Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/12**

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

1 hour 15 minutes

You must answer on the multiple choice answer sheet.

3055168285

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 **24** pages. Any blank pages are indicated.

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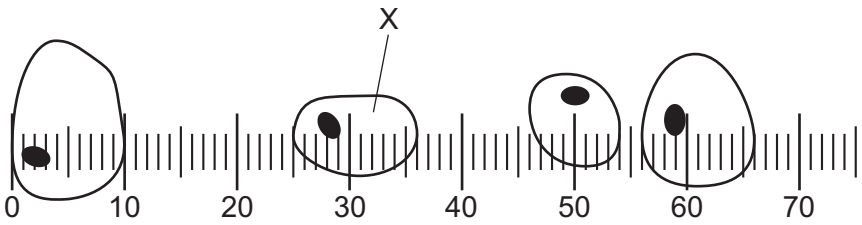
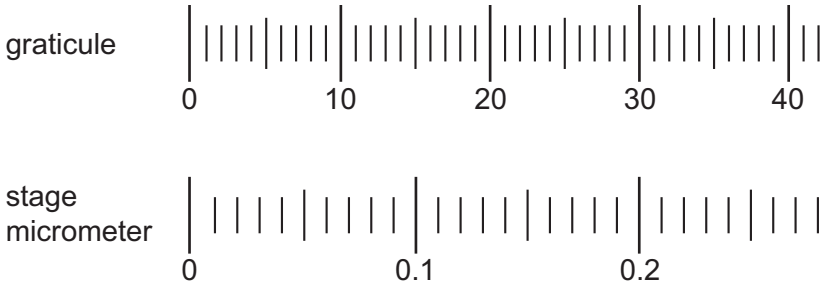
1 A student observed some cells using a microscope with an eyepiece graticule.



They then replaced the slide containing the cells with a stage micrometer with a millimetre scale, and lined up the eyepiece graticule as shown.



What is the maximum diameter of the cell labelled X?

A 0.0066 μm **B** 66 μm **C** 73 μm **D** 733 μm

2 Which structures will be present in a cell that causes cholera?

1 circular DNA

2 cytoplasmic DNA

3 70S ribosomes

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

3 Which organelles have a partially permeable membrane?

1 Golgi apparatus

2 lysosome

3 mitochondrion

4 ribosome

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

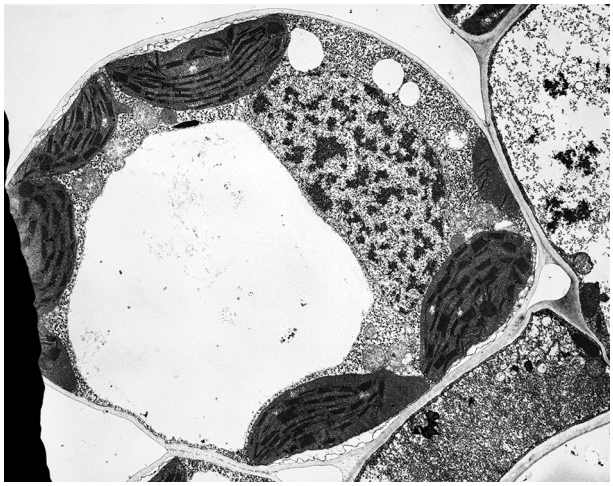
4 Mouse cells were grown in a dish containing a growth medium. Radioactively labelled amino acids were added to the growth medium. The table shows the time taken for the radioactively labelled amino acids to appear in three different organelles, R, S and T.

organelle	time taken for radioactivity to appear / min
R	2
S	9
T	35

Which row correctly identifies the organelles?

	R	S	T
A	Golgi body	lysosome	rough endoplasmic reticulum
B	Golgi body	rough endoplasmic reticulum	lysosome
C	rough endoplasmic reticulum	Golgi body	lysosome
D	rough endoplasmic reticulum	lysosome	Golgi body

5 The electron micrograph shows a section through a cell.



What would be present in this type of cell?

	mitochondria	peptidoglycan cell wall	histone proteins
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = present

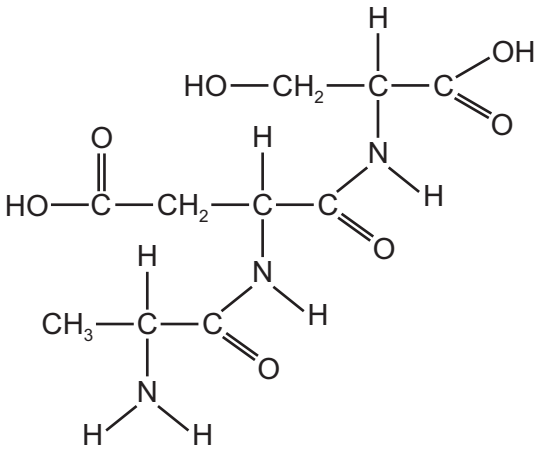
✗ = **not** present

6 A student carried out four tests for biological molecules. The observations are shown in the table.

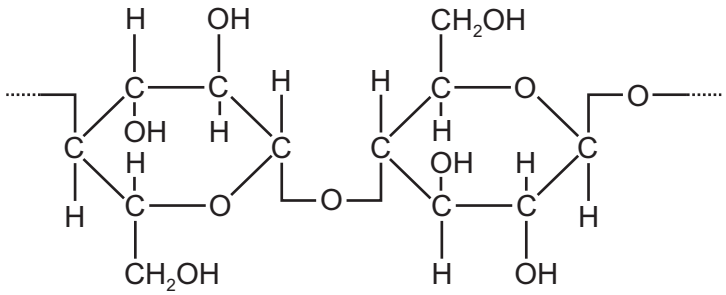
test	observations
iodine	orange
biuret	purple
Benedict's	orange
emulsion	clear

The diagrams show molecules or parts of molecules.

