Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2018**

1 hour

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

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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.

CAMBRIDGE International Examinations

1 A student made notes describing photomicrographs of four cells.

cell 1 Grey cytoplasm at edge of cell contains many black lines and spots. Large white area in centre of cell.

cell 2 Grey cytoplasm contains many black lines and spots which fill the entire cell.

cell 3 Pale blue cytoplasm surrounds a single dark blue spot.

cell 4 Many green structures are enclosed within a rectangular shape with visible boundaries.

Which table identifies the type of cell and the type of microscope used to take each photograph?

A

	animal cell	plant cell
electron microscope	1	2
light microscope	3	4

B

	animal cell	plant cell
electron microscope	1	2
light microscope	4	3

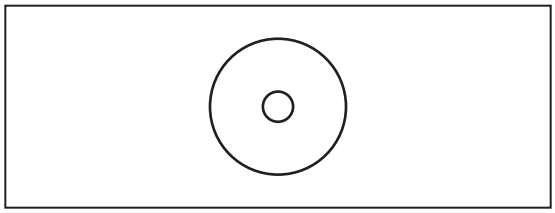
C

	animal cell	plant cell
electron microscope	2	1
light microscope	3	4

D

	animal cell	plant cell
electron microscope	2	1
light microscope	4	3

2 The diagram shows a slide of a transverse section of a stem. This diagram is the same size as the actual slide.



A student observed this slide using a light microscope at a magnification of ×40. The student made a plan drawing of the stem, which was 20 cm in diameter.

The student labelled the plan 'Transverse section of a stem ×40'.

Which statement explains why this label is **not** correct?

A The actual size of the stem should have been checked using an eyepiece graticule.

B The actual size of the stem was smaller under low power.

C The image size in the drawing was larger than ×40.

D The image size in the drawing was smaller than ×40.

3 Which cell structures may contain cisternae?

	chloroplast	endoplasmic reticulum	Golgi body	mitochondrion
A	✓	✓	✓	✗
B	✓	✗	✗	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

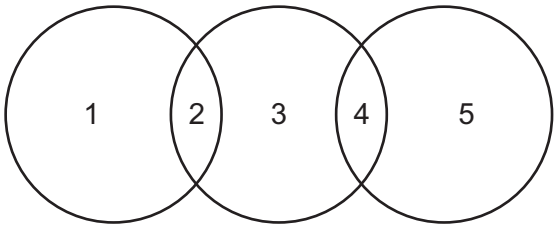
key
✓ = may contain cisternae
✗ = does not contain cisternae

[Turn over

4 Which row correctly describes the function of the cell structures?

	lysosomes	mitochondria	smooth endoplasmic reticulum	Golgi body
A	digestion of unwanted structures	abundant in sites of active transport	processing of proteins	a stack of flattened sacs
B	digestion of unwanted structures	ATP synthesis	lipid production	glycoprotein production
C	spherical sacs containing hydrolytic enzymes	abundant in sites of active transport	lipid production	glycoprotein production
D	spherical sacs containing hydrolytic enzymes	ATP synthesis	glycoprotein production	lipid production

5 The diagram shows the relationship between various cells and their components.



Which row is correct?

	1	2	3	4	5
A	80S ribosome	eukaryotic cell	mitochondrion	70S ribosome	prokaryotic cell
B	chloroplast	plant cell	cell wall	prokaryotic cell	80S ribosome
C	circular DNA	nucleus	eukaryotic cell	mitochondrion	70S ribosome
D	prokaryotic cell	circular DNA	chloroplast	membrane bound	70S ribosome

6 Which comparison of bacteria cell walls and plant cell walls is correct?

	bacteria cell wall	plant cell wall
A	made of a polymer of α-glucose	made of cellulose
B	made of a polymer of β-glucose	made of a polymer of amino sugars
C	made of a polymer of amino sugars	made of a polymer of α-glucose
D	made of peptidoglycan	made of a polymer of β-glucose

7 A glycosidic bond is broken and two monosaccharides are formed during a positive test for a non-reducing sugar.

Which row identifies the catalyst and reactants in this process?

	catalyst	reactants
A	hydrochloric acid	fructose and glucose
B	hydrochloric acid	sucrose and water
C	sucrase enzyme	fructose and glucose
D	sucrase enzyme	sucrose and water

8 Which pair of statements are correct?

A Carbon and oxygen occur in a ratio of 2 : 1 in carbohydrates.
Triglycerides are soluble in water.

