Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2020**

1 hour

You must answer on the multiple choice answer sheet.

1346699030

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. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.

This document has **20** pages. Blank pages are indicated.

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1 Which row shows the correct order of size of these cell structures?

1 width of a mitochondrion

2 width of a ribosome

3 width of a cell surface membrane

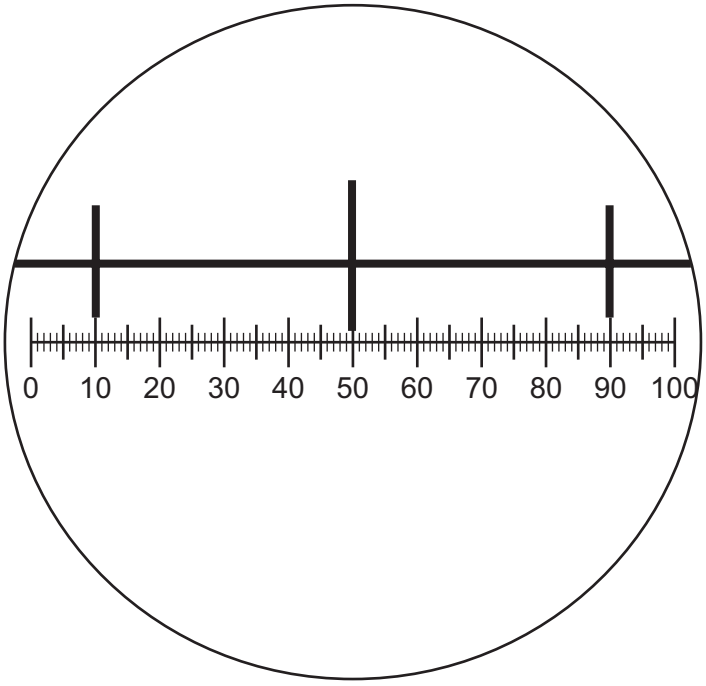
4 width of a chloroplast

	largest	→		smallest
A	1	4	2	3
B	1	4	3	2
C	4	1	2	3
D	4	2	1	3

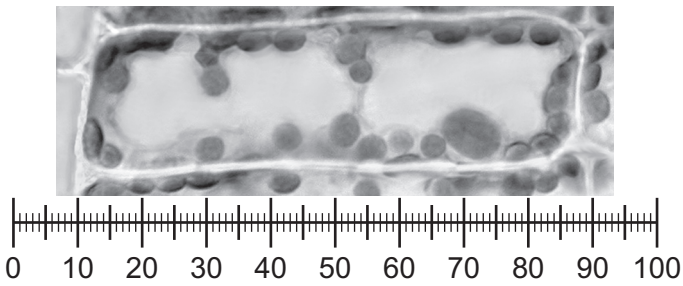
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2 The diagram shows a stage micrometer scale viewed through an eyepiece containing a graticule.

The small divisions of the stage micrometer scale are 0.1 mm.



The stage micrometer scale is replaced by a slide of a plant cell.



What is the actual length of the nucleus in the plant cell?

A 8 μm **B** 25 μm **C** 200 μm **D** 0.8 mm

3 Insulin is a hormone synthesised from two polypeptide chains inside cells of the pancreas.

Which row shows the cell structures that are used in producing insulin and releasing it from the cells?

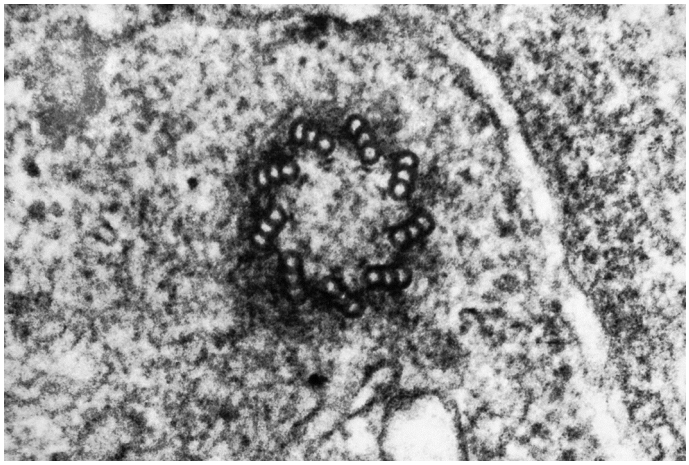
	Golgi body	lysosome	rough endoplasmic reticulum
A	✓	✓	✗
B	✓	✓	✓
C	✓	✗	✓
D	✗	✓	✓

key

✓ = used

✗ = not used

4 The electron micrograph shows a cell structure in a eukaryotic cell.



Which statements about this cell structure are correct?