Which pair is present in the solution?



1



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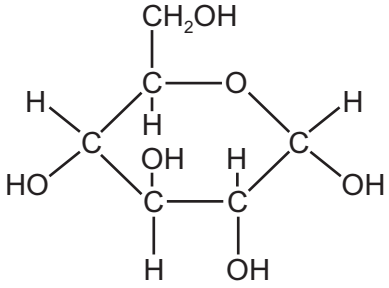

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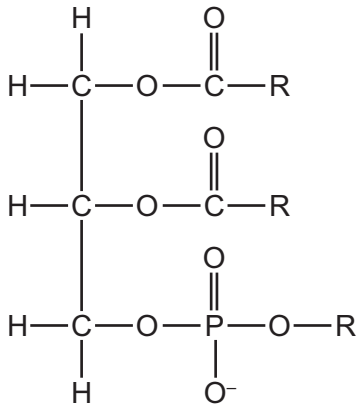
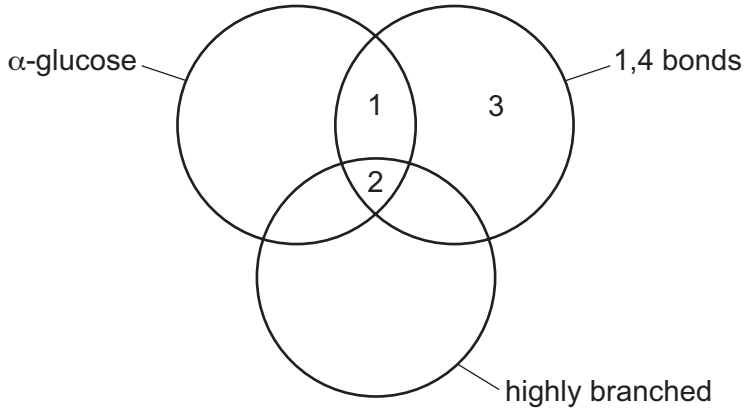


4

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

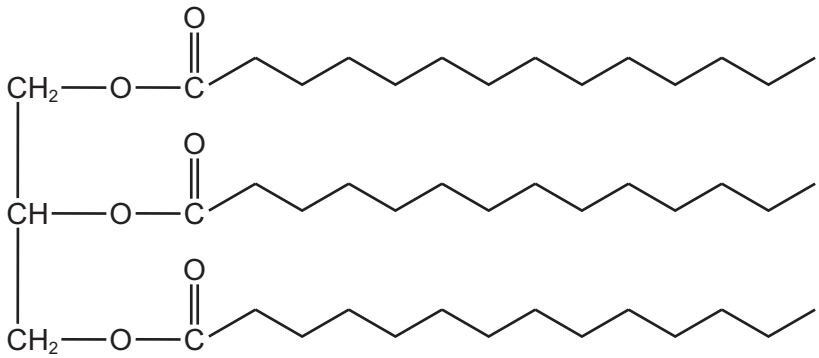
7 The diagram shows some relationships between features of carbohydrates.



Which row correctly matches the carbohydrate with some of its features?

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

8 The diagram shows a triglyceride molecule.



Which statement is correct for the structure and function of this triglyceride?

A The glycerol head forms hydrogen bonds with water in cytoplasm to produce oil droplets.

B The hydrophobic fatty acids allow only small molecules to pass through the cell surface membrane.

C It packs closely with identical triglyceride molecules to form energy reserves in lysosomes.

D It has long hydrocarbon chains that release high energy output per unit mass when oxidised.

9 Enzyme P has been found in a tropical grass.

- The enzyme catalyses the hydrolysis of the fungal polysaccharide, chitin, into amino sugars.
- It also inhibits the activity of an enzyme in locust guts which catalyses the digestion of amylose.

Which row describes the actions of enzyme P?

	reaction catalysed	reaction inhibited
A	hydrolysis of glycosidic bonds	condensation of glycosidic bonds
B	hydrolysis of glycosidic bonds	hydrolysis of glycosidic bonds
C	hydrolysis of peptide bonds	condensation of glycosidic bonds
D	hydrolysis of peptide bonds	hydrolysis of glycosidic bonds

10 Which bonds between amino acids hold the shape of the secondary structure and also the tertiary structure of proteins?

A peptide bonds

B disulfide bonds

C hydrogen bonds

D ionic bonds

11 Resilin is a protein found in the wings of insects. It is an elastic, fibrous protein and scientists have suggested that it may have an important role in allowing the wings of an insect to fold and unfold without damage.

Peptidyl transferase is an enzyme which catalyses the condensation of amino acids during translation to form resilin.

Which statements are correct?

1 Peptidyl transferase and resilin have structural roles in the insect.

2 Peptidyl transferase is a globular protein.

3 Peptidyl transferase is soluble in water.

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

12 Collagen is a protein that helps to strengthen and increase the elasticity and hydration of the skin. Aging can lead to dry skin and the formation of wrinkles, due to the body producing less collagen.

