Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **October/November 2016**

1 hour

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

7093770083

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.

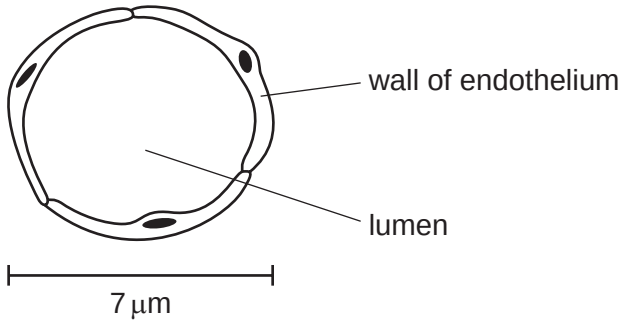
Read the instructions on the Answer Sheet very carefully.

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 **15** printed pages and **1** blank page.

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1 The diagram shows a transverse section through a blood capillary.



What is the magnification of the drawing?

A ×200 **B** ×245 **C** ×500 **D** ×5000

2 A culture of human cells had its cell surface membranes removed, releasing the cell contents.

This material became contaminated by bacteria.

The material was then centrifuged, separating out the various cell structures according to size and mass.

Which cell structure would be separated out along with the bacteria?

A endoplasmic reticulum

B mitochondria

C nuclei

D ribosomes

3 Which parts of a cell contain ribosomes?

1 chloroplast

2 mitochondrion

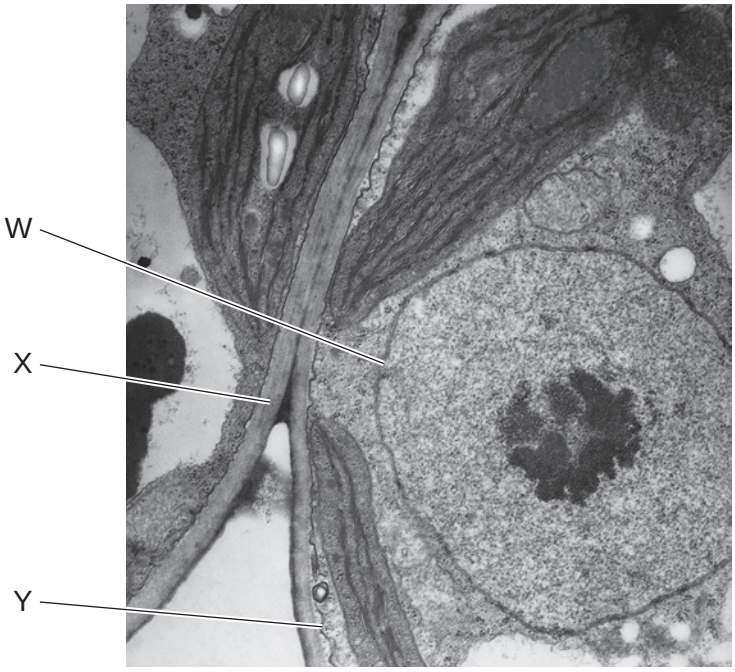
3 nucleus

4 cytoplasm

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

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4 The electron micrograph shows part of two eukaryotic cells.



Which features are also found in prokaryotes?

A W only **B** X only **C** X and Y only **D** W, X and Y

5 Which of the structures are found in photosynthetic prokaryotes?

1 cell surface membrane

2 cellulose wall

3 ribosomes

4 chloroplasts

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

6 In order to estimate the quantity of glucose in a solution, equal volumes of a range of known concentrations were mixed with equal excess volumes of Benedict's solution and placed in a thermostatically controlled water-bath at 90 °C for the same length of time.

The unknown solution was then treated in the same way and the colours of the known and unknown solutions compared.

What is the independent variable in this procedure?

A concentration of glucose

B final colour of solutions

C temperature of water-bath

D volumes of glucose solutions

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7 What **cannot** occur as a result of a condensation reaction?

A breaking of a glycosidic bond

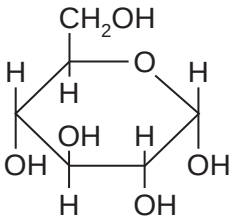
B formation of a disaccharide

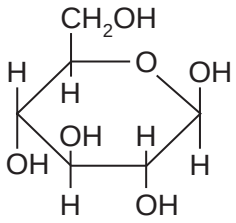
C joining together two amino acids

D production of a molecule of water

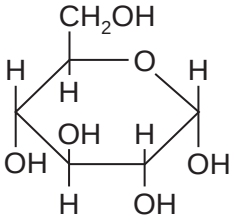
8 Which pair of monosaccharides forms sucrose?