1 ATP is synthesised in this cell structure.

2 The cell structure is made of protein molecules.

3 The cell structure replicates during interphase of the cell cycle.

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

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5 Four students were asked to match the function with the appearance of some cell structures in an animal cell.

The functions were listed by number.

1 synthesis of polypeptides

2 synthesis of lipids

3 packaging of hydrolytic enzymes that will remain in the cell

The appearances were listed by letter.

V membranes which surround an enclosed inner cavity

W non-membrane-bound, spherical structures

X a double membrane interspersed with pores

Y non-membrane-bound, cylindrical structures

Z membrane-bound sacs, arranged as a flattened stack

Which student correctly matched the numbered function with the appearance of the cell structure?

	1	2	3
A	W	V	Z
B	W	Z	Y
C	Z	W	Z
D	Z	V	W

6 The DNA of typical prokaryotes is naked and circular.

Which statement describes how the DNA of eukaryotes differs from the DNA of typical prokaryotes?

A Only DNA of eukaryotes has a nuclear envelope around it and is a double helix.

B Only DNA of eukaryotes has a nuclear envelope around it and is circular.

C Only DNA of eukaryotes has proteins attached to it and is a double helix.

D Only DNA of eukaryotes has proteins attached to it and is linear.

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7 A student carried out the Benedict's test on two different types of milk, X and Y.

A sample of each type of milk was heated to 100 °C in a water-bath with Benedict's solution and the time taken for the first appearance of a colour change was recorded.

The results are shown in the table.

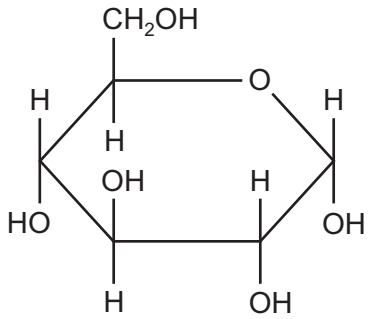
type of milk	time for first appearance of a colour change with Benedict's solution / s
X	13
Y	26

Which row shows the biological molecule the student detected in each sample of milk and the sample of milk with the highest concentration of this biological molecule?

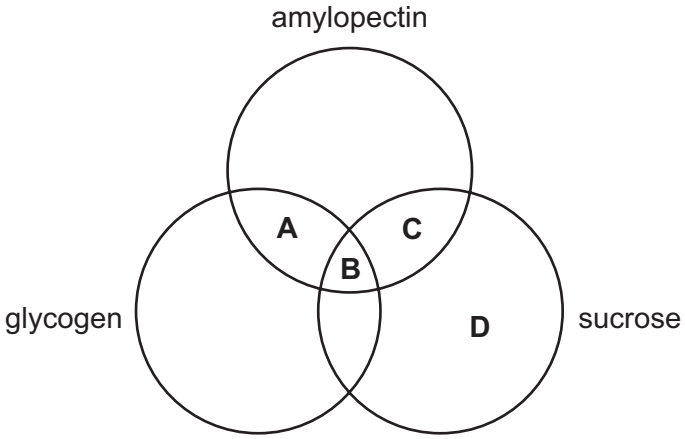
	biological molecule present in each sample of milk	sample of milk with the highest concentration of this biological molecule
A	glucose	X
B	glucose	Y
C	reducing sugar	X
D	reducing sugar	Y

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8 The diagram shows the structure of a monomer.



Which molecules contain this monomer?



