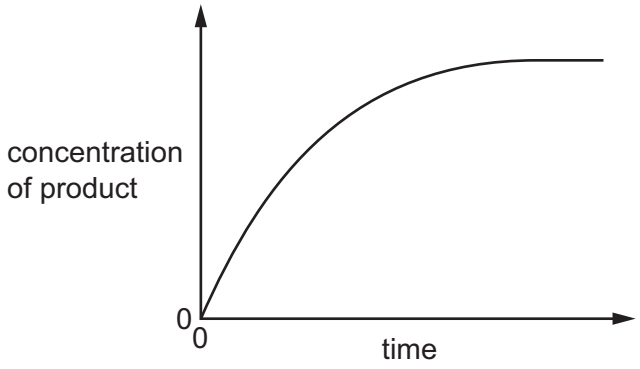
A 1, 2, 3 and 4

B 1, 2 and 4 only

C 1 and 3 only

D 2, 3 and 4 only

10 A fixed volume of the enzyme catalase was added to a fixed volume of hydrogen peroxide solution. The diagram shows how the concentration of product changed over the course of the reaction.



What explains the shape of this graph?

A The active sites become saturated.

B The enzyme was denatured.

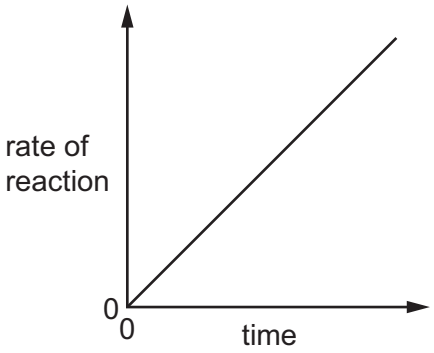
C The hydrogen peroxide inhibited the reaction.

D The substrate molecules were used up.

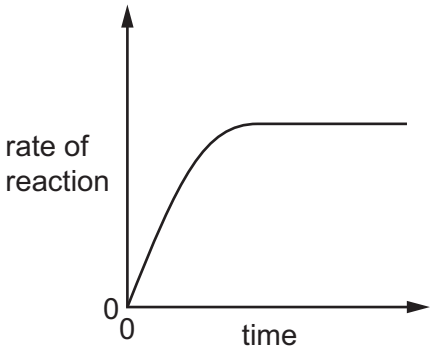
11 A fixed volume and concentration of substrate and enzyme were mixed. All other variables were kept constant. The enzyme-catalysed reaction was left until it was complete.

Which graph shows how the rate of reaction changes with time?

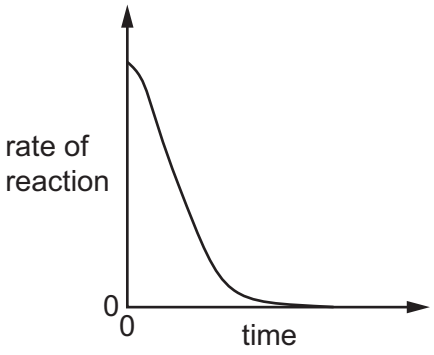
A



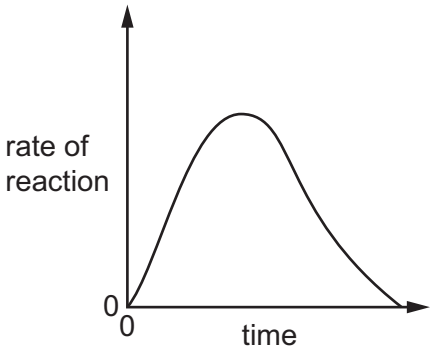
B



C

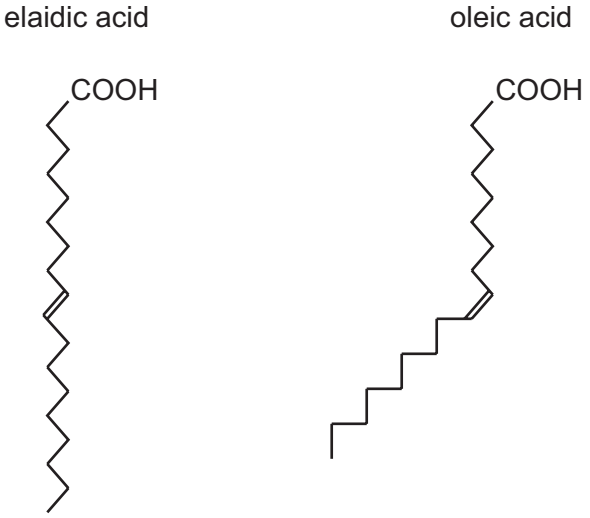


D



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12 The fatty acids elaidic acid and oleic acid have exactly the same structural formulae, with one double bond in the chain. However, the shapes of the chains are different, as shown in the diagram.