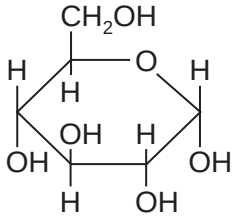
A



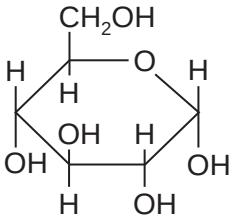


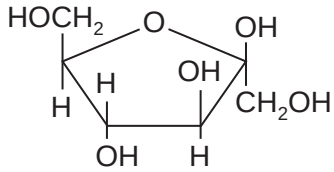
B



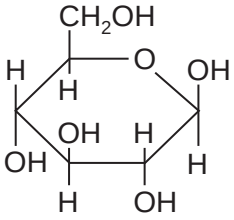


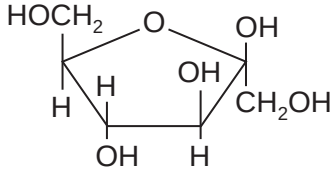
C



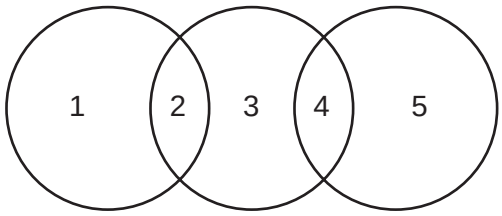


D





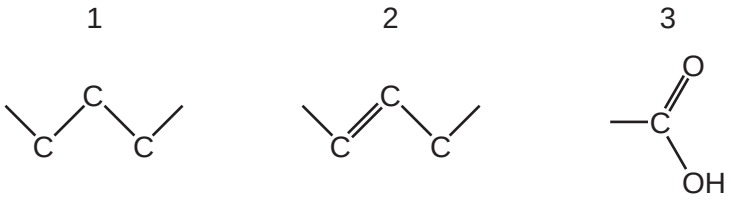
9 The diagram shows the relationship between different polysaccharides and the glycosidic bonds formed between the monomers.



Which row is correct?

	1	2	3	4	5
A	amylopectin	α-1,6	cellulose	β-1,4	glycogen
B	amylose	α-1,4	glycogen	β-1,4	amylopectin
C	cellulose	β-1,4	amylose	α-1,4	glycogen
D	glycogen	α-1,6	amylopectin	α-1,4	amylose

10 The diagrams show some of the types of bond in fatty acids.



Which row shows the bonds found in each type of molecule?

	unsaturated fatty acid	saturated fatty acid
A	1, 2 and 3	1 and 3 only
B	1, 2 and 3	2 and 3 only
C	1 and 3 only	1, 2 and 3
D	2 and 3 only	1, 2 and 3

11 What could describe the tertiary structure of a protein?

1 α-helix

2 a globular structure

3 the specific order of amino acids

4 a specific three-dimensional (3D) shape

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

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12 Following a heart attack, the enzyme lactate dehydrogenase leaks into the blood plasma from damaged heart muscle.

Which steps are required to obtain an estimate of lactate dehydrogenase activity in a sample of blood plasma?

	sterilise blood plasma by heating	incubate with substrate for lactate dehydrogenase	incubate with lactate dehydrogenase inhibitor
A	✓	✓	✓
B	✗	✓	✓
C	✗	✓	✗
D	✗	✗	✓

key

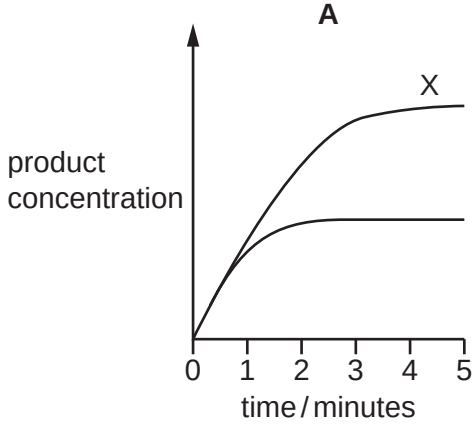
✓ = step required

✗ = step not required

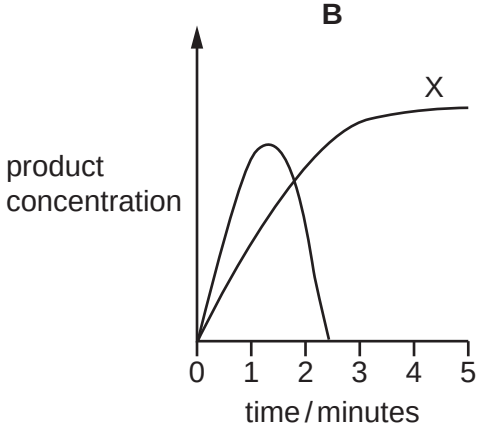
13 Two experiments were carried out using an enzyme from humans. The first experiment, X, was carried out at a constant temperature of 37 °C. During the second experiment, the temperature was increased from 37 °C to 80 °C. All other factors were kept the same.