9 Which molecules are formed by condensation which involves a carboxyl group?

A amylopectin, collagen, triglyceride, sucrose

B amylopectin, collagen, triglyceride

C amylopectin, β-globin, sucrose

D collagen, β-globin, triglyceride

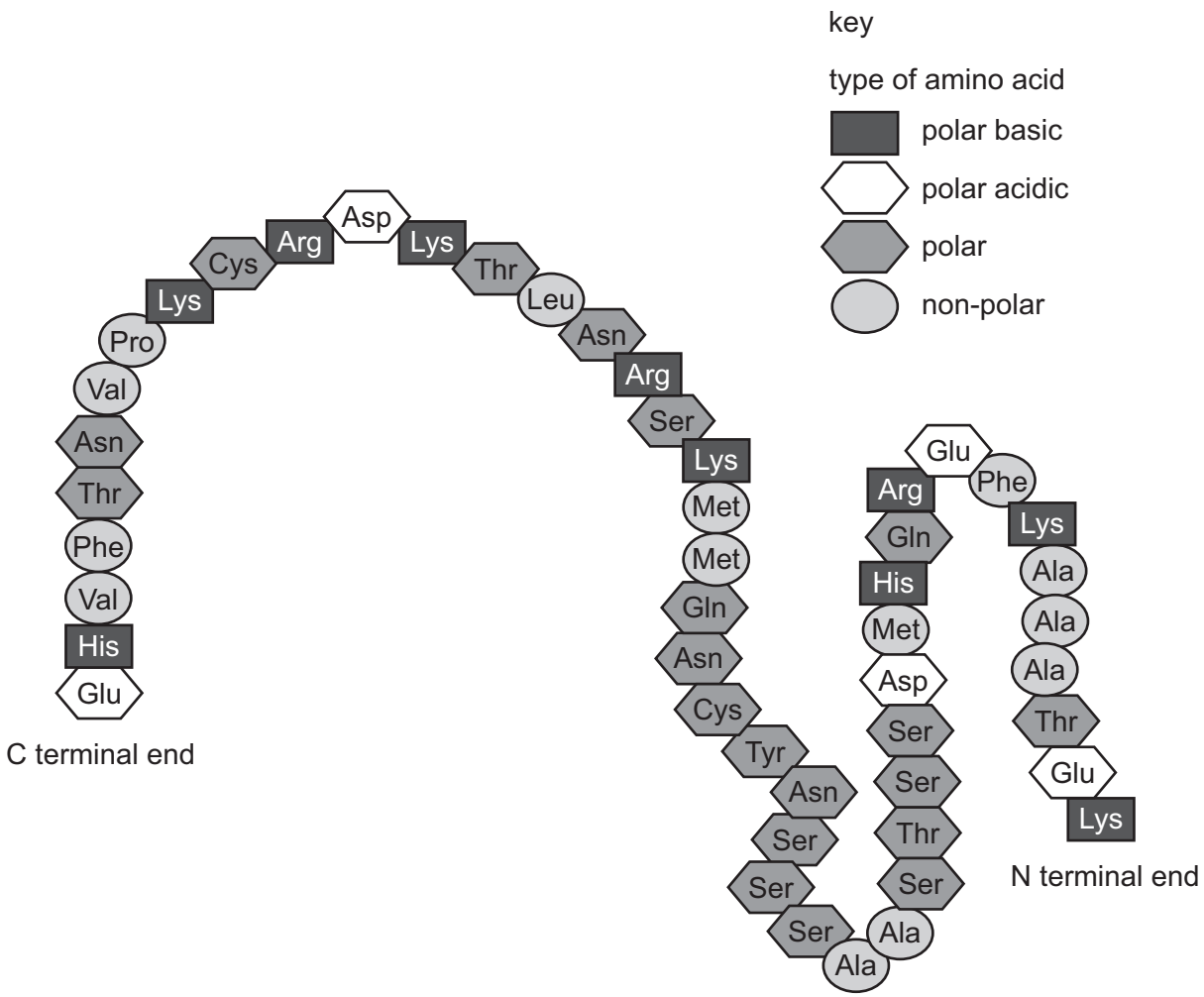
10 Which row correctly matches the function with the structural features of cellulose, collagen, glycogen or triglyceride?

	molecule	function	structure		
			fibrous	molecules held together by hydrogen bonds	branched chains
A	cellulose triglyceride	support energy source	✓ ✗	✓ ✗	✗ ✗
B	collagen cellulose	strengthening support	✓ ✓	✓ ✗	✗ ✓
C	collagen glycogen	strengthening storage	✓ ✗	✓ ✗	✓ ✓
D	glycogen triglyceride	storage energy source	✗ ✗	✓ ✓	✓ ✗

key ✓ = correct ✗ = not correct

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11 The diagram shows the amino acids in a polypeptide.



An enzyme catalyses the hydrolysis of **any** peptide bond between a non-polar amino acid **and** any polar amino acid.

