Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

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)

7713874507

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 **16** printed pages.

1 A student was told that the actual length of a cell structure is 5 μm.

The student was asked to state an equation that can be used to calculate the magnification of an electron micrograph of this cell structure. The student used some of the letters *q* to *u* in the equation.

q = the length of the cell structure image on the micrograph in centimetres

r = the length of the cell structure image on the micrograph in millimetres

s = 1000

$t = \frac{1}{5}$

u = 5

Which is the correct equation to calculate the magnification?

A $\frac{q}{s} \times u$ **B** $q \times s \times t$ **C** $\frac{r}{s} \times u$ **D** $r \times s \times t$

2 Which features of cilia and root hairs are correct?

	increase cell surface area	cannot be resolved with the light microscope	contain vacuoles	more than one present on a cell
A	cilia	cilia	root hairs	root hairs
B	cilia	root hairs	cilia	cilia
C	root hairs	cilia	root hairs	cilia
D	root hairs	root hairs	cilia	root hairs

3 Which are functions of microtubules?

1 allowing movement of cilia in a bronchus

2 attachment of centromeres during metaphase

3 moving secretory vesicles around a cell

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

4 Some cell structures are listed.

1 mitochondria

2 nucleus

3 chloroplasts

4 ribosomes

What is the correct order of these cell structures when listed from largest to smallest?

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

5 Which cell structures have ribosomal RNA (rRNA)?

1 chloroplast

2 mitochondrion

3 nucleus

4 rough endoplasmic reticulum

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 2 and 4 only

D 2, 3 and 4 only

6 A cell structure in the macrophage destroys bacteria. Some bacteria stop this cell structure from functioning.

Which cell structure in the macrophage is stopped from functioning by the bacteria?

A Golgi body

B lysosome

C ribosome

D vesicle

7 A solution of amylase was added to a suspension of starch. After 30 seconds, three samples of the mixture were tested with iodine solution, Benedict's solution or with biuret reagent.

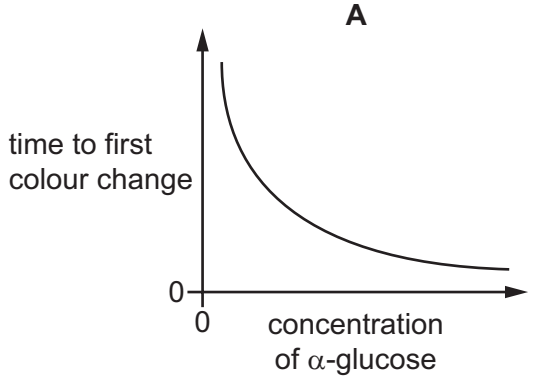
Which are the expected results?

	colour with test reagent		
	iodine solution	Benedict's solution	biuret reagent
A	black	green	purple
B	black	red	blue
C	brown	blue	purple
D	brown	yellow	blue

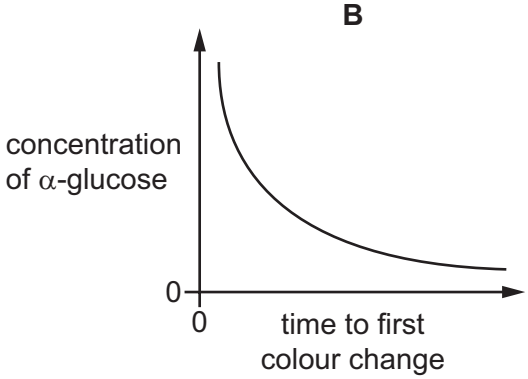
8 A student carried out a Benedict's test on several different known concentrations of α-glucose.

Which graph represents the results correctly?