Which row is correct for the structure of collagen in the skin?

	every fourth amino acid is glycine	fibrous protein
A	✗	✗
B	✓	✓
C	✗	✓
D	✓	✗

key

✓ = correct

✗ = **not** correct

13 What is the effect of an enzyme in an enzyme-catalysed reaction?

A decreases the activation energy and decreases the energy yield

B decreases the activation energy and has **no** effect on the energy yield

C increases the activation energy and increases the energy yield

D decreases the activation energy and increases the energy yield

14 How is the Michaelis–Menten constant (K_m) used?

A to determine the number of collisions between the enzyme and substrate

B to compare the affinity of enzymes for their substrates

C to find the maximum velocity of an enzyme (V_{max})

D to find the optimum rate of reaction

15 Some students investigated the effect of pH on the rate of starch digestion by amylase at 20 °C.

- They added 2 cm^3 of a 1% amylase solution and 1 cm^3 of pH 4 buffer to a test-tube.
- They added 2 cm^3 of a starch solution, containing 0.02 g of starch, to the test-tube.
- They measured the time taken for the starch to be digested (to disappear).

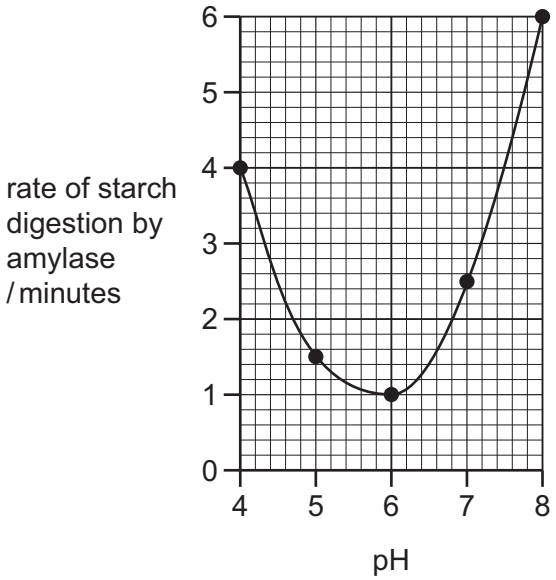
The students then repeated these steps with pH 5, pH 6, pH 7 and pH 8 buffers.

The table shows the results.

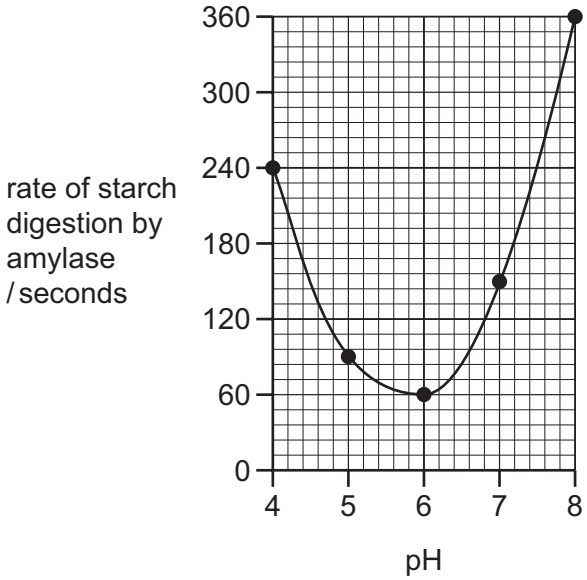
pH	time taken for starch to be digested / minutes
4	4.0
5	1.5
6	1.0
7	2.5
8	6.0

Which graph is correct for these data?

A



B



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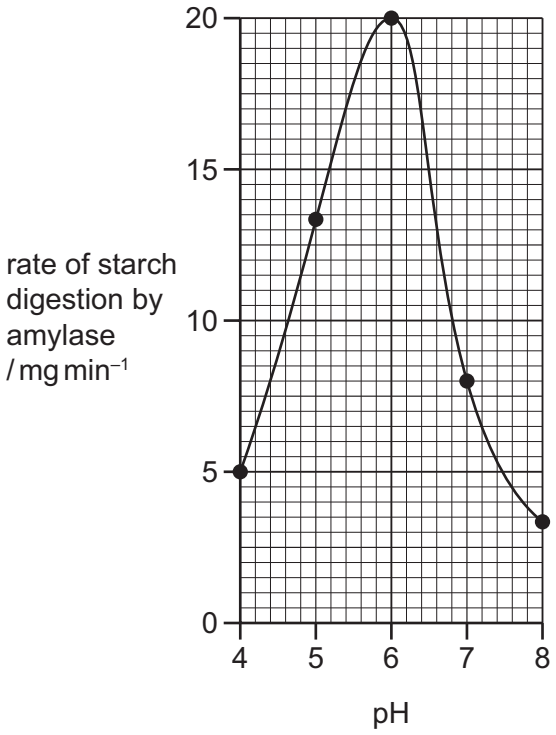

