Cambridge Assessment International Education

Cambridge International AS & A Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **May/June 2025**

1 hour 15 minutes

You must answer on the multiple choice answer sheet.

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.

1 Which statements about light microscopes are correct?

1 To calculate the magnification of a light microscope, the eyepiece lens and objective lens magnifications are added together.

2 The resolution of a light microscope is limited by the wavelength of light.

3 The divisions on the scale on a stage micrometer are closer together than the divisions on the scale on an eyepiece graticule.

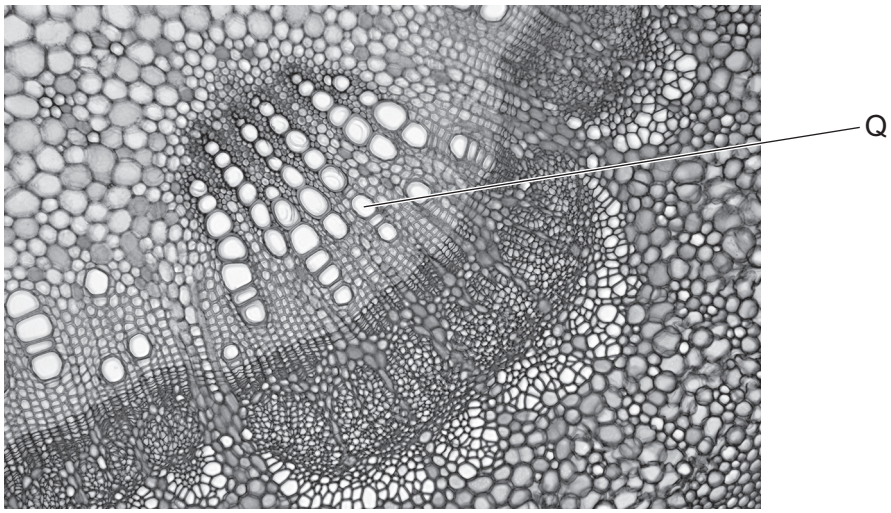
A 1, 2 and 3 **B** 1 and 2 only **C** 2 only **D** 3 only

2 A student measured the width of a mitochondrion in an electron micrograph of an animal cell with a magnification of ×9600. The width was 6 mm.

What was the actual width of the mitochondrion?

A 6 μm **B** 0.6 μm **C** 0.06 μm **D** 0.006 μm

3 The photomicrograph shows a section of the stem of a plant.



Which statements could describe Q?

1 The cell wall contains pits.

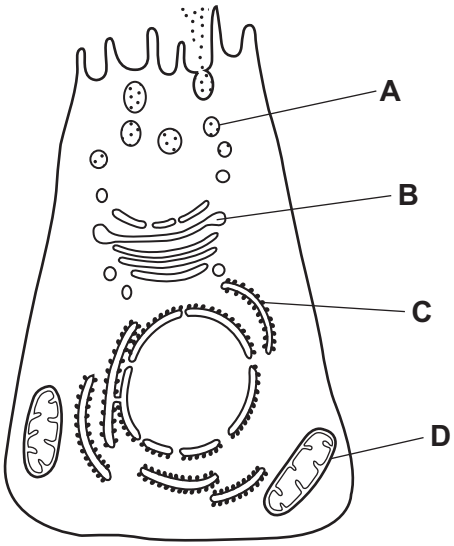
2 The cell wall contains cellulose and also lignin.

3 It is connected to adjacent cells via plasmodesmata.

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

4 The diagram is taken from an electron micrograph of a cell that secretes enzymes.

Where are the polypeptides for these enzymes made?

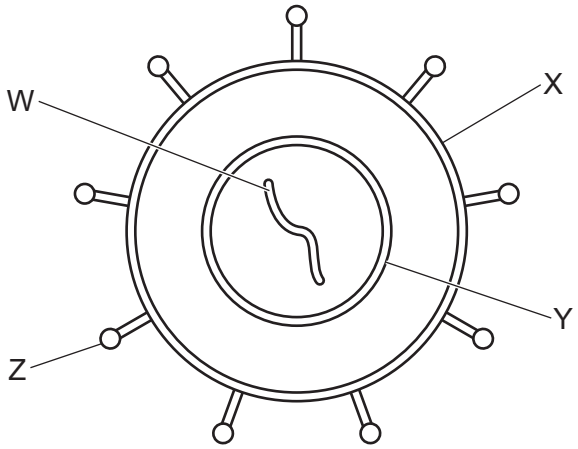


5 Which comparisons between a typical bacterial cell and a typical plant cell are correct?

	bacterial cell	plant cell
1	cytoplasmic DNA	nuclear DNA
2	no smooth ER present	smooth ER present
3	peptidoglycan cell walls found	cellulose cell walls found
4	80S ribosomes	70S ribosomes

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

6 The diagram shows a virus.



Which row correctly identifies the labelled biological molecules?