B Glycolipids are found in all cell surface membranes.
Carbohydrates are stored as starch in plants.

C Phospholipids all have two saturated hydrocarbon chains.
Polysaccharides are polymers.

D Water is released during the formation of a glycosidic bond.
Phospholipids all have three ester bonds.

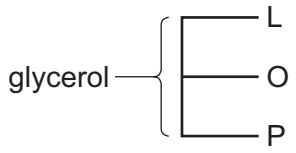
9 What is the general formula for cellulose?

A $(C_5H_{10}O_5)_n$ **B** $(C_5H_{10}O_6)_n$ **C** $(C_6H_{10}O_5)_n$ **D** $(C_6H_{12}O_6)_n$

[Turn over

10 A triglyceride consists of glycerol and three different fatty acids, linoleic acid (L), oleic acid (O) and palmitic acid (P).

The diagram shows one possible arrangement of the fatty acids L, O and P in the molecule.



What is the total number of different arrangements of the fatty acids in this triglyceride?

A 3 **B** 4 **C** 5 **D** 9

11 Which statements about a peptide bond are correct?

1 It joins two monomers which are always identical to each other.

2 It contains four different atoms.

3 It can be broken by the addition of water at room temperature.

4 It is important in the primary structure of proteins.

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

12 Which statements about the primary structure of a protein are correct?

1 It may be branched.

2 It is determined by the sequence of DNA bases.

3 It is unique to that protein.

4 It determines the tertiary structure of the protein.

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

13 A mutation occurred within the DNA sequence coding for an enzyme, causing a decrease in the rate of a reaction catalysed by this enzyme.

Which statements could explain the decrease in the rate of reaction?

1 An inhibitor for this enzyme has an increased affinity for the enzyme and forms an enzyme–inhibitor complex more easily.

2 The active site of the enzyme might have changed shape and so is no longer complementary.

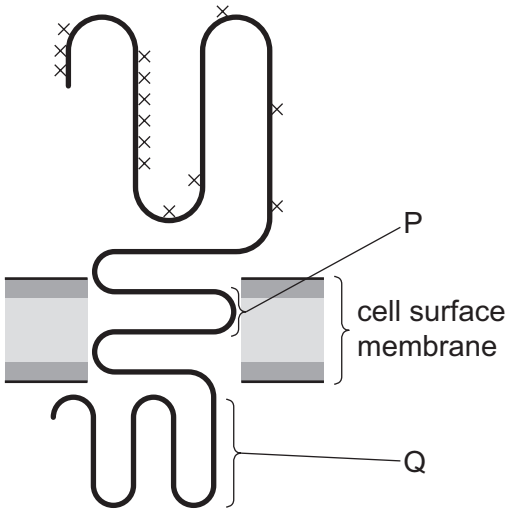
3 The activation energy for the reaction with the mutated enzyme is greater than with the non-mutated enzyme.