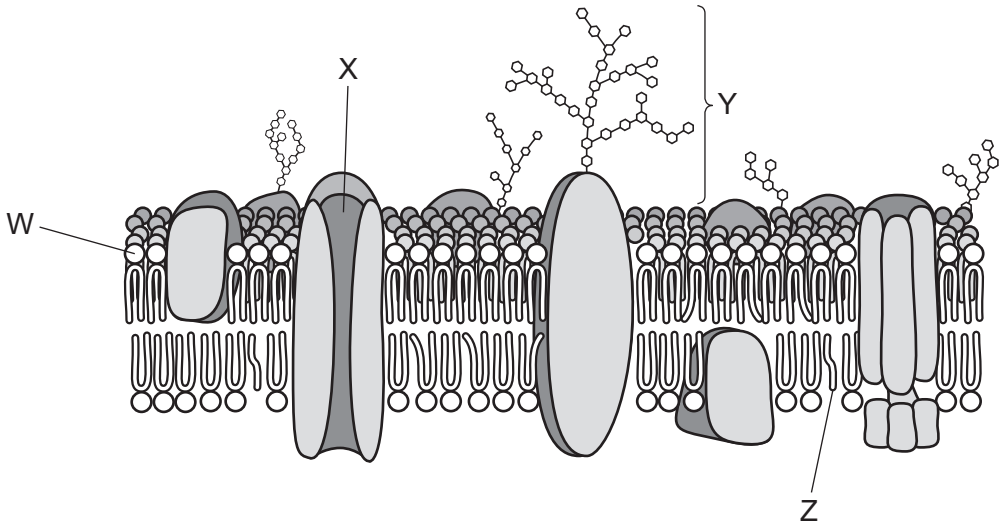


Which row shows the effect of the presence of these fatty acids on the structure and behaviour of a cell surface membrane?

	elaidic acid	oleic acid
A	does not fit closely with other fatty acids so that the membrane is less fluid at high temperatures	fits closely with other fatty acids so that the membrane is less fluid at low temperatures
B	does not fit closely with other fatty acids so that the membrane is more fluid at low temperatures	fits closely with other fatty acids so that the membrane is less fluid at low temperatures
C	fits closely with other fatty acids so that the membrane is less fluid at high temperatures	does not fit closely with other fatty acids so that the membrane is more fluid at low temperatures
D	fits closely with other fatty acids so that the membrane is more fluid at low temperatures	does not fit closely with other fatty acids so that the membrane is more fluid at high temperatures

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13 The diagram shows a cell surface membrane.



Which is a correct role for a labelled molecule?

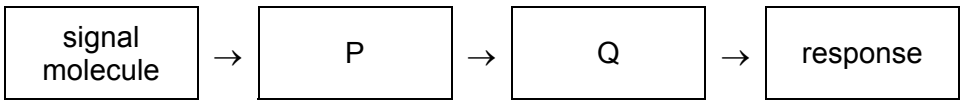
A W is involved in controlling membrane stability.

B X is involved in active transport.

C Y is involved in cell signalling.

D Z is involved in diffusion of ions.

14 The diagram shows a simple cell signalling pathway in which a signal molecule leads to a response, such as a secretion.



Which row identifies P and Q?

	P	Q
A	activated enzyme in cytoplasm	target in cell surface membrane
B	lipid in cell surface membrane	extracellular enzyme
C	protein in cell surface membrane	activated enzyme in cytoplasm
D	target in cytoplasm	protein in cell surface membrane

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15 Three parts of a chromosome and their functions are listed.

part	function
P1 centromere	F1 holds the coils of DNA together
P2 histone proteins	F2 holds two chromatids together
P3 telomere	F3 prevents loss of genes

Which part is matched with its correct function?

A P1 and F1 **B** P2 and F1 **C** P2 and F3 **D** P3 and F2

16 The enzyme telomerase prevents loss of telomeres after many mitotic cell cycles.

Which cells need to transcribe telomerase enzyme?