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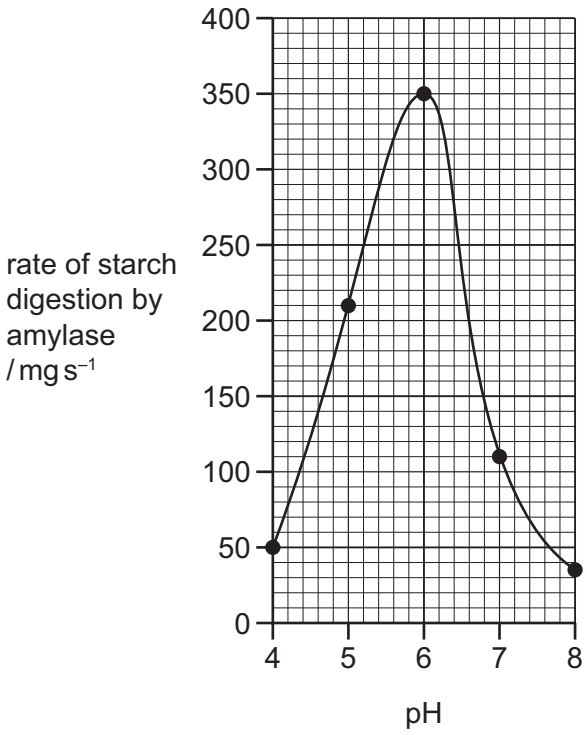


16 Which statements are correct for a non-competitive inhibitor of enzyme action?

1 Increasing the concentration of the enzyme's substrate will reduce its effect.

2 It reduces the activation energy required for a reaction to take place.

3 It reduces the maximum rate of reaction.

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

17 What can increase the fluidity of the cell surface membrane at low temperatures?

1 double bonds between carbon atoms in the fatty acid chains

2 cholesterol

3 fatty acids having shorter chains

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

18 Which statements about the proteins and glycoproteins in cell surface membranes are correct?

1 They can allow cells to bond together to form tissues.

2 They can recognise messenger molecules like hormones.

3 They can be antigens and allow cell-to-cell recognition.

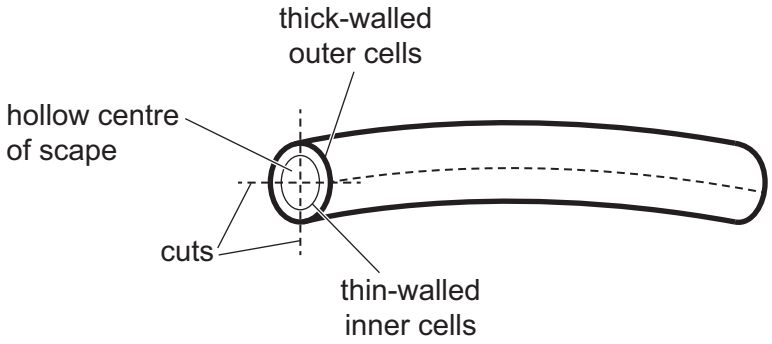
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

19 In an experiment, four different-sized cubes of colourless agar were placed into a blue dye. The time taken for each cube to turn blue was recorded.

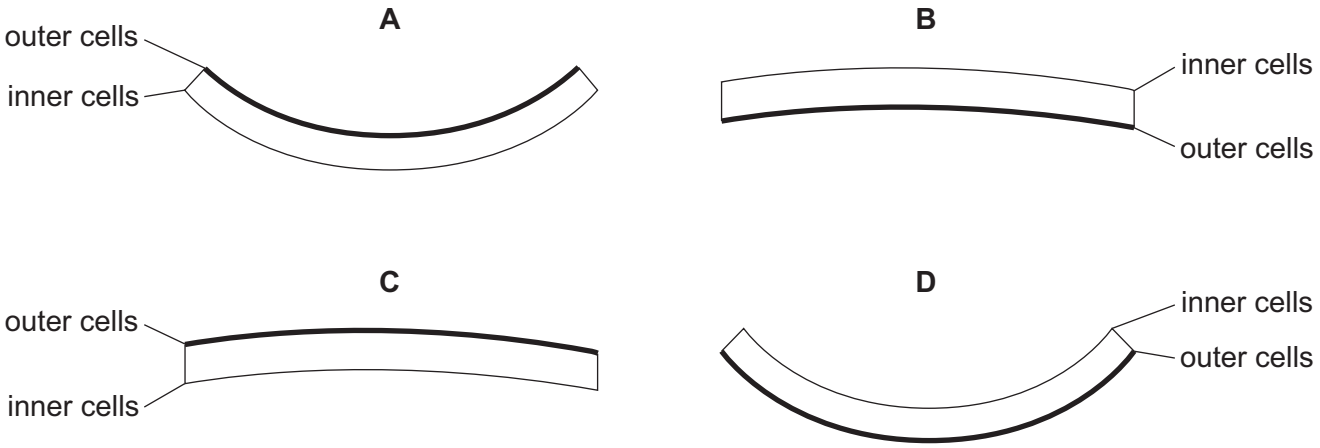
Which row shows the surface area and volume of the cube that took the longest time to turn completely blue?

	surface area / cm^2	volume / cm^3
A	6.0	1
B	9.5	2
C	12.5	3
D	38.0	16

20 The stalk of a dandelion flower is a hollow tube called a scape. Pieces of the scape are cut as shown by the dotted lines and placed in sucrose solutions of different water potentials.



Which diagram shows the piece that is placed in the sucrose solution with the highest water potential?