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

14 Which row is correct for an enzyme with a low Michaelis-Menten constant?

	affinity of enzyme for substrate	substrate concentration at maximum reaction rate
A	high	high
B	high	low
C	low	high
D	low	low

15 The diagram shows a glycoprotein embedded in the cell surface membrane of a human red blood cell. This glycoprotein is part of a system of cell surface blood group recognition sites.



key
× = carbohydrate

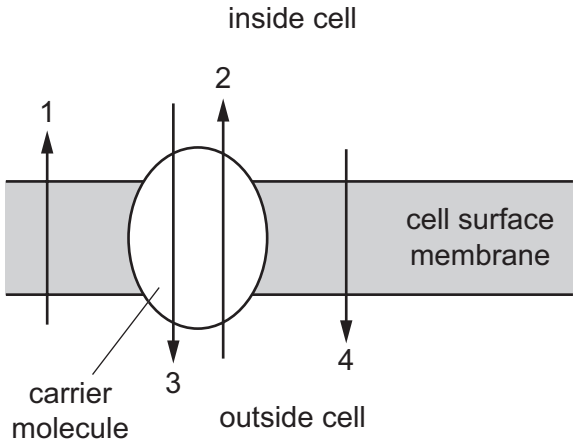
Which row identifies the role of this glycoprotein and regions P and Q of the molecule?

	role of glycoprotein	region P	region Q
A	antigen	amino acids with hydrophobic R groups	amino acids with hydrophilic R groups in the cell's cytoplasm
B	carrier	amino acids with hydrophilic R groups	amino acids with hydrophilic R groups in the cell's cytoplasm
C	channel	amino acids with hydrophilic R groups	amino acids with hydrophobic R groups outside the cell
D	receptor	amino acids with hydrophobic R groups	amino acids with hydrophobic R groups outside the cell

[Turn over

16 The diagram shows the transport of ions across the cell surface membrane. Inside the cell there is a low concentration of sodium ions (Na^+) and a high concentration of potassium ions (K^+). Outside the cell there is a low concentration of K^+ and a high concentration of Na^+.

The carrier molecule is a pump which exchanges Na^+ for K^+.



Which ionic movements are represented by the arrows?

	active transport of K^+	active transport of Na^+	diffusion of Na^+	diffusion of K^+
A	2	3	1	4
B	2	3	4	1
C	3	2	1	4
D	3	2	4	1

17 The indicator cresol red changes from red to yellow when put into an acid.

Some blocks of agar containing cresol red were cut to different sizes and put in an acid. All other variables were kept constant. The blocks were measured in mm.

Which block became completely yellow most quickly?

A $3 \times 30 \times 30$ **B** $6 \times 6 \times 6$ **C** $6 \times 12 \times 12$ **D** $12 \times 12 \times 12$

18 When red blood cells are put into pure water they burst (haemolysis).

Which statements explain this haemolysis?

1 The water potential of the surrounding liquid is lower than the water potential of the contents of the red blood cell.

2 The cell surface membranes of red blood cells are not supported by cell walls.

3 More water moves into the red blood cells by osmosis than leaves the cells.

4 Water enters the red blood cells by osmosis but does not leave the cells.

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

19 How many copies of each DNA molecule will be found in a cell at each stage of the mitotic cell cycle?

	G_1 of interphase	cytokinesis
A	1	1
B	1	2
C	2	1
D	2	2

20 Which metabolic processes will be very active in a cell that has just completed cytokinesis?

1 ATP formation

2 DNA replication

3 protein synthesis

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

21 A mutation occurs in a gene which prevents the production of telomerase.

What is the effect of this mutation if it occurs in bone marrow stem cells?

A a rapid increase in the production of lymphocytes

B a tumour grows in the bone marrow

C bone marrow stem cells eventually no longer divide

D the total blood cell count will be unchanged

22 What are the products when a DNA molecule replicates?

A two molecules of DNA each made of a paired sequence of bases

B two molecules of DNA each made of a paired sequence of nucleotides

C two strands of DNA each made of a paired sequence of bases

D two strands of DNA each made of a paired sequence of nucleotides

23 Following translation, the alpha polypeptide chain of haemoglobin, α-globin, undergoes modification. During this modification, the first amino acid is removed, leaving 141 amino acid residues.

How many nucleotides does the gene coding for α-globin contain?