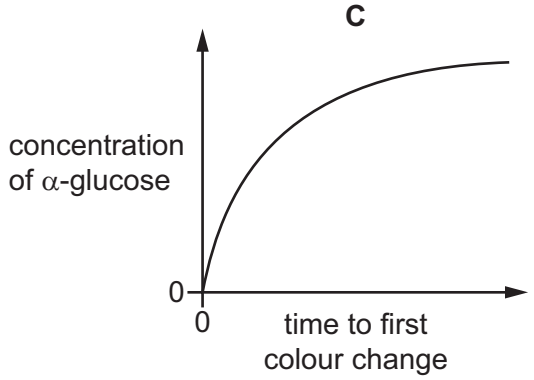
A



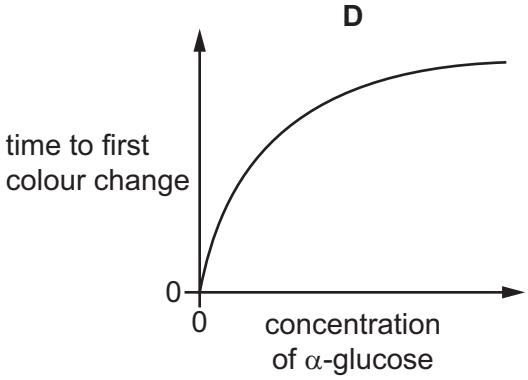
B



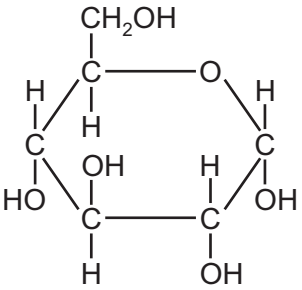
C



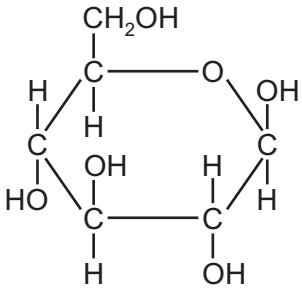
D



9 The diagram shows three hexose sugars.



1



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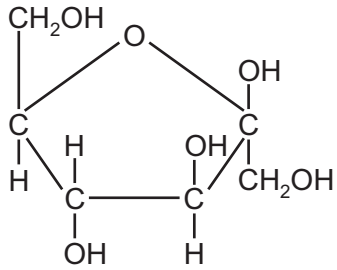


3

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

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

10 What can occur during condensation of carbohydrates?

A a disaccharide is produced from monosaccharides

B glycosidic bonds are broken

C molecules of water are used up

D monosaccharides are produced

11 What is true about triglycerides?

	hydrophobic	insoluble in alcohol
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = correct

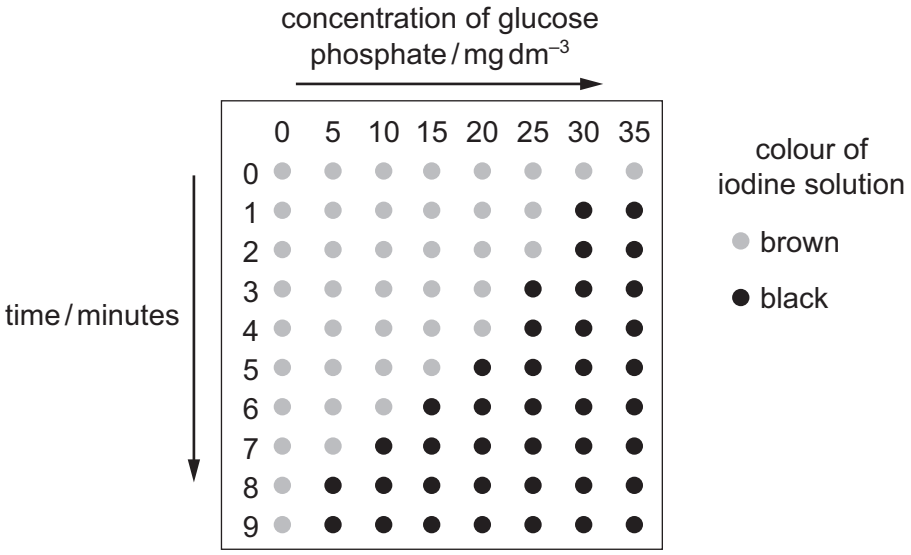
✗ = not correct

12 What is the minimum number of carbon atoms in an amino acid?

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

13 In an investigation, the same concentration of the enzyme phosphorylase was added to different concentrations of glucose phosphate and incubated at 30 °C. At 1 minute intervals, one drop of the reaction mixture was removed and added to a drop of iodine solution on a white tile.