	W	X	Y	Z
A	RNA	proteins	phospholipids	carbohydrates
B	DNA	phospholipids	proteins	proteins
C	DNA	proteins	proteins	carbohydrates
D	RNA	phospholipids	phospholipids	proteins

7 The iodine test and the Benedict's test were carried out on samples of a starch solution. Amylase was added to another sample of the starch solution and incubated for 10 minutes. The Benedict's test was then carried out on this sample.

What were the results of the tests?

	iodine test before adding amylase	Benedict's test before adding amylase	Benedict's test after adding amylase
A	✗	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✗	✗

key

✓ = positive result

✗ = negative result

8 Which row about α-glucose and β-glucose molecules is correct?

	carbon atom on which the OH position is different	cellulose contains both molecules
A	1	no
B	1	yes
C	4	no
D	4	yes

9 Which molecules are monosaccharides?

1 ribose

2 glucose

3 deoxyribose

4 sucrose

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

10 Many animals use triglycerides for long-term energy storage.

Which statements are correct additional functions of triglycerides?

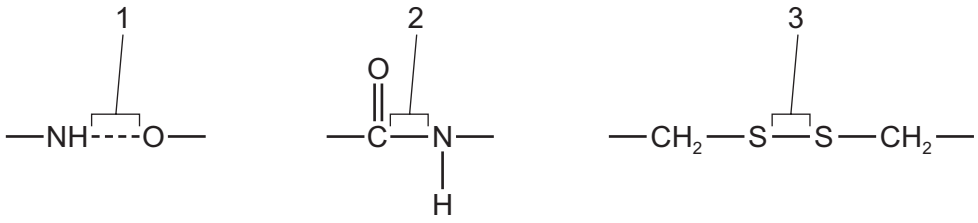
1 They provide buoyancy in some marine animals.

2 They are the main components of cell membranes.

3 They are used as thermal insulation.

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

11 The diagrams show three different bonds.



Which bonds are found in proteins?

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

12 What describes the quaternary structure of a collagen molecule?

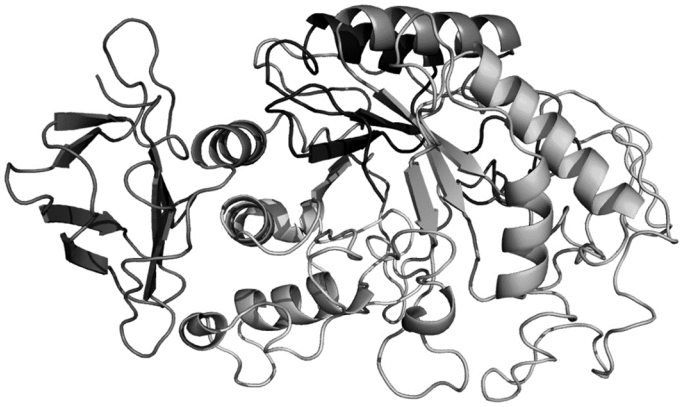
A polypeptides that form an α-helix, which are held together by covalent bonds

B polypeptides that form a double helix, which are held together by hydrogen bonds

C four polypeptides that are held together by covalent bonds, which form a helix

D three polypeptides that form helix structures, which are held together by hydrogen and covalent bonds

13 The diagram shows the structure of the enzyme amylase.



Which level of protein structure results in the folding of amylase into its globular shape?

A primary

B secondary

C tertiary

D quaternary

14 Which statement explains why large volumes of water maintain a constant temperature when the air temperature increases?

A The latent heat of vaporisation of water is high.

B The specific heat capacity of water is high.

C Each water molecule can form a hydrogen bond with a maximum of three water molecules.

D Water is able to evaporate rapidly from a surface with little loss of heat.