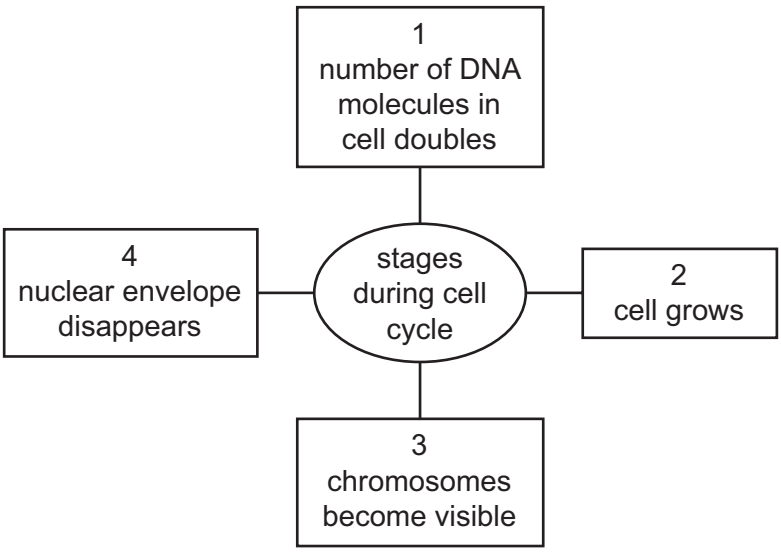
1 cancer cells

2 stem cells

3 activated memory B-lymphocytes

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

17 The diagram shows some of the stages which take place during the cell cycle.



Which two stages take place during interphase?

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

18 Which statement correctly describes the base pairing in a molecule of DNA?

A The purine adenine forms bonds with the pyrimidine thymine.

B The purine adenine forms bonds with the pyrimidine uracil.

C The purine cytosine forms bonds with the pyrimidine guanine.

D The purine guanine forms bonds with the pyrimidine thymine.

19 Which statements about complementary base pairing are correct?

1 It allows translation to occur.

2 Purines and pyrimidines are the same size.

3 The base pairs are of equal length.

4 Uracil forms two hydrogen bonds with adenine.

A 1, 2, 3 and 4

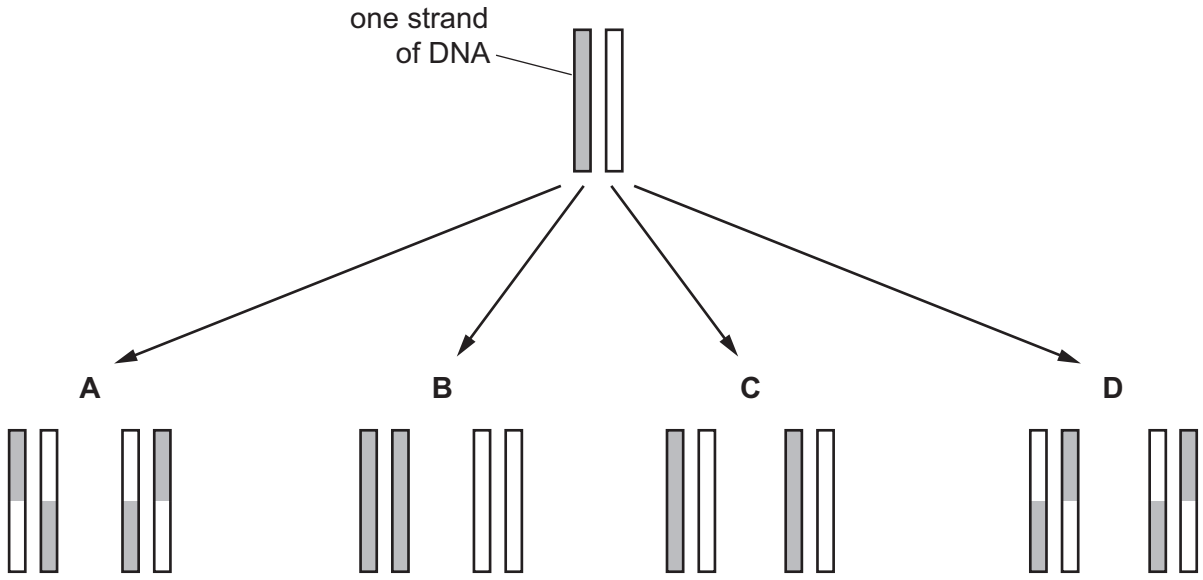
B 1, 3 and 4 only

C 1 and 4 only

D 2 and 3 only

20 The diagram shows the possible organisation of DNA molecules after one replication.

Which organisation is correct?