The diagram shows the results of this investigation.



What explains the trend in the results of this investigation?

A Phosphorylase catalyses a reaction converting glucose phosphate to starch.

B The maximum rate of reaction is reached at 20 mg dm^{-3} of glucose phosphate.

C Substrate concentration is limiting at concentrations of glucose phosphate 25 mg dm^{-3} or less.

D Enzyme concentration is limiting at concentrations of glucose phosphate 25 mg dm^{-3} or less.

14 What is the definition of the Michaelis-Menten constant, K_m, for an enzyme?

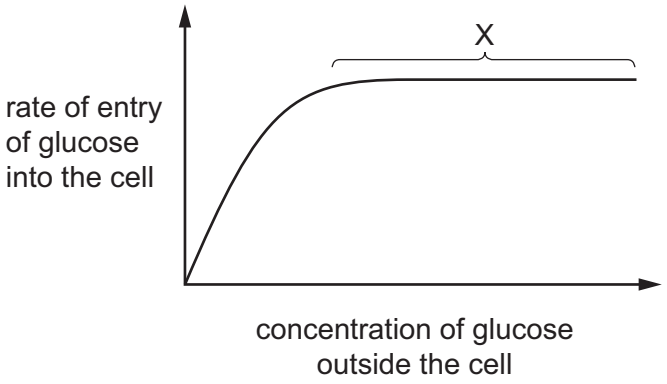
A V_{max}

B half V_{max}

C the substrate concentration that gives V_{max}

D the substrate concentration that gives half V_{max}

15 The graph shows how the rate of entry of glucose into a cell changes as the concentration of glucose outside the cell changes.



What is the cause of the plateau at X?

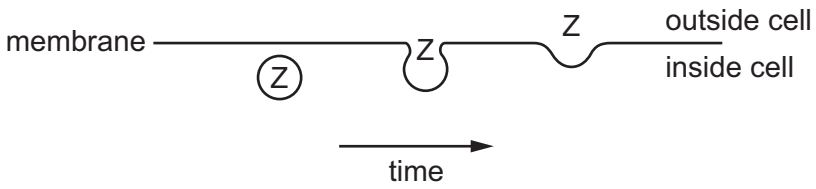
A All the carrier proteins are saturated with glucose.

B The carrier proteins are denatured and no longer able to function.

C The cell has used up its supply of ATP.

D The concentrations of glucose inside and outside the cell are equal.

16 The diagram shows the movement of substance Z across a cell surface membrane.



Which process is involved in this movement?

A endocytosis

B exocytosis

C phagocytosis

D pinocytosis

17 Visking tubing is often used as a model during experiments to investigate osmosis in plants.

What could Visking tubing be used to represent?

	cell surface membrane	cell wall	tonoplast
A	✓	✓	✓
B	✓	✗	✓
C	✓	✗	✗
D	✗	✓	✓

key

✓ = represents

✗ = does not represent

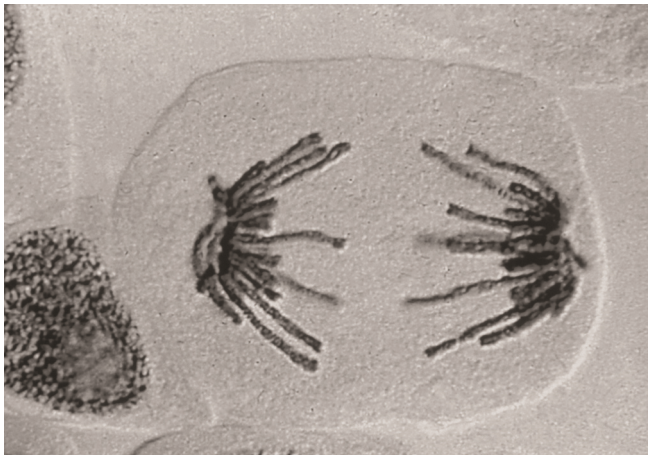
18 A scientist stains the chromosomes of a diploid plant cell with a fluorescent dye to observe the telomeres.

This cell has 38 chromosomes.

How many telomeres will the scientist observe in one of the nuclei during telophase of mitosis?