21 Telomeres prevent the loss of genes during DNA replication.

Which row correctly shows cell types that contain telomeres?

	typical animal cell	typical plant cell	typical bacterial cell
A	✓	✓	✓
B	✓	✓	✗
C	✗	✗	✓
D	✓	✗	✗

key
✓ = present
✗ = **not** present

22 Which events listed are part of mitosis?

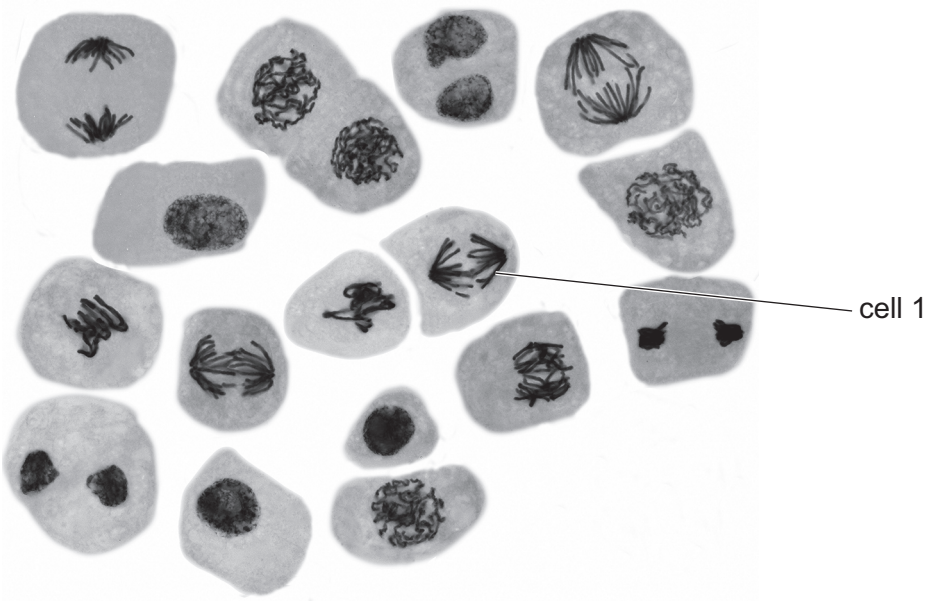
1 interphase

2 prophase

3 cytokinesis

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

23 The photomicrograph shows 17 cells in different stages of the mitotic cell cycle.

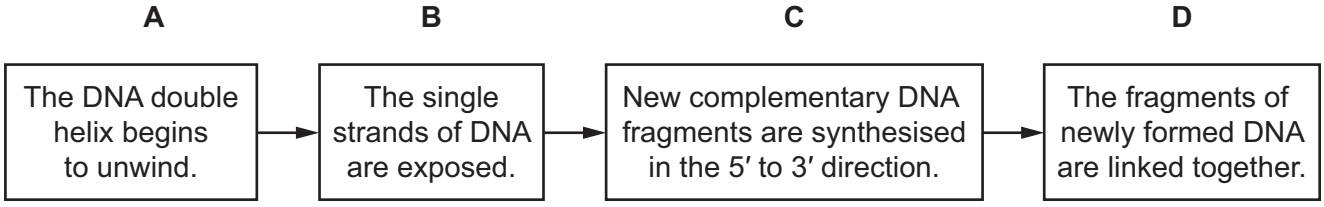


Which row is correct for this photomicrograph?

	the role of a centromere in cell 1	the proportion of the cells in the photomicrograph in telophase
A	attaches daughter chromosomes to spindle fibres	> 0.2
B	holds sister chromatids together	> 0.2
C	attaches daughter chromosomes to spindle fibres	< 0.2
D	holds sister chromatids together	< 0.2

24 The flow diagram shows some of the stages in the replication of a lagging strand of DNA.

Which stage of DNA replication uses the enzyme DNA ligase?



25 In a gene, the 20 common amino acids are each coded for by three bases in adjacent nucleotides.

Why is there a difference between the number of amino acids and the number of possible triplet codes?

A 44 triplets have **no** functions.

B Some amino acids are coded for by more than one triplet.

C Some triplets have unknown functions.

D There are 44 'start' and 'stop' triplets.

26 How is a primary transcript modified to form mRNA?

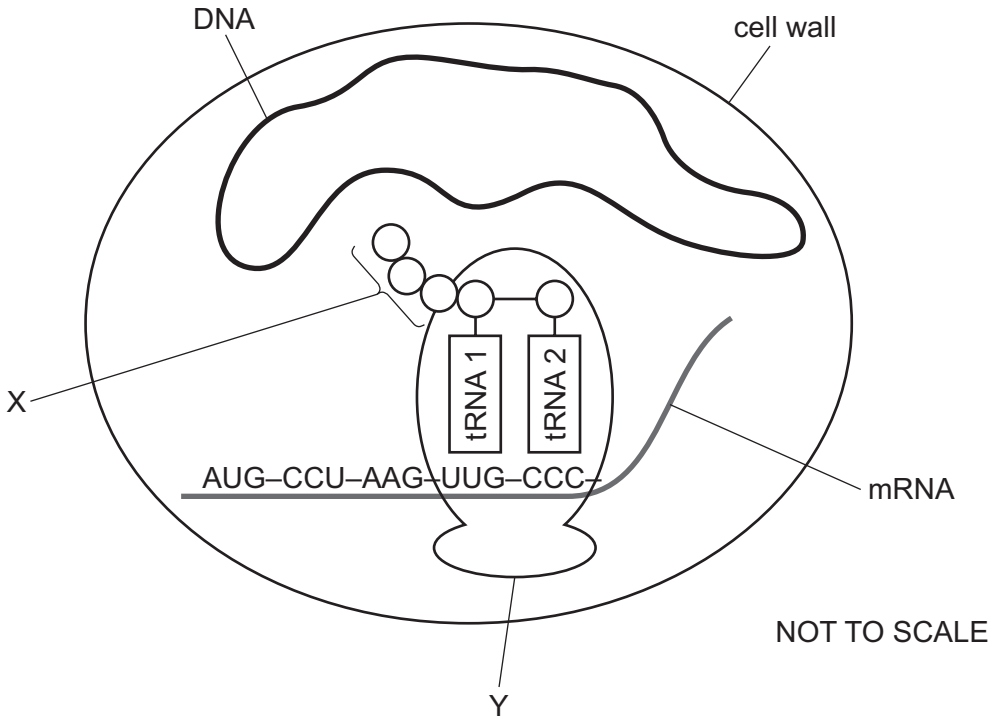
A It becomes longer as exons are joined together.