How many small peptides and single amino acids will be formed by the action of this enzyme?

	small peptides	single amino acids
A	6	1
B	8	1
C	12	3
D	13	4

12 Which properties of water reduce temperature changes inside cells?

1 cohesion

2 latent heat of vaporisation

3 specific heat capacity

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

13 Which enzyme is extracellular?

A Amylase in saliva is an enzyme that catalyses the breakdown of starch in the mouth.

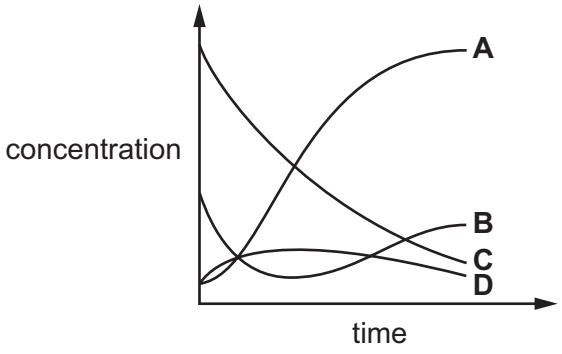
B ATP synthetase is an enzyme found in mitochondria that synthesises ATP.

C DNA polymerase is an enzyme that helps build DNA molecules by assembling nucleotides.

D RNA polymerase is an enzyme involved in the process of gene transcription.

14 The graph shows how the concentration of components of an enzyme-catalysed reaction changes with time.

Which line represents enzymes with empty active sites?



15 Which effects can non-competitive inhibitors have on enzyme-controlled reactions?

1 lower the K_m value

2 reduce the concentration of the product

3 reduce the rate of a metabolic pathway

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

16 Which processes can allow transport into or out of a cell?

1 active transport

2 facilitated diffusion

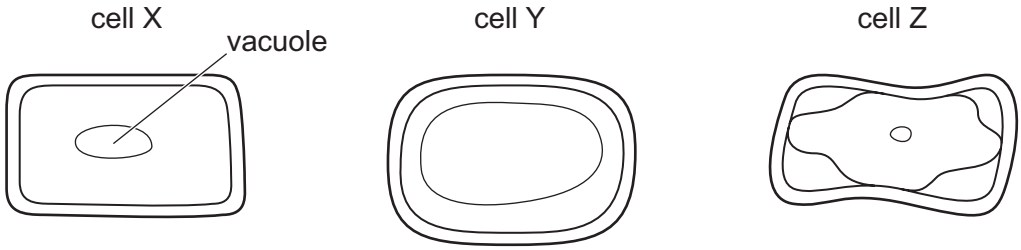
3 osmosis

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

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17 Plant cells were put into one of three different concentrations of sugar solution, 10%, 5% and 2.5%.

The cells were left for 50 minutes and then observed using a light microscope.



Which statements are correct?

1 Cell Y had a lower water potential than the sugar solution it was put into.

2 Cell Z was put into the 10% sugar solution.

3 Cell Z had a less negative water potential than the sugar solution it was put into.

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

18 During telophase of mitosis, a scientist stains the chromosomes of a diploid animal cell with a fluorescent dye to observe the telomeres.

This cell has 22 chromosomes.

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

A 22 **B** 44 **C** 66 **D** 88

19 Methotrexate is a drug used to treat cancer. It can act as an enzyme inhibitor preventing the synthesis of nucleotides containing thymine.

Cells treated with methotrexate are not able to complete the cell cycle.

A cell entering telophase is treated with methotrexate.

Which stage of the cell cycle will be affected by the action of methotrexate?

A anaphase

B interphase

C metaphase

D prophase

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20 Which stage of mitosis is correctly described?

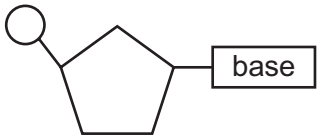
A In anaphase chromosomes line up across the equator.

B In metaphase the centrosomes replicate.

C In prophase chromatids move to opposite poles.

D In telophase chromosomes uncoil to form chromatin.

21 The diagram represents a nucleotide containing cytosine.



Which statements about this nucleotide are correct?