A 38 **B** 76 **C** 114 **D** 152

19 The photomicrograph shows a cell during mitosis.



What is happening in this cell?

1 Centrioles are replicating.

2 Spindle microtubules are shortening.

3 Chromatin is condensing.

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

20 Which events listed are part of mitosis?

1 interphase

2 prophase

3 cytokinesis

A 1, 2 and 3

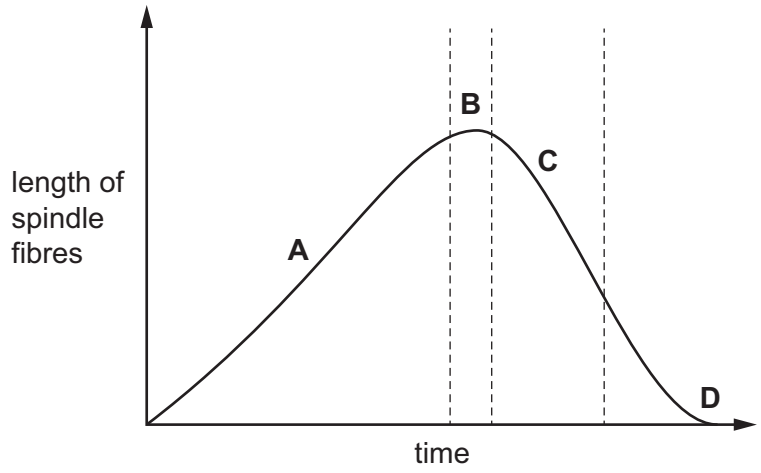
B 1 and 2 only

C 1 only

D 2 only

21 The graph shows the length of the spindle fibres during mitosis.

Which region of the graph shows when all the centromeres have detached from the spindle fibres?



22 A short piece of DNA, 19 base pairs long, was analysed to find the number of nucleotide bases in each of the polynucleotide strands. Some of the results are shown below.

	number of nucleotide bases			
	A	C	G	T
strand 1				4
strand 2		7		5

How many nucleotide bases containing C were present in strand 1?

A 2 **B** 3 **C** 5 **D** 7

23 Which nucleic acid bases are purines?

A adenine and cytosine

B cytosine and thymine

C guanine and adenine

D uracil and cytosine

24 In a genetic engineering experiment a piece of double-stranded DNA containing 6000 nucleotides coding for a specific polypeptide is transcribed and translated.

What is the total number of amino acids in this polypeptide?

A 500 **B** 1000 **C** 2000 **D** 3000

25 Which statements about tRNA are correct?

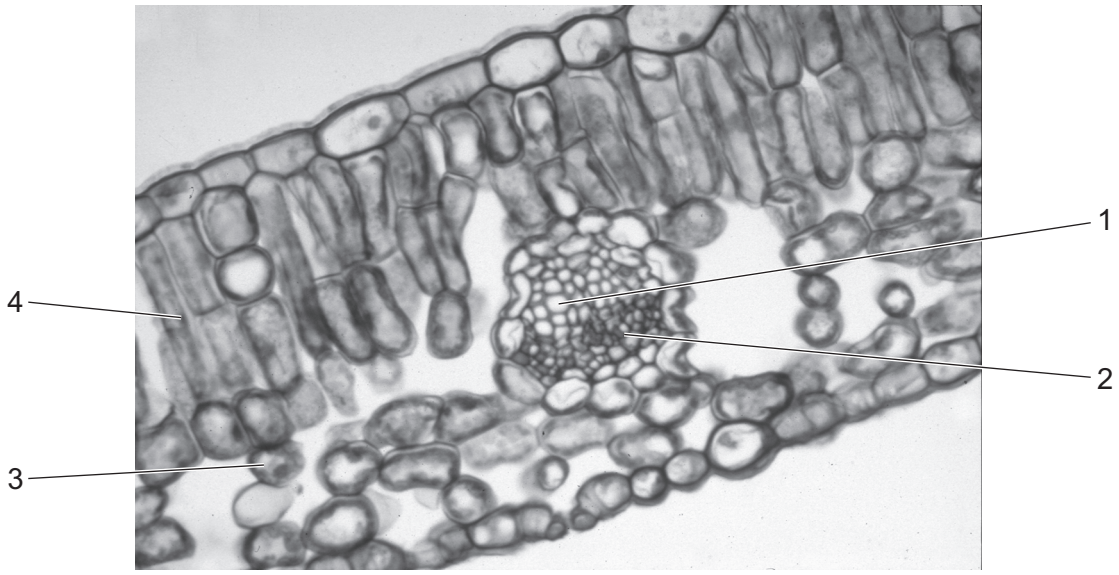
1 Hydrogen bonds between bases temporarily hold tRNA against mRNA.