21 The diagram shows part of the DNA sequence of a gene and a mutated sequence of the same gene.

normal DNA sequence ...CCG GAT TAT TGC GAG AAA TGG CAT TCT AGG...

mutated DNA sequence ...CCG GAT GTA TTG CGA GAA ATG CAT TCT AGG...

What are possible effects of the mutated sequence?

1 the presence of mRNA stop codons, UAG, UAA or UGA

2 a change in the sequence of amino acids

3 a non-functional protein

4 ribosomes cannot translate the mRNA

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

22 What is correct for phloem sieve tube elements?

A Companion cells provide structural support to the phloem sieve tube elements.

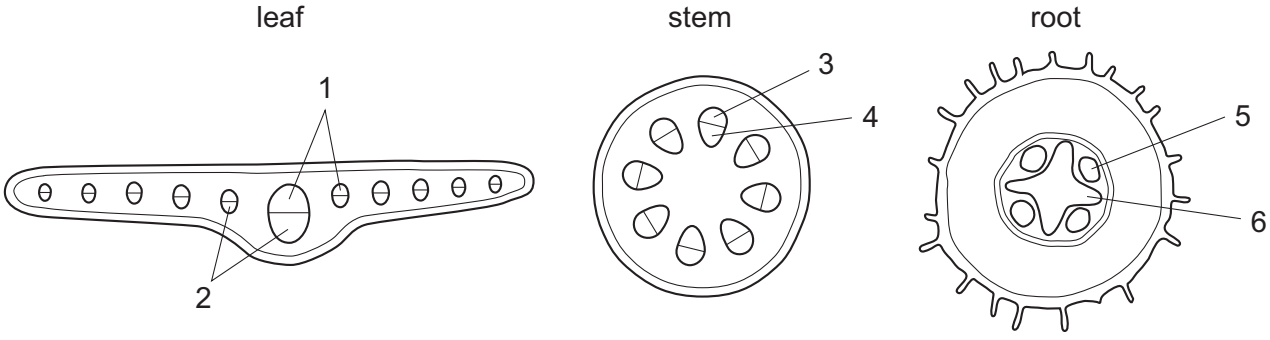
B Lignified walls of phloem sieve tube elements prevent transport of mineral salts by mass flow.

C Phloem sieve tube elements become narrower as movement of sucrose occurs.

D Plasmodesmata allow movement of water and solutes across cell walls of phloem sieve tube elements.

23 The diagrams show transverse sections of parts of a plant.

Transport tissues are labelled 1 to 6.



Which combination shows the tissues that have a main function of transporting water?

	1	2	3	4	5	6
A	✓	✓	✗	✗	✓	✓
B	✓	✗	✗	✓	✗	✓
C	✗	✓	✓	✗	✓	✗
D	✗	✓	✗	✓	✓	✗

key

✓ = transporting water is a main function

✗ = transporting water is **not** a main function

24 The statements are descriptions of how water moves across the root to the xylem vessel elements.

1 Water enters cell walls.

2 Water enters cytoplasm by osmosis.

3 Water moves from cell to cell through plasmodesmata.

4 Water moves through cell walls.

Which statements describe the apoplast pathway?

A 1, 2, 3 and 4

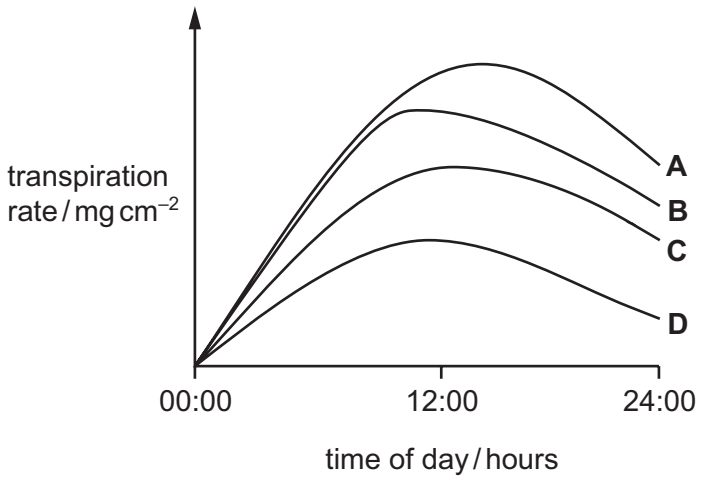
B 1, 2 and 3 only

C 1 and 4 only

D 4 only

25 Four plants, **A**, **B**, **C** and **D**, were grown in the same conditions and their transpiration rates measured.

Which plant is most likely to be a xerophyte?