1 The carbohydrate could be ribose.

2 The organic base contains nitrogen.

3 Base pairing occurs with guanine.

4 Cytosine is a purine.

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

22 A section of DNA contains 73 base pairs.

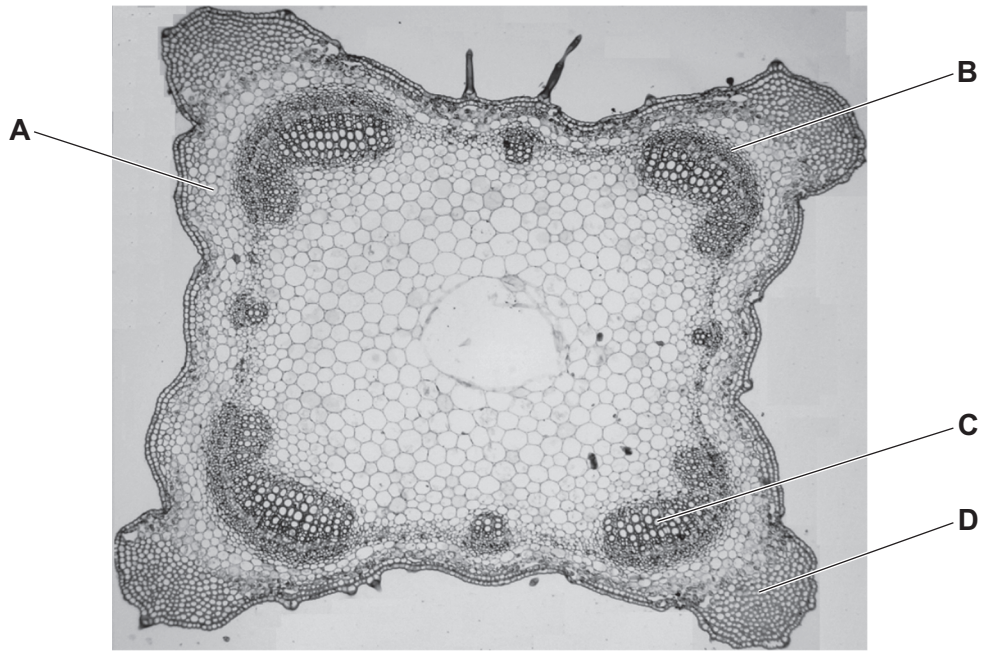
	number of bases on each strand			
	adenine	cytosine	guanine	thymine
strand 1	29	V	14	W
strand 2	21	X	Y	Z

Which row represents the correct number of bases?

	V	W	X	Y	Z
A	9	21	14	9	29
B	14	29	9	9	21
C	21	9	29	9	14
D	29	9	29	14	9

23 The photograph shows a section of a stem.

Which labelled part is the xylem?



24 Some fungi cause wilting in crop plants by growing within the xylem vessel elements.

Which process will be directly affected by these fungi?

A cohesion between water molecules

B development of root pressure

C mass flow during movement of assimilates

D uptake of water by root hair cells

25 Which features have a role in the transport of water in xylem vessel elements?

1 capillary action

2 adhesion

3 hydrogen bonding

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

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26 The loading of sucrose into companion cells involves a number of processes.

Which process is active?

A the movement of hydrogen ions into the cytoplasm of companion cells

B the movement of hydrogen ions out of the cytoplasm of companion cells

C the movement of sucrose into companion cells

D the movement of sucrose out of companion cells

27 The statements describe events that occur during the movement of sucrose.

1 Hydrostatic pressure is decreased.

2 Hydrostatic pressure is increased.

3 Sucrose is loaded into the phloem vessel.

4 Sucrose is unloaded from the phloem vessel.

5 Water moves by osmosis into the phloem.

6 Water moves by osmosis out of the phloem.

7 Water potential decreases in the phloem.

8 Water potential increases in the phloem.

Which sequence correctly describes what happens in a plant at a source during the movement of sucrose?