B It becomes shorter as exons are removed.

C It becomes longer as introns are joined together.

D It becomes shorter as introns are removed.

27 The diagram shows protein synthesis in a prokaryote.

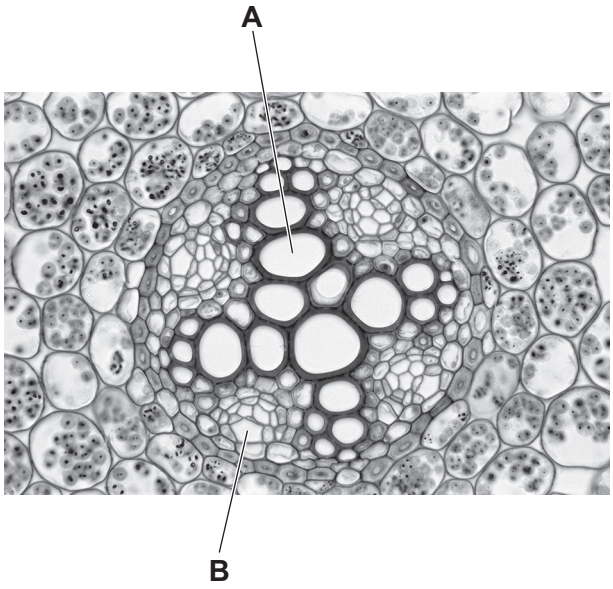


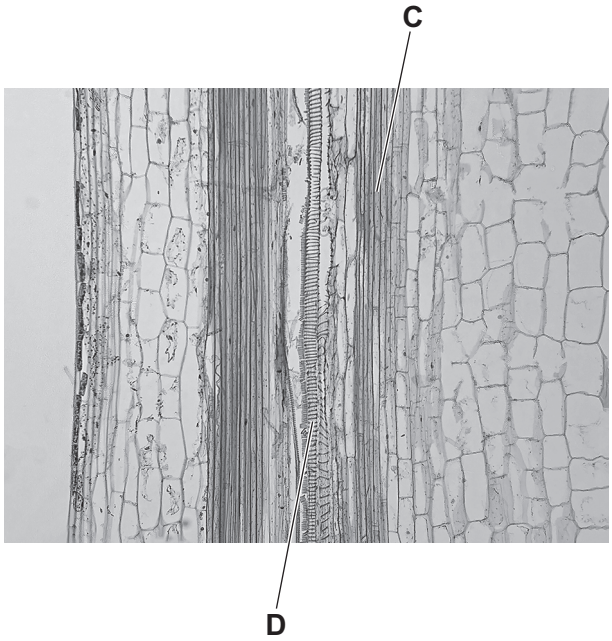
Which row is correct for molecule X, structure Y and the anticodon of tRNA 1?

	molecule X	structure Y	anticodon of tRNA 1
A	amino acid	80S ribosome	AAC
B	polypeptide	80S ribosome	UUG
C	polypeptide	70S ribosome	AAC
D	protein	70S ribosome	UUG

28 The photomicrographs show sections of two organs of a plant.

Which letter identifies a cell found with companion cells in a tissue in a root?





29 Which row correctly describes the pressure in the xylem and the water potential in the root hair cells used in the transport of water in a transpiring plant?

	pressure in the xylem	water potential in root hair cells
A	positive	negative
B	positive	positive
C	negative	negative
D	negative	positive

30 Which row correctly identifies the definitions for each of the key terms used in transpiration?

	attraction between water molecules and walls of the xylem vessel	effect created by evaporation of water from the surface of the leaf
A	cohesion	adhesion
B	adhesion	tension
C	cohesion	tension
D	tension	cohesion

[Turn over

31 Which combination of features is characteristic of a phloem sieve tube element immediately after it is loaded from a source?

	water potential of the phloem sieve tube element	lignification of the cell wall
A	higher than source	**not** present
B	higher than source	present
C	lower than source	**not** present
D	lower than source	present