A 141 **B** 142 **C** 423 **D** 426

24 Which statements correctly describe transport pathways in dicotyledonous plants?

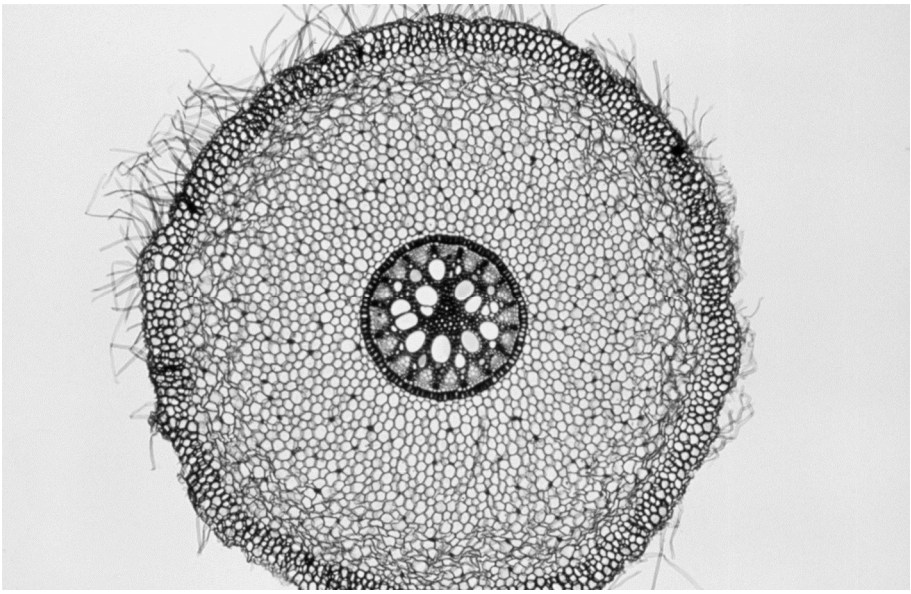
1 In the apoplast pathway, water does not move through plasmodesmata.

2 In the symplast pathway, water does not move through intercellular spaces.

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

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

25 The photomicrograph shows a transverse section through a root.



What is the simplest ratio of the diameter of the root (excluding root hairs) to the diameter of the vascular tissue and endodermis?

A 40 mm : 11 mm

B 40 : 11

C 8 cm : 2.2 cm

D 80 : 22

26 Which properties of water molecules are important in the upward flow of water through xylem?

1 Water molecules are attracted to each other by hydrogen bonding.

2 Water molecules are attracted to cellulose by adhesion.

3 Water molecules have high cohesion in water columns.

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

27 What is correct for a phloem sieve tube element that is unloading to a sink?

	water potential of the phloem sieve tube element becomes	lignification of the cell wall
A	less negative than sink	absent
B	less negative than sink	present
C	more negative than sink	absent
D	more negative than sink	present

[Turn over

28 Which statement concerning transpiration is correct?

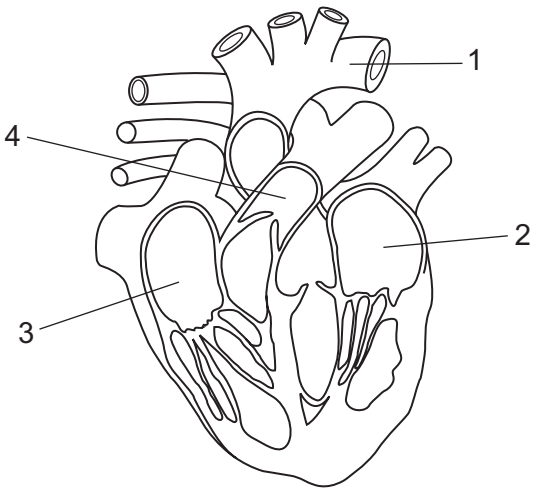
A On a humid day, the water potential gradient between the intercellular air space and the external atmosphere increases to stimulate water loss by evaporation.