Which graph shows the results?

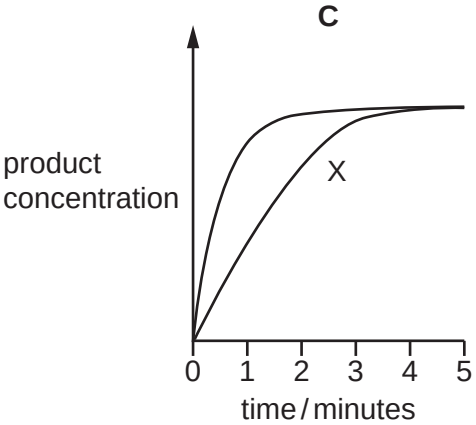
A



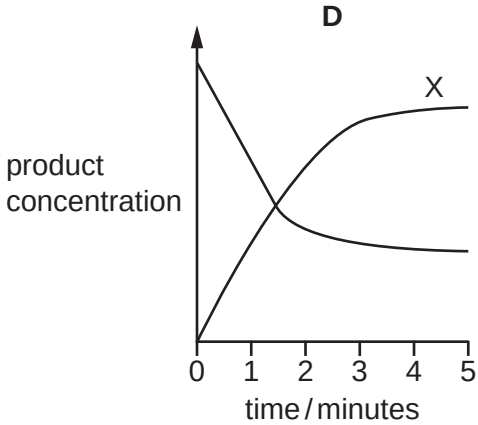
B



C



D



14 Which molecules are found at the outer surface of a cell surface membrane?

	cholesterol	glycolipids	phospholipids
A	✓	✓	✗
B	✓	✗	✓
C	✓	✗	✗
D	✗	✓	✓

key

✓ = present

✗ = absent

15 Which substances can pass directly through cell surface membranes **without** using a carrier protein or channel protein?

1 CO_2

2 Ca^{2+} and Na^{+}

3 H_2O

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

16 Which statements about the proteins in cell surface membranes are correct?

1 They can be involved in active transport and facilitated diffusion.

2 They can be involved in antigen recognition.

3 They have hydrophilic R groups to interact with the inner portion of the membrane.

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

17 Which row is correct for a human cell just before the cell enters prophase of mitosis?

	number of chromatids	number of molecules of DNA in nucleus	spindle present	nuclear envelope present
A	46	46	yes	no
B	46	92	yes	yes
C	92	46	no	yes
D	92	92	no	yes

18 Which event is part of the mitotic cell cycle?

A anaphase

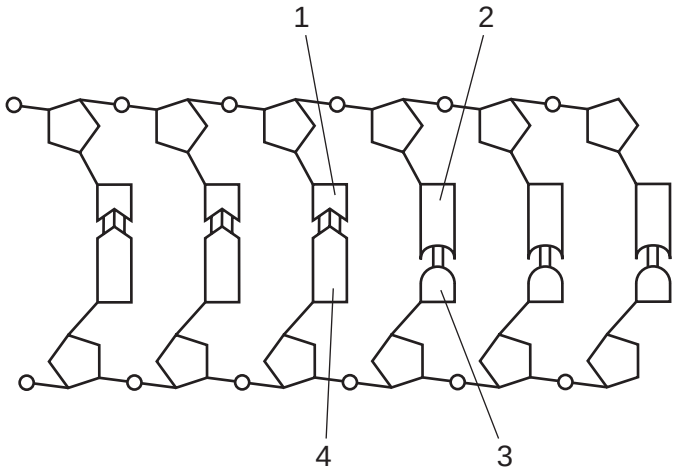
B cytokinesis

C DNA replication

D interphase

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19 The diagram shows part of a DNA molecule.



Which labels represent purines?

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

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

What percentage of its nucleotide bases will be cytosine?

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

21 When a gene mutation occurs, which of the following may be altered, resulting in the production of a non-functional protein?