2 The base sequences in the tRNA molecules are the same as the base sequences in the mRNA that is being translated.

3 tRNA translates the base sequence in mRNA into the amino acid sequence in a protein.

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

26 The photomicrograph shows a transverse section of part of a dicotyledonous leaf.



What are the correct labels for 1, 2, 3 and 4?

	1	2	3	4
A	phloem	xylem	palisade mesophyll	spongy mesophyll
B	phloem	xylem	spongy mesophyll	palisade mesophyll
C	xylem	phloem	palisade mesophyll	spongy mesophyll
D	xylem	phloem	spongy mesophyll	palisade mesophyll

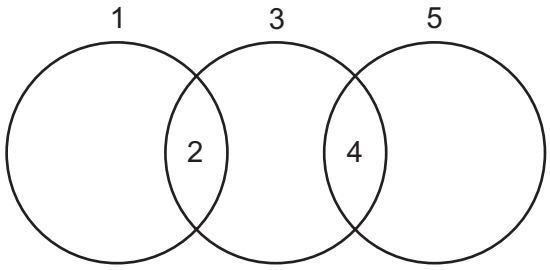
27 Some of the features present in transport tissues in plants are listed.

1 lignified walls
2 cytoplasm
3 mitochondria
4 pits
5 plasmodesmata

Which of these features are present in phloem sieve tube elements?

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

28 The diagram shows the relationship between phloem sieve tube elements, xylem vessel elements and companion cells.



Which row is correct?

	1	2	3	4	5
A	companion cells	endoplasmic reticulum	phloem sieve tube elements	no nucleus	xylem vessel elements
B	companion cells	nucleus	phloem sieve tube elements	cytoplasm	xylem vessel elements
C	phloem sieve tube elements	mitochondria	companion cells	nucleus	xylem vessel elements
D	xylem vessel elements	no cytoplasm	phloem sieve tube elements	vacuole	companion cells

29 Which statement correctly describes a transport pathway in plants?

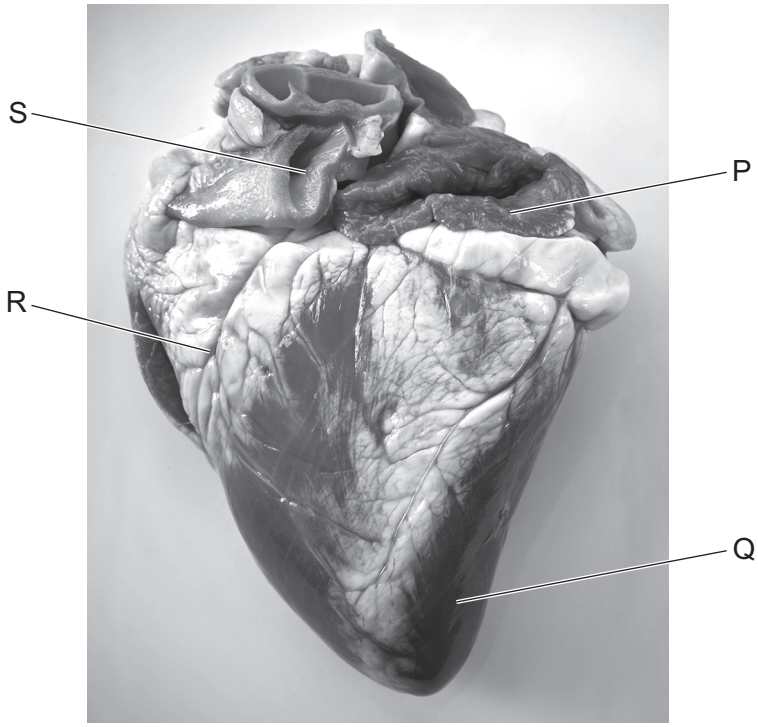
A In the apoplast pathway, water may move through plasmodesmata.