32 Which blood vessel carries blood with the lowest pressure?

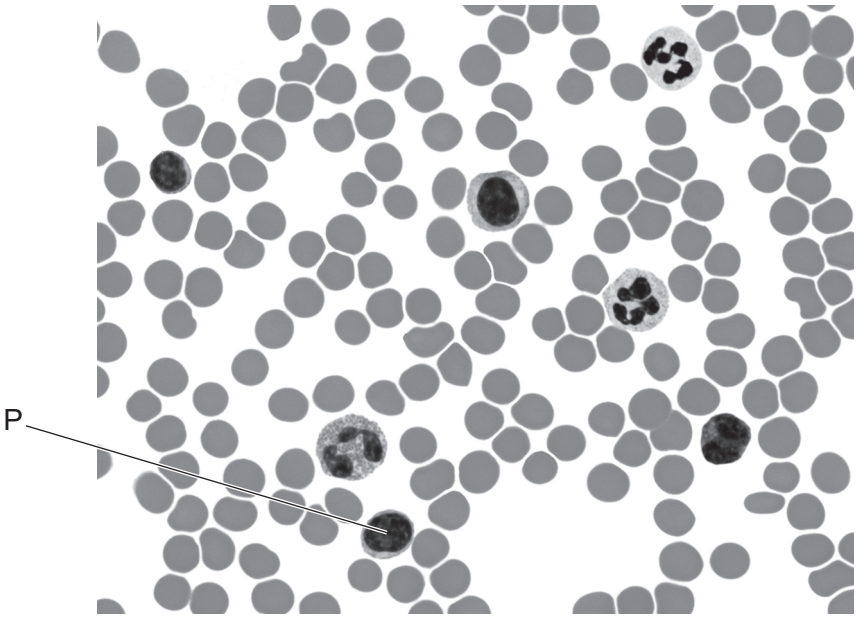
A aorta

B pulmonary artery

C pulmonary vein

D vena cava

33 The photomicrograph shows cells found in mammalian blood.



What is cell P?

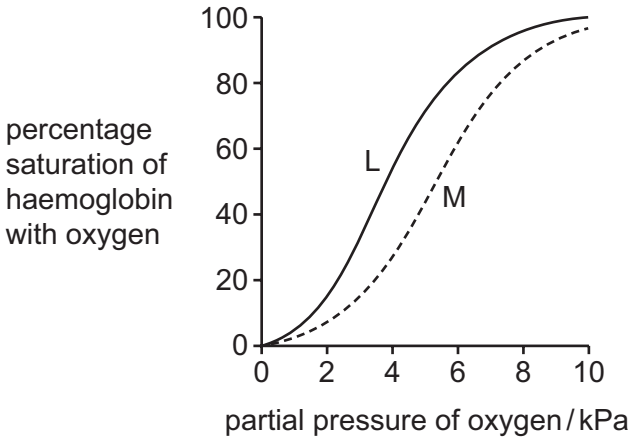
A lymphocyte

B monocyte

C neutrophil

D red blood cell

34 The diagram shows the Bohr shift in actively respiring cells.



What causes the shift from L to M?

A Carbonic acid dissociates to release protons that bind to oxyhaemoglobin, affecting the conformation of haemoglobin to reduce its affinity for oxygen.

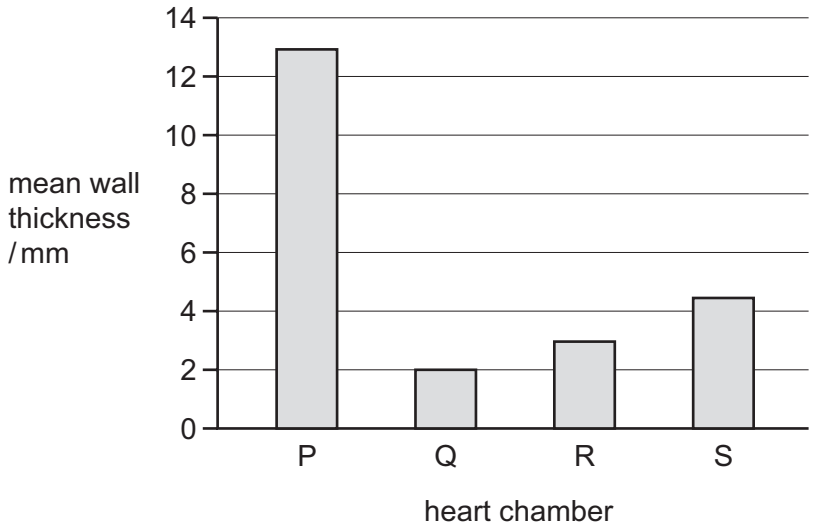
B Hydrogencarbonate ions produced by carbonic anhydrase alter the charge of oxyhaemoglobin, reducing its ability to bind oxygen.

C Hydrogen ions combine with chloride ions in tissue fluid to produce hydrochloric acid, distorting oxyhaemoglobin and causing it to lose bound oxygen.

D A low concentration of oxygen in actively respiring cells causes oxyhaemoglobin to release oxygen more quickly down the concentration gradient.

[Turn over

35 The bar chart shows the mean thickness of the walls of the main chambers in a mammalian heart.



Which row correctly identifies the heart chambers?

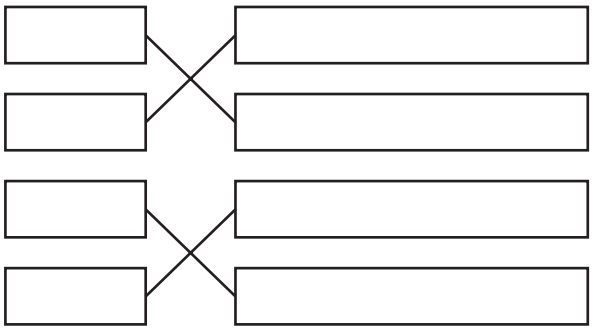
	right atrium	left atrium	right ventricle	left ventricle
A	R	Q	S	P
B	Q	S	R	P
C	R	Q	P	S
D	Q	R	S	P

36 The diagram shows parts of the gas exchange system in humans and the associated cells or structures.

alveolus	ciliated cells
bronchiole	squamous epithelial cells
bronchus	C-shaped rings of cartilage
trachea	ciliated cells and goblet cells

Which diagram shows the lines that correctly match the parts to their cells or structures?