15 Which statements about the mode of action of an enzyme are correct?

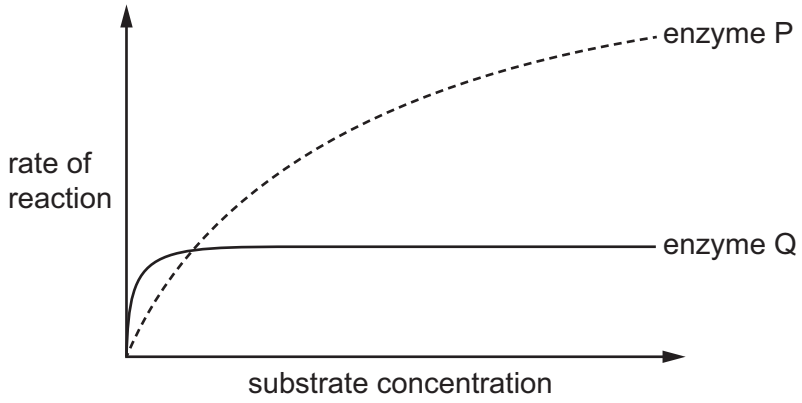
1 Some enzymes have a region on their surface to which the substrate has a complementary shape.

2 Some enzymes and their substrates can change shape slightly as the substrate enters the active site.

3 Enzymes permanently change shape when they react with their substrates to form an enzyme–substrate complex.

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

16 The graph shows the effect of increasing substrate concentration on the rate of reaction of two enzymes that catalyse reactions with the same substrate.



Which statement is correct?

A Enzyme Q has a higher K_m and a higher affinity for the substrate than enzyme P.

B Enzyme Q has a higher K_m and a lower affinity for the substrate than enzyme P.

C Enzyme Q has a lower K_m and a higher affinity for the substrate than enzyme P.

D Enzyme Q has a lower K_m and a lower affinity for the substrate than enzyme P.

17 The cell surface membrane structure is described as a ‘fluid mosaic’.

What correctly describes the ‘mosaic’ part of the cell surface membrane?

A the different patterns that are obtained by the moving phospholipid molecules

B the random distribution of cholesterol molecules within the phospholipid bilayer

C the regular pattern produced by the phospholipid heads and membrane proteins

D the scattering of the different proteins within the phospholipid bilayer

18 A student immersed a plant tissue in solution S.

For the next 30 minutes, the student used a microscope to observe the cells in the plant tissue.

During this time, the cytoplasm of the cells shrunk and no longer pushed up against the cell wall. In many cells, a space appeared between the cytoplasm and the cell wall.

Which statements are correct conclusions from these observations?

1 The water potential in solution S was more negative than the water potential in the cytoplasm of the cells at the start of the experiment.

2 Without a cell wall to provide support, it is likely that many of the cells would have burst.

3 The clear space between the cell wall and the cytoplasm of many of the cells was filled with air.

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

19 A sample of 500 cells dividing by mitosis was examined to identify the stage of mitosis for each cell.

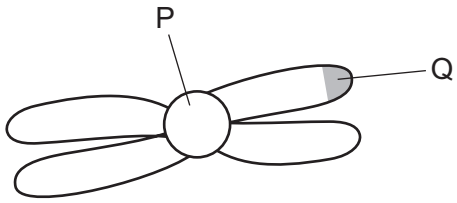
The table shows the results.

stage of mitosis	percentage of cells in the stage
late prophase	23
end of metaphase	45
between the start of anaphase and the end of telophase	24

Which row is correct?

	number of cells with chromosomes at the equator of the cell	number of cells with separated chromatids
A	225	120
B	225	345
C	380	120
D	380	345

20 The diagram shows a chromosome.



What are structures P and Q?

	P	Q
A	centriole	chromatid
B	centromere	telomere
C	centromere	centriole
D	centriole	telomere

21 Which processes are used by stem cells during tissue repair?

1 cytokinesis

2 DNA replication

3 transcription

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

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

Which cells transcribe a high concentration of telomerase?

1 neutrophils

2 mature red blood cells

3 activated memory T-lymphocytes

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

23 Which statements are correct?

1 All polypeptides are coded for by genes.

2 All genes are made up of a sequence of nucleotides.

3 All gene mutations result in a change to the nucleotide sequence.

4 All gene mutations will result in an altered polypeptide.

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1 and 4 only

D 2 and 3 only

24 A double-stranded DNA molecule was analysed and 29% of its nucleotide bases were found to be adenine.

Which percentage of its nucleotide bases will be cytosine?

A 21% **B** 29% **C** 42% **D** 58%

25 In some cells, non-coding sequences of RNA are removed after transcription.

Which row correctly states the name of these non-coding sequences of RNA and the type of cell in which the non-coding sequences are removed?

	name of non-coding sequences	type of cell in which non-coding sequences are removed
A	exons	eukaryotic
B	exons	prokaryotic
C	introns	eukaryotic
D	introns	prokaryotic

26 Water potentials were measured inside a leaf cell, in the air spaces of the leaf and in the atmosphere.

Which values of water potential (Ψ) would allow water to move from the leaf to the atmosphere?