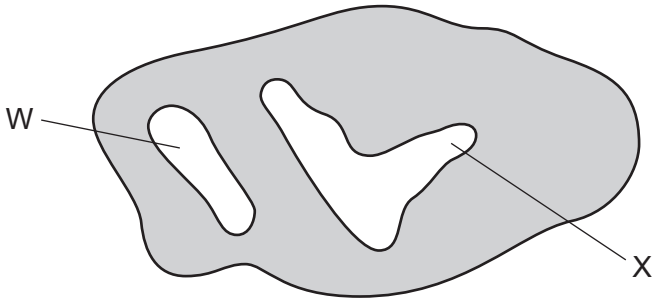
26 Sucrose moves from a mesophyll cell in a leaf into a phloem sieve tube element.

Which changes to the water potential and the volume of liquid in the phloem sieve tube element are correct?

	water potential becomes	volume of liquid
A	less negative	decreases
B	less negative	increases
C	more negative	decreases
D	more negative	increases

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27 The diagram shows a cross-section through a mammalian heart.



Which chambers of the heart are represented by W and X?

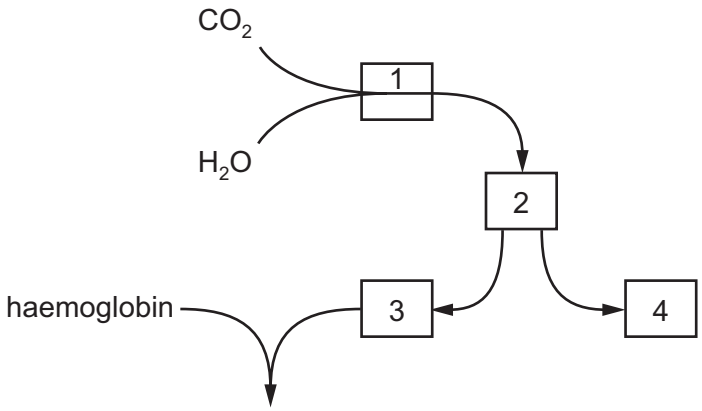
	W	X
A	left ventricle	right ventricle
B	right atrium	left atrium
C	right atrium	right ventricle
D	right ventricle	left ventricle

28 At a certain point in a cardiac cycle, the pressure in the right ventricle is lower than that in the right atrium and lower than that in the pulmonary artery.

Which row is correct?

	atrioventricular valve	semilunar valve
A	closed	closed
B	closed	open
C	open	closed
D	open	open

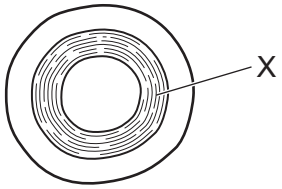
29 The diagram shows the pathway for the transport of carbon dioxide that occurs in red blood cells.



Which row is correct?

	1	2	3	4
A	carbaminohaemoglobin	haemoglobinic acid	hydrogen ions	hydrogencarbonate ions
B	carbonic anhydrase	carbonic acid	hydrogen ions	hydrogencarbonate ions
C	carboxyhaemoglobin	carbonic anhydrase	carbonic acid	carbon dioxide
D	haemoglobinic acid	carbonic acid	hydrogencarbonate ions	hydrogen ions

30 The diagram shows a transverse section through an artery.



Which statement describes the tissues present in layer X?

A collagen and smooth muscle only

B elastic fibres and collagen only

C elastic fibres and smooth muscle only

D elastic fibres, collagen and smooth muscle

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31 The large arteries close to the heart have a thick elastic layer in their walls.

Which statements about this layer are correct?

1 helps to maintain the blood pressure in arteries

2 reduces friction within the arteries

3 prevents too much pressure bursting the artery wall

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

32 Which tissues are present in the walls of a trachea and an alveolus?

		tissue	
		epithelium with goblet cells	smooth muscle
A	trachea	✓	✓
	alveolus	✗	✗
B	trachea	✓	✓
	alveolus	✗	✓
C	trachea	✓	✗
	alveolus	✓	✓
D	trachea	✗	✓
	alveolus	✗	✗

key

✓ = present
✗ = absent

33 The surface tension of the layer of liquid lining the alveoli tends to pull the walls inwards so alveoli could collapse.