A



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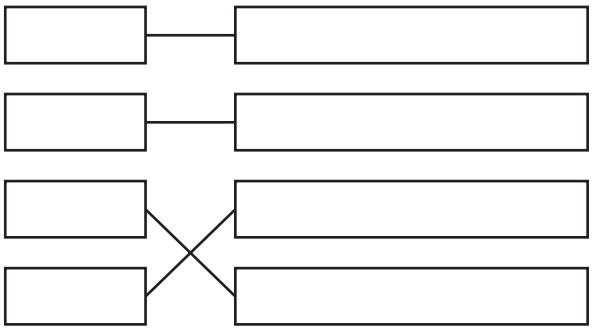
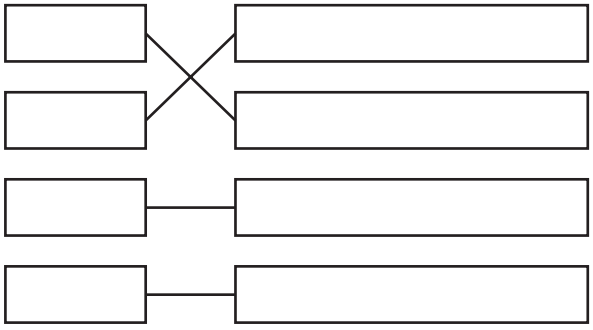


C



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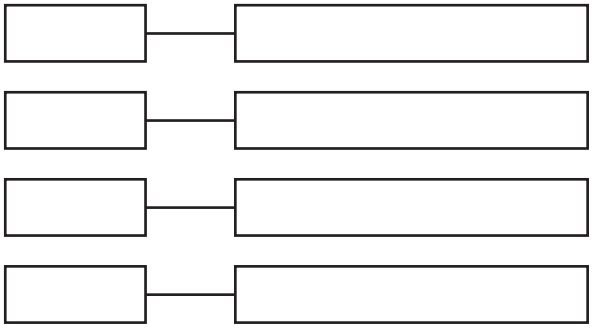
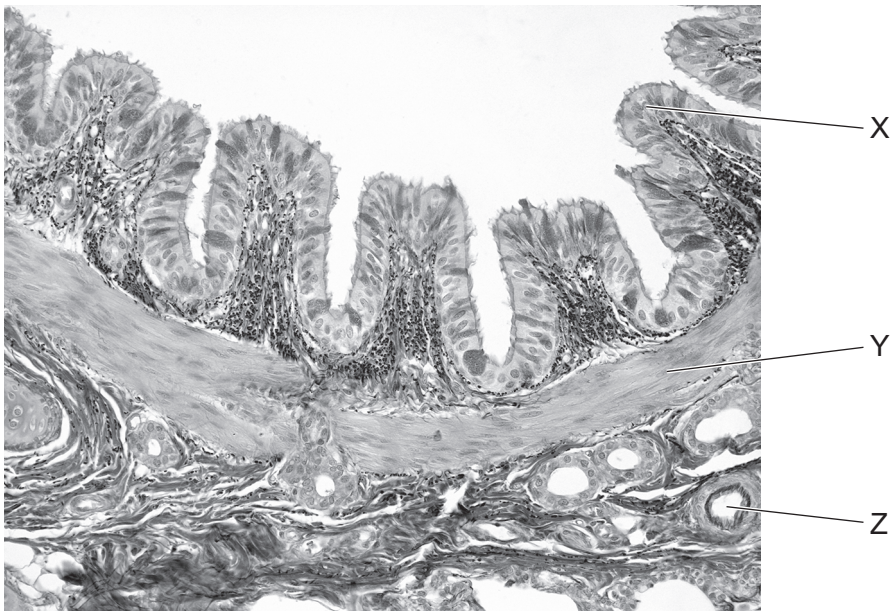


37 The photomicrograph shows the wall of a bronchus as seen with a light microscope.



Which row correctly identifies the structures labelled?

	X	Y	Z
A	epithelium	elastic fibres	bronchiole
B	endothelium	smooth muscle	bronchiole
C	epithelium	smooth muscle	blood vessel
D	endothelium	elastic fibres	blood vessel

38 Which factors affect the global pattern of distribution of malaria?

1 the disease is mainly restricted to tropical and subtropical environments

2 the effective vaccine has eradicated the disease in many countries

3 the vector required for transmission of malaria parasites

	1	2	3
A	✓	✓	✗
B	✓	✓	✓
C	✓	✗	✓
D	✗	✓	✓

key

✓ = effect

✗ = **not** an effect

39 Which molecule could be a self antigen?

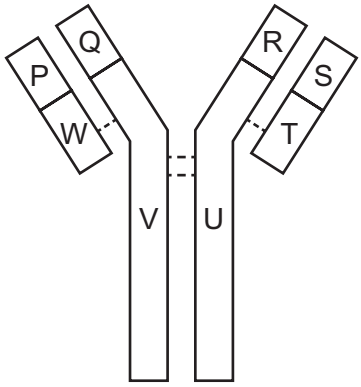
A a viral capsid protein

B a phospholipid in a viral envelope

C a toxin released by a pathogen

D a glycoprotein on the surface of a macrophage

40 The diagram shows an antibody molecule with some parts labelled.



Which row is correct about the parts that form an antigen-binding site and have identical amino acid sequences?

	form an antigen-binding site	have identical amino acid sequences
A	P and Q	R and S
B	Q and V	P and S
C	R and S	U and V
D	U and V	Q and R

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