	Ψ inside the leaf cell / MPa	Ψ of air spaces / MPa	Ψ of atmosphere / MPa
A	–1	–7	–100
B	–100	–7	–1
C	1	7	100
D	100	7	1

27 Three samples of liquid were taken from different locations in a plant and tested to measure the concentration of four solutes. The results are shown.

sample	concentration of solute / mol m^{-3}			
	sucrose	nitrate ions	amino acids	magnesium ions
1	652	0.14	41	3.4
2	0.12	7.1	7.2	1.1
3	433	0.6	68	3.7

Which samples have been taken from phloem sieve tube elements?

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

28 A heated band was wrapped around the stem of a plant at a height of 1 m above the ground and left for 10 minutes.

How will heating a small section of the stem to 60 °C affect the transport of phloem sap and xylem sap between the roots and leaves?

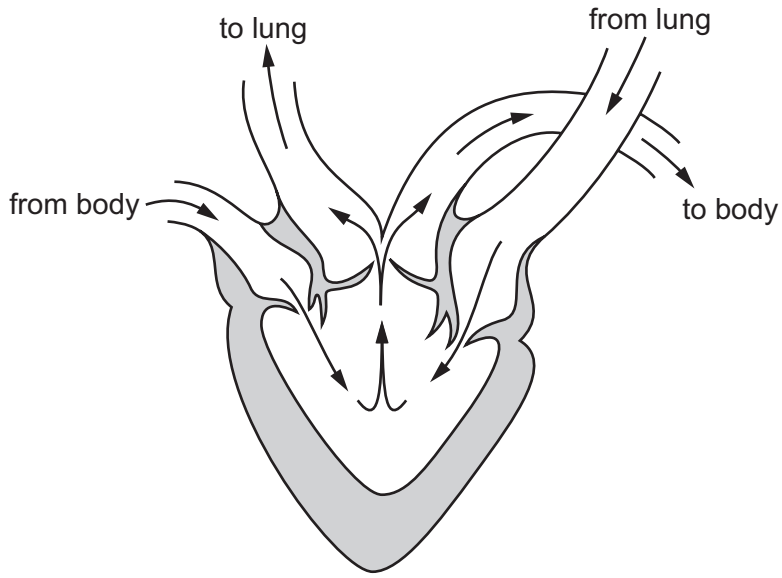
	transport of phloem sap	transport of xylem sap
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = transport continues

✗ = transport stops

29 The diagram shows the structure of an amphibian heart and the movement of blood through it.



Which statements about differences between the amphibian heart and a human heart are correct?

1 The hearts have a different number of ventricles.

2 The hearts have a different number of atrioventricular valves.

3 A septum is absent in the amphibian heart and a septum is present in the human heart.

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

30 A mutation in one of the genes that codes for haemoglobin changes the affinity of haemoglobin for oxygen.

This mutation lowers the partial pressure of oxygen at which haemoglobin is 50% saturated with oxygen.

Which row shows the effect of the mutation on the affinity of haemoglobin for oxygen and the change in the position of the oxygen dissociation curve for haemoglobin?

	the effect of the mutation on the affinity of haemoglobin for oxygen	change in the position of the oxygen dissociation curve for haemoglobin
A	higher	shift to the left
B	higher	shift to the right
C	lower	shift to the left
D	lower	shift to the right

31 Which processes are responsible for the Bohr shift?

1 Carbon dioxide reacts with haemoglobin to form carbaminohaemoglobin.

2 Carbon dioxide reacts with water to form carbonic acid.

3 Haemoglobinic acid is formed from the dissociation of carbonic acid.

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

32 A student viewed a drop of human blood with a microscope and described a cell as having a very large diameter and a U-shaped nucleus that occupies half the volume of the cell.

Which type of cell was the student viewing?

A monocyte

B neutrophil

C red blood cell

D lymphocyte

33 How many times must an oxygen molecule pass through a cell surface membrane to get from the air in the alveolus to the haemoglobin in a red blood cell?

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

A 2 **B** 3 **C** 4 **D** 5

34 Asthma can affect children and adults. The air passages become narrower, severely restricting the flow of air into the lungs.

Salbutamol is a drug that widens the air passages to relieve the symptoms of asthma.

How does salbutamol relieve the symptoms of asthma?