A $3 \rightarrow 7 \rightarrow 5 \rightarrow 2$

B $3 \rightarrow 8 \rightarrow 6 \rightarrow 1$

C $4 \rightarrow 7 \rightarrow 5 \rightarrow 2$

D $4 \rightarrow 8 \rightarrow 6 \rightarrow 1$

28 Which are present in the walls of capillaries?

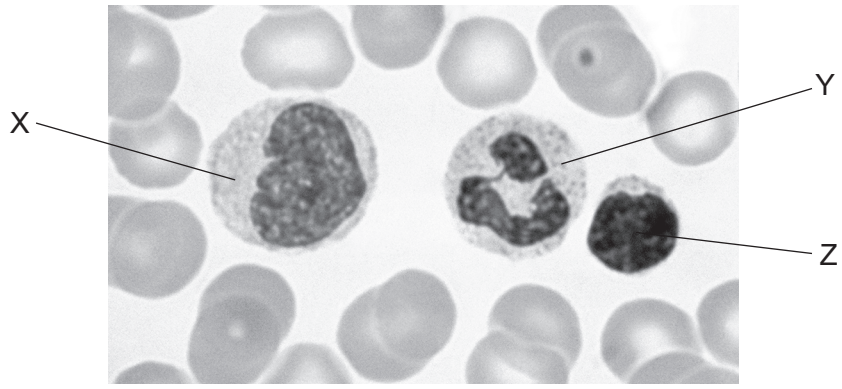
	endothelium	smooth muscle	elastic tissue	collagen fibres
A	✓	✗	✗	✗
B	✓	✗	✗	✓
C	✗	✓	✗	✓
D	✗	✓	✓	✗

key

✓ = present

✗ = not present

29 The photomicrograph shows three white blood cells labelled X, Y and Z.



Which row correctly identifies these cells?

	cell X	cell Y	cell Z
A	lymphocyte	monocyte	neutrophil
B	lymphocyte	neutrophil	monocyte
C	monocyte	neutrophil	lymphocyte
D	neutrophil	monocyte	lymphocyte

30 Which sequence of letters correctly identifies the order of events during the cardiac cycle?

T atrial walls contract

U impulse is delayed a fraction of a second

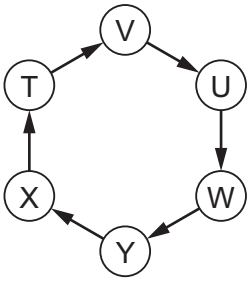
V wave of excitation enters the atrioventricular node

W wave of excitation passes down the Purkyne tissue

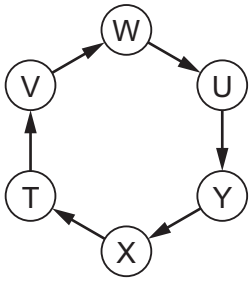
X wave of excitation spreads from the sinoatrial node

Y ventricles contract

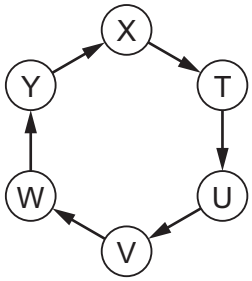
A



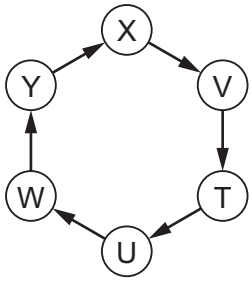
B



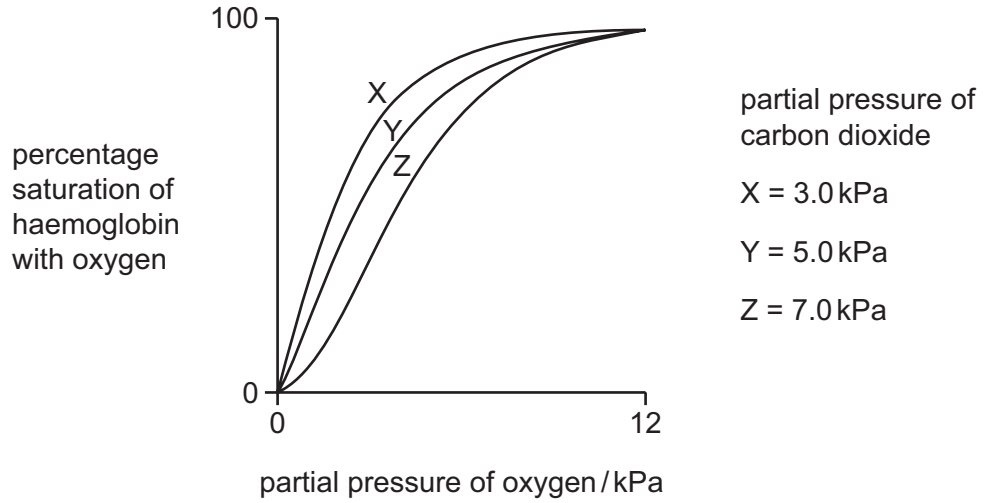
C



D



31 The graph shows the effect of three different partial pressures of carbon dioxide on the oxygen dissociation curve for human haemoglobin.



What effect does decreasing the partial pressure of carbon dioxide have on haemoglobin?

A It is less efficient at taking up oxygen and less efficient at releasing oxygen.

B It is less efficient at taking up oxygen and more efficient at releasing oxygen.