B Water arriving at the spongy mesophyll cells via the symplast pathway must move by osmosis through the cell surface membrane before evaporation from the surface of the cells.

C Water diffuses down the water potential gradient from the saturated air space through the guard cells before evaporating from the surface of the cells into the atmosphere.

D Water moves up the xylem in the apoplast pathway and can continue on this pathway by osmosis to reach the spongy mesophyll cells before evaporating into the intercellular air space.

29 The diagram shows a section through the heart and the associated blood vessels.



What is correct for the flow of blood through the heart?

A $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

B $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

C $3 \rightarrow 4 \rightarrow 1 \rightarrow 2$

D $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$

30 Blood, tissue fluid and lymph each have a different composition.

Which row shows the composition of lymph?

	water	antibodies	lipid
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

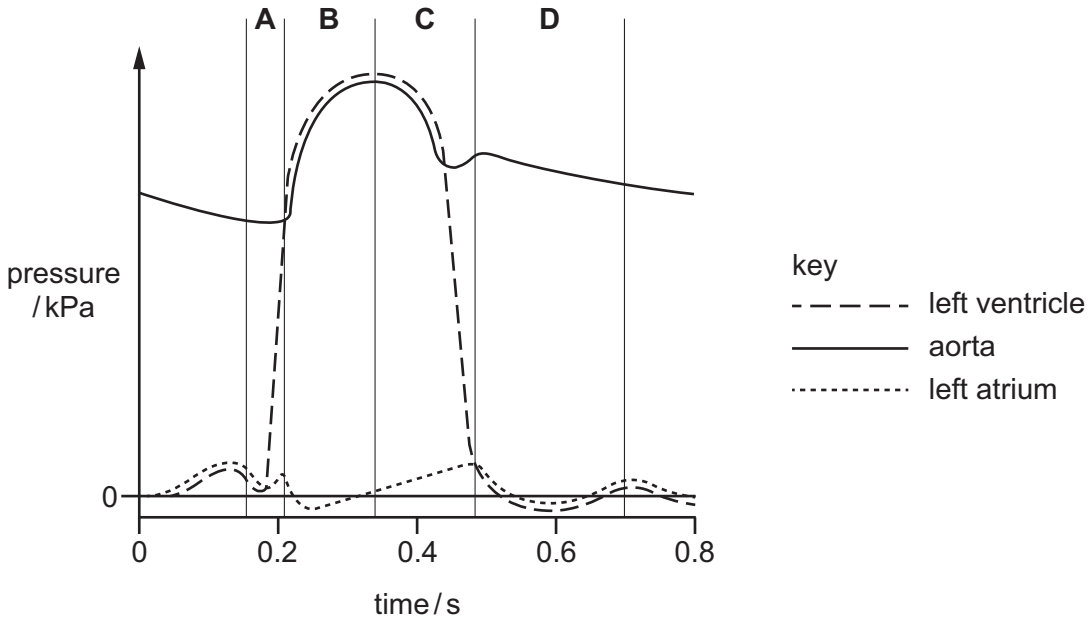
key
✓ = present
✗ = absent

31 Which row shows the change in concentration of some substances in red blood cells when carbon dioxide diffuses from active cells?