B In the symplast pathway, water may move through intercellular spaces.

C The apoplast pathway may be blocked by the Casparian strip.

D The symplast pathway may be blocked by the tonoplast.

30 The photograph shows an external view of the front of a mammalian heart.



Which row identifies the position of the structures labelled P, Q, R and S?

	P	Q	R	S
A	left atrium	cardiac muscle	Purkyne tissue	pulmonary vein
B	left atrium	left ventricle	coronary artery	vena cava
C	right atrium	cardiac muscle	Purkyne tissue	aorta
D	right atrium	right ventricle	coronary artery	pulmonary artery

31 What happens during ventricular systole?

1 The atrioventricular node transmits an electrical signal to the apex of the heart.

2 The pressure in the ventricles drops below the pressure in the atria.

3 The atrioventricular valves close and the semilunar valves open.

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

32 Athletes often move from low altitude to high altitude to train for a race.

Which statements about the effect of training at high altitude are correct?

1 Higher concentrations of carbon dioxide stimulate greater oxygen dissociation.

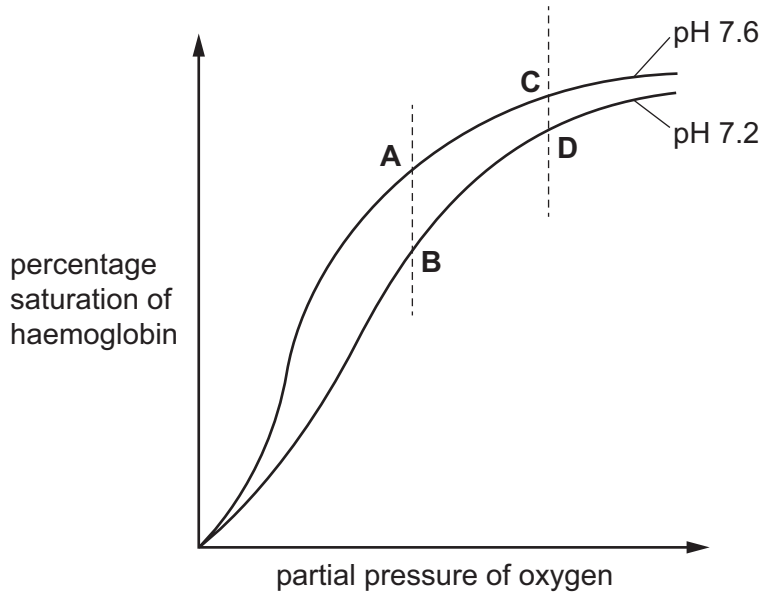
2 Lower concentrations of oxygen stimulate the uptake of more oxygen by red blood cells.

3 Lower partial pressures of oxygen stimulate higher production of red blood cells.

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

33 The graph shows the oxygen haemoglobin dissociation curves at pH 7.6 and at pH 7.2.

Which point on the graph shows the percentage saturation of haemoglobin in the blood leaving an active muscle?



34 Which row correctly describes the short-term effects of carbon monoxide and nicotine on the body of a smoker?

	demand for oxygen	concentration of oxygen in blood
A	decreased by carbon monoxide	increased by nicotine
B	decreased by nicotine	increased by carbon monoxide
C	increased by carbon monoxide	decreased by nicotine
D	increased by nicotine	decreased by carbon monoxide