Which statements could explain how this is prevented?

1 Alveolar fluid is moved around by cilia.

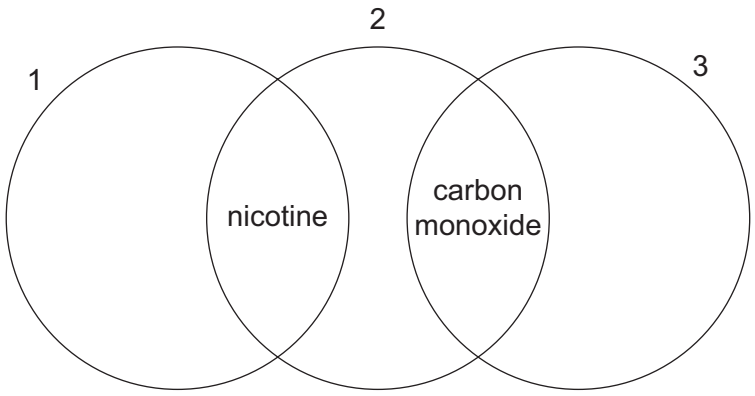
2 Elastic fibres keep the alveoli open.

3 Epithelial cells secrete a chemical that reduces the cohesion in water.

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

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34 The diagram shows some of the effects of nicotine and carbon monoxide in cigarette smoke.



Which row is correct?

	1	2	3
A	increase in heart rate	short-term effect on cardiovascular system	combines more readily with haemoglobin than oxygen
B	increases diameter of small arteries	can cause chronic bronchitis	combines irreversibly with haemoglobin
C	reduces the oxygen carrying capacity of blood	short-term effect on gas exchange system	reduces the blood supply to hands and feet
D	stimulates goblet cells to secrete more mucus	highly addictive	increases risk of blood clotting

35 Which row correctly identifies the causative organism of each disease?

	cholera	measles	smallpox	tuberculosis
A	*Variola*	*Morbillivirus*	*Vibrio*	*Mycobacterium*
B	*Variola*	*Mycobacterium*	*Vibrio*	*Morbillivirus*
C	*Vibrio*	*Morbillivirus*	*Variola*	*Mycobacterium*
D	*Vibrio*	*Mycobacterium*	*Variola*	*Morbillivirus*

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36 The following advice was given to a person travelling to a country where there had been an outbreak of an infectious disease.

- cook food well and eat it hot
- peel fruit and vegetables
- drink only cool, boiled water
- wash hands often with soap and cool, boiled water

Which infectious disease would this advice help to protect against?

A cholera

B malaria

C measles

D tuberculosis

37 What is a **social** factor that affects the spread of malaria?

A an increase in drug resistant forms of malaria

B climate change

C difficulty in producing a vaccine

D migration of people because of wars

38 Which are specific immune responses?

1 phagocytosis

2 production of antibodies

3 production of memory cells

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

39 Newborn babies have natural passive immunity.

What is correct for this type of immunity?

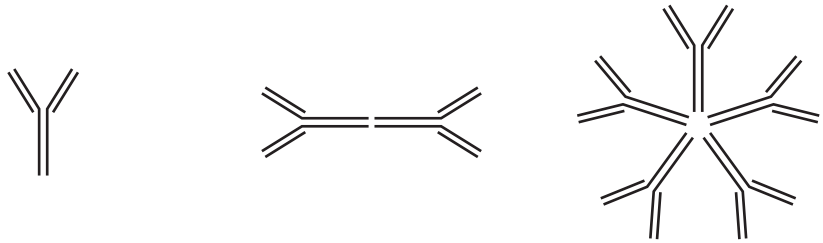
	immunity is temporary	antibodies are broken down
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = correct

✗ = not correct

40 The diagrams show three different types of antibody structure.



IgG IgA IgM

Which row is correct?

	IgG	IgA	IgM
A	one binding site for an antigen molecule	two light chains	two heavy chains
B	two heavy chains	four binding sites for antigen molecules	five hinge regions
C	two hinge regions	four heavy chains	five light chains
D	two light chains	four hinge regions	ten binding sites for antigen molecules

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