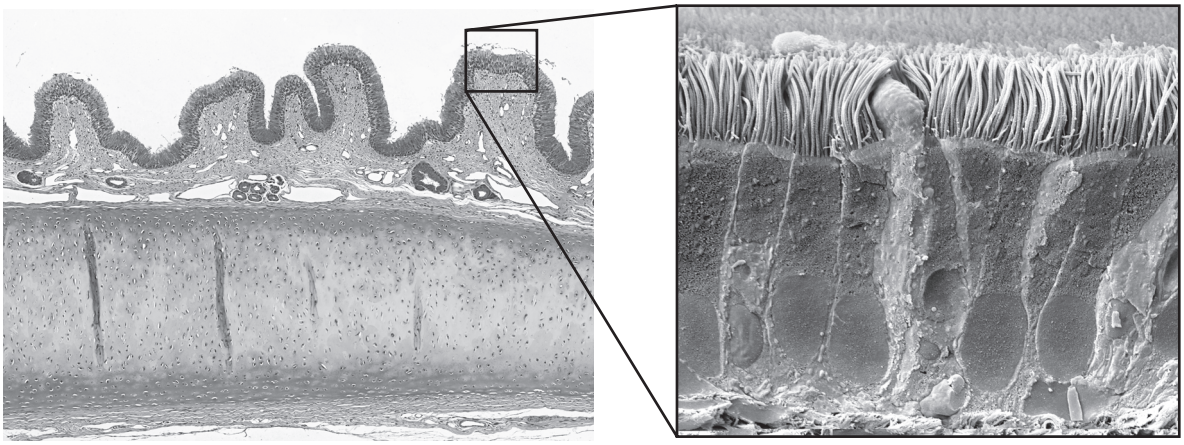
	carbonic anhydrase	hydrogencarbonate ions	hydrogen ions
A	decreases	no change	no change
B	increases	increases	increases
C	no change	decreases	increases
D	no change	increases	increases

32 The diagram shows the pressure changes in various structures of the left side of the heart during the cardiac cycle.

At the end of which period is the ventricle full of blood?



33 The photomicrographs show a cross-section through the lining of part of the respiratory system.



Which statements are correct?

1 Goblet cells are visible between squamous epithelium cells.

2 Smooth muscle is visible.

3 The section cannot be from a bronchiole as cartilage is visible.

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

34 In the lungs, oxygen and carbon dioxide pass through cell surface membranes by diffusion.

Which row is correct?

	number of cell surface membranes diffused through by	
	oxygen from air	carbon dioxide to air
A	3	2
B	3	2 or 3
C	5	4
D	5	4 or 5

35 Which flow diagram correctly describes the effect of tar entering the lungs?

A	carcinogens come into contact with DNA	→	mutation occurs	→	uncontrolled cell division
B	goblet cells secrete more mucus	→	mucus accumulates causing infection	→	phagocytes attracted by inflammation
C	mucus accumulates causing infection	→	phagocytes attracted by inflammation	→	elastase destroys the alveolar walls
D	mutation occurs	→	phagocytes attracted by inflammation	→	causes irritation and coughing

36 Which list contains only infectious diseases?

A cholera, HIV / AIDS, lung cancer and malaria

B cholera, malaria, tuberculosis (TB) and sickle cell anaemia

C HIV / AIDS, malaria, measles and tuberculosis (TB)

D lung cancer, measles, sickle cell anaemia and tuberculosis (TB)

37 Which disease is caused by a eukaryote?

A cholera

B malaria

C measles

D smallpox

38 A vaccine is available against most common strains of the influenza virus.

The virus that causes influenza often undergoes mutation in the gene coding for its antigenic protein.

Which statements explain why vaccinated people are not immune to a mutated influenza virus?

1 They will not have primary immune response to the mutated antigen.

2 They will not have a secondary immune response to the mutated antigen.

3 Their memory cells do not recognise the mutated antigen.

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

[Turn over

39 Which statements correctly describe lymphocytes?

1 Each B-lymphocyte has the ability to make several types of antibody molecules.

2 Some B-lymphocytes and T-lymphocytes become memory cells.

3 Plasma cells secrete antibodies into the blood plasma.

4 Some T-lymphocytes stimulate macrophages to kill infected cells.

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1 and 4 only

D 2, 3 and 4 only

40 Addison's disease can occur when antibodies are produced in response to an enzyme found in some organs of the body.

Which statements correctly describe Addison's disease?

1 It is a non-infectious disease.

2 It is a type of auto-immune disease.

3 Antibodies are produced against a self-antigen.

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