35 Which statements about bronchioles are correct?

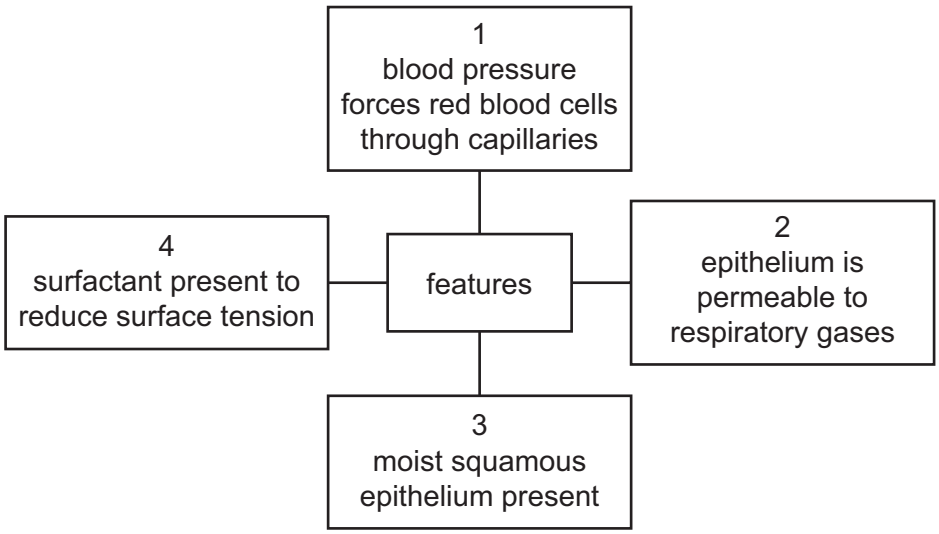
1 They have ciliated cells.

2 They have goblet cells.

3 They have muscle tissue.

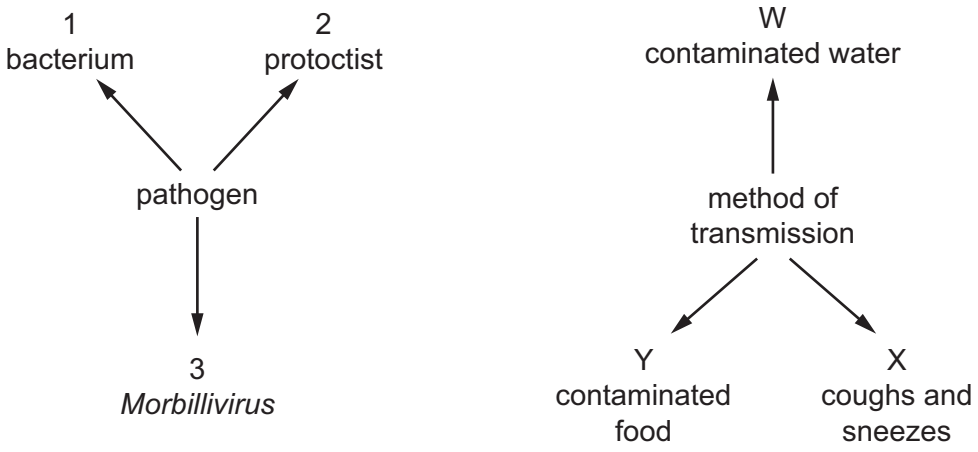
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

36 Which features are important for the diffusion of oxygen out of an alveolus?



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

37 The diagram shows some of the pathogens that cause disease in humans and some of the ways they are transmitted.



What is the correct pathogen and method of transmission for measles?

A 1 and X **B** 2 and W **C** 3 and W **D** 3 and X

38 Which row is correct for each disease?

	cholera	HIV / AIDS	malaria	measles
A	caused by a bacterium	can be transmitted in breast milk and across placenta	eradication programme unsuccessful	caused by a virus
B	eating raw shellfish can be a source of infection	may be carried by a vector	carried by male *Anopheles* mosquitoes	can cause blindness
C	air borne infection	caused by a retrovirus	causative agent is a eukaryote	symptoms usually include a rash
D	can be caught by swimming in contaminated water	causes reduction in number of T-lymphocytes	mainly kills children under five years	no effective vaccination available

39 Which statements describe myasthenia gravis?

1 Antibodies attack proteins within the body.

2 T-lymphocytes are involved in an inflammatory response.

3 The immune system blocks receptors at the neuromuscular junction.

4 The immune system attacks the central nervous system.

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

40 Which row shows the cells that are able to divide continuously and are involved in monoclonal antibody production?

	cancer cells	mouse B-lymphocyte plasma cells	hybridoma cells
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = correct

✗ = not correct