A It decreases mucus secretions in the terminal bronchioles.

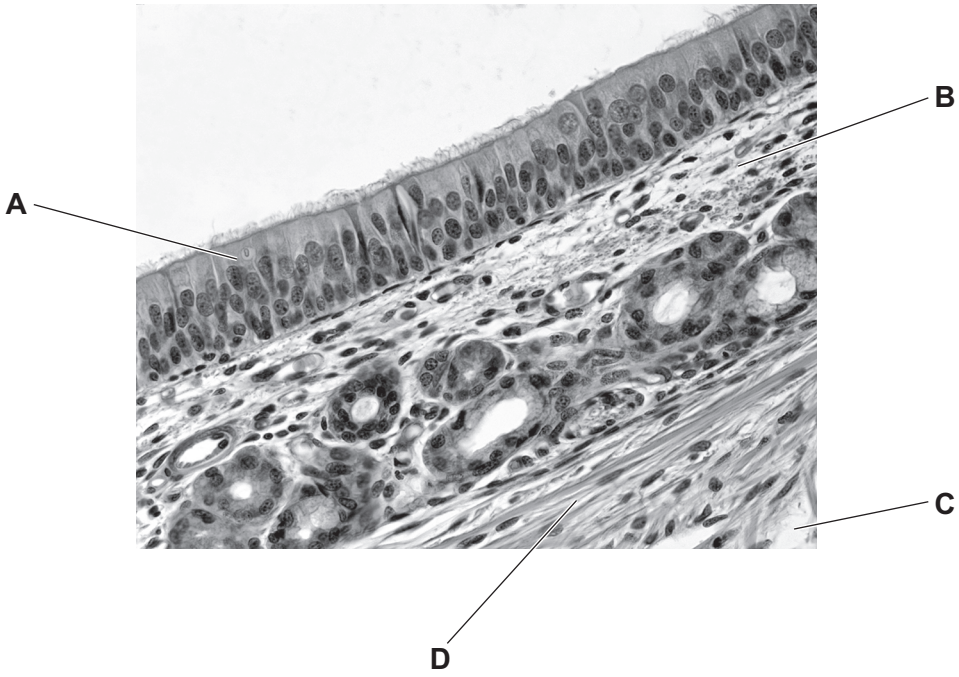
B It decreases the surface area of the alveoli.

C It causes recoil of elastic tissue in the bronchioles.

D It relaxes smooth muscle in the bronchi and bronchioles.

35 The photomicrograph shows the transverse section of part of the trachea.

Which letter represents a tissue that can contract and relax to adjust the diameter of the airways?



36 Which statements about an infectious disease may be correct?

1 It can be caused by a protoctist.

2 It can be transmitted by an insect vector.

3 It can be transmitted from mother to child.

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

37 Which statements explain why cholera has **not** been eradicated by vaccination?

1 There is limited availability of an affordable vaccine.

2 Protection takes several weeks to develop after vaccination.

3 The under-reporting of cholera in the community.

4 Immunity to cholera decreases after two years.

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

38 Antibiotic resistance is a serious threat to global health.

Which statement describes a step that can be taken to reduce the impact of antibiotic resistance?

A Antibiotics prescribed by a doctor should be shared with family members to protect them.

B Antibiotics should only be used to treat infectious diseases caused by viruses.

C Farmers should give antibiotics to healthy animals to prevent infections occurring.

D Vaccination programmes should be used to reduce the spread of bacterial diseases.

39 Tetanus is an infectious disease caused by a type of bacterium. This bacterium produces a protein that is a toxin which causes illness.

Scientists have produced a vaccine for tetanus which contains a harmless form of the toxin called a toxoid.

The toxoid is produced by mixing the toxin with the chemical formaldehyde. This chemical binds to the toxin making it harmless.

Which statement about the tetanus vaccine is correct?

A After vaccination, the toxoid in the vaccine will be ingested by neutrophils and displayed in their cell surface membranes.

B The tetanus vaccine containing the toxoid does **not** contain antigens because it does **not** contain any cells of the pathogen.

C The toxoid protein in the vaccine stimulates the production of antibodies which remain in the blood to provide long-term immunity.

D When formaldehyde binds to the toxin, it causes the toxin to completely change shape.

40 What is an effect on the immune system of a reduced number of T-helper cells?

A a decrease in the destruction of infected body cells by T-helper cells

B a decrease in the activation of B-lymphocytes

C an increase in the activation of T-killer cells

D an increase in the production of plasma cells

BLANK PAGE