C It is more efficient at taking up oxygen and less efficient at releasing oxygen.

D It is more efficient at taking up oxygen and more efficient at releasing oxygen.

32 What is correct about the transport of carbon dioxide by blood?

1 The enzyme carbonic anhydrase catalyses the formation of carbonic acid in red blood cells.

2 Carbon dioxide diffuses from active cells to red blood cells and reacts with water.

3 Carbonic acid dissociates forming hydrogen ions that combine with haemoglobin to form carbaminohaemoglobin.

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

33 Which statements about all bronchioles are correct?

1 they have goblet cells

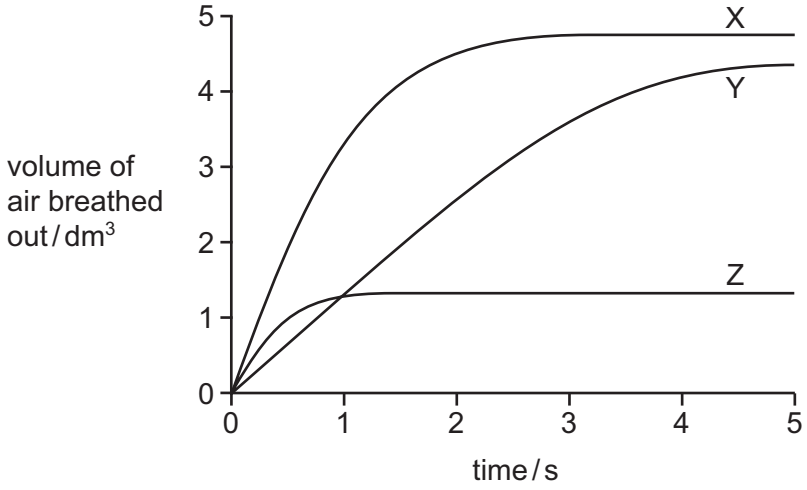
2 they have ciliated cells

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

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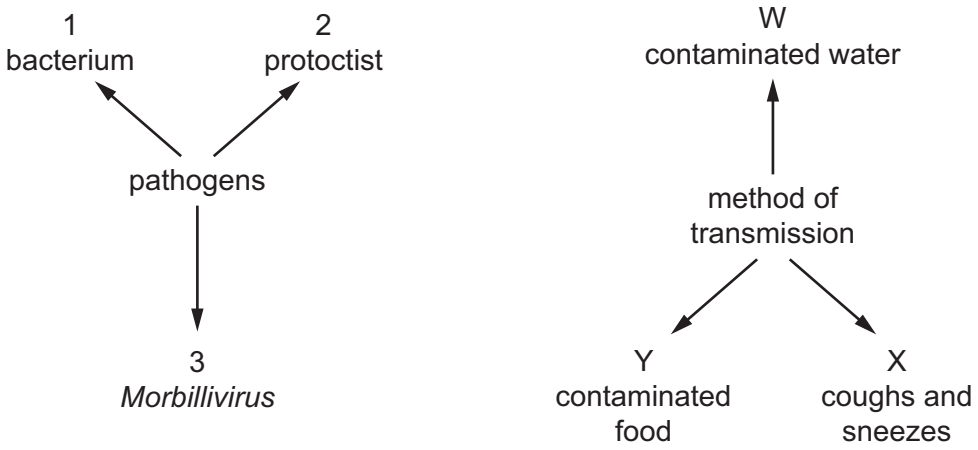
34 The graph shows the volume of air breathed out quickly and with force, following a deep breath in, for three different people, X, Y and Z.



What is a possible explanation for the differences in the volume of air breathed out by these people shown?

	chronic bronchitis	emphysema	normal lung function
A	X	Z	Y
B	Y	X	Z
C	Y	Z	X
D	Z	Y	X

35 The diagrams show 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 the disease TB?

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

36 The proportion of the local population who have malaria in area R is higher than the proportion in area S.

Which factor causes this difference?

A Area R has a more humid climate than area S.

B Area R is nearer the equator than area S.

C There is a higher population in area R than area S.

D There is less sewage treatment in area R than area S.

37 Species X is a single-celled eukaryote.

Species X has been genetically modified to produce penicillin, which does not harm the cell walls of species X.

What may be concluded from this information?

1 The cell walls of species X are chemically different from those of bacteria.

2 The cell walls of species X are made of peptidoglycan.

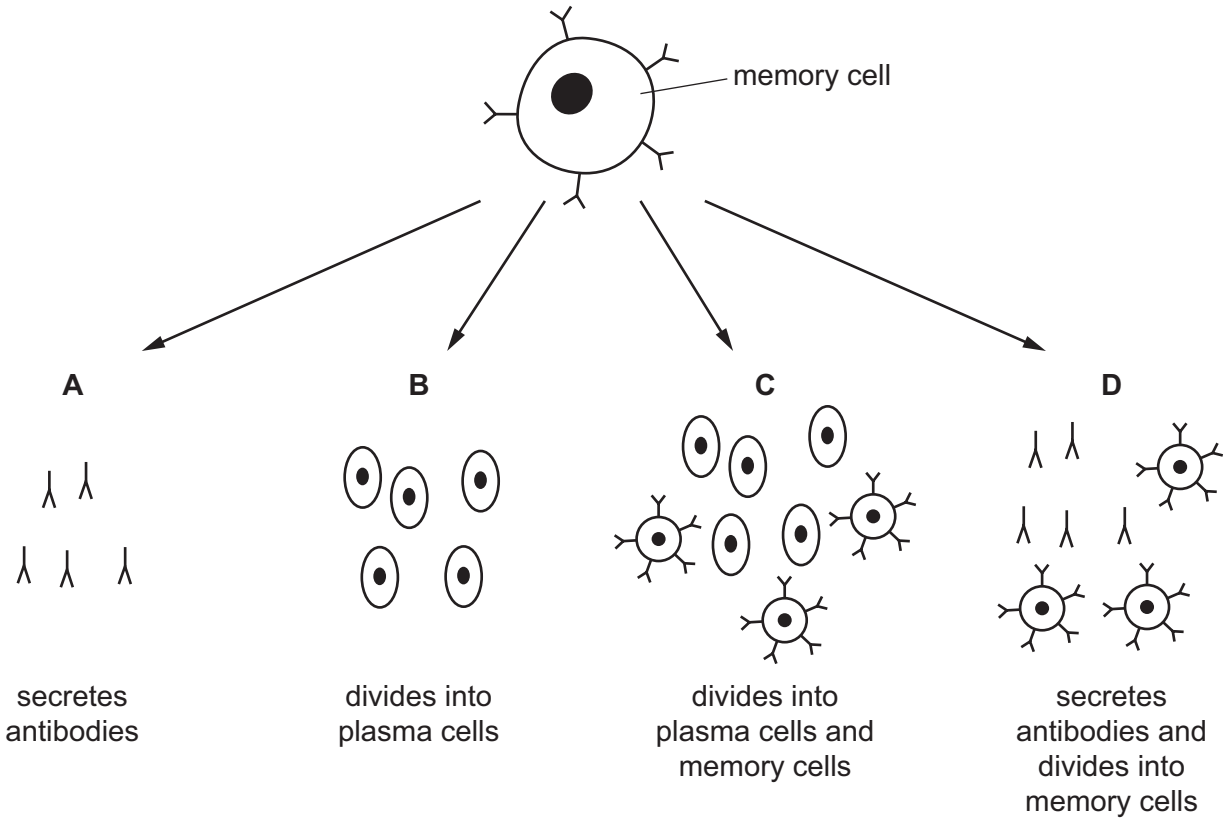
3 The cell walls of species X are made of cellulose.

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

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38 When exposed to an antigen for a second time, memory cells stimulate a secondary immune response.

Which correctly shows the secondary immune response?



39 Monoclonal antibodies are produced for use in diagnosis or treatment of disease. To obtain the antibodies for an antigen, a mouse is injected with the antigen.

Some of the events in the production of the monoclonal antibody are listed.

1 Plasma cells are fused with cancer cells to form a hybridoma.

2 Hybridomas that secrete the required antibody are identified and cloned.

3 B-lymphocytes that recognise the antigen multiply and become plasma cells.

4 Hybridomas divide by mitosis and secrete antibodies.

5 Plasma cells are removed from the mouse spleen.

What is the sequence of the first four events in the production of the monoclonal antibody?

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

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

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

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

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40 Which row describes passive immunity?

	triggered by an antigen	involves an immune response	memory cells produced	permanent protection
A	✓	✓	✓	✓
B	✓	✓	✗	✗
C	✗	✗	✓	✓
D	✗	✗	✗	✗

key

✓ = correct

✗ = not correct

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