1 amino acid sequence

2 DNA nucleotide sequence

3 mRNA nucleotide sequence

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

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22 The diagram shows the nucleotide sequence of a small section of a gene which is transcribed.

GCAGCATGCGCG

The table shows the amino acids coded for by 10 mRNA codons.

mRNA codon	amino acid
AAG	Lys
ACG	Thr
CGG CGC CGU	Arg
CCG	Pro
GCC GCG	Ala
GGC	Gly
UGC	Cys

What is the order of the four amino acids in the polypeptide translated from this small section of a gene?

A Ala-Ala-Cys-Ala

B Ala-Arg-Gly-Ala

C Arg-Ala-Pro-Arg

D Arg-Arg-Thr-Arg

23 Which changes to the water potential and the volume of liquid in the phloem occur when carbohydrate is taken out of a sink into a phloem sieve tube element?

	water potential in phloem sieve tube element	volume of liquid in phloem sieve tube element
A	higher	decreases
B	higher	increases
C	lower	decreases
D	lower	increases

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24 A dendrograph records changes in the diameter of a tree. The diagram shows a dendrograph fixed to a tree.

Some results are shown on the chart recording.

dendrograph fixed to a tree

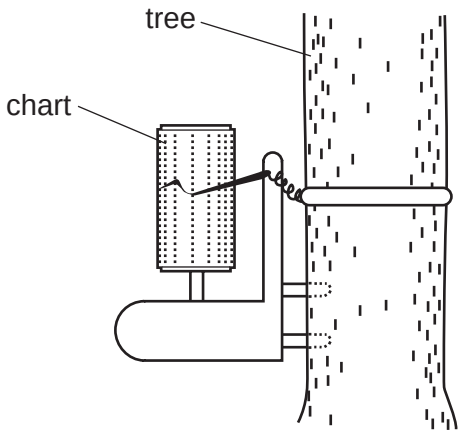
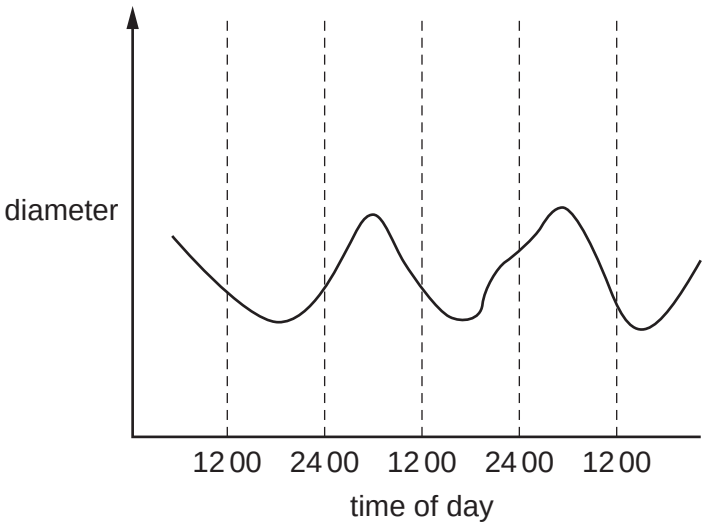


chart recording



What explains the diameter changes recorded during the day and night?

A Adhesion forces decrease during the night.

B Cohesive tension forces increase during the day.

C Mass flow of sucrose increases during the night.

D Root pressure decreases during the day.

25 Which description is correct for xylem vessel elements?

A cells joined to form a tube, pits at intervals, sieve plates between cells, surrounded by the endodermis in roots

B contains cells joined end to end, containing cytoplasm, cell walls with lignin, located to the outside of phloem in vascular bundles

C contains elongated cells with end walls broken down, located in vascular bundles in the stem and centrally in the roots

D dead elongated cells, lignified cell walls with pits at intervals, associated with companion cells in the roots only

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26 Different substances, such as sucrose and amino acids, can move in different directions in the phloem sieve tube elements.

Which statement explains this?

A Active transport occurs in some phloem sieve tube elements and mass flow occurs in other sieve tube elements.

B Both active transport and mass flow occur in each individual phloem sieve tube element.

C Mass flow occurs in both directions at the same time in each individual phloem sieve tube element.

D Mass flow occurs in different directions in different phloem sieve tube elements at the same time.

27 Which describes possible mechanisms by which sucrose is transferred from a mesophyll cell into a companion cell?

1 co-transport with the active transport of hydrogen ions

2 co-transport by passive diffusion of hydrogen ions

3 facilitated diffusion through plasmodesmata

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

28 Which statement about haemoglobin is correct?

A Carbon dioxide increases its affinity for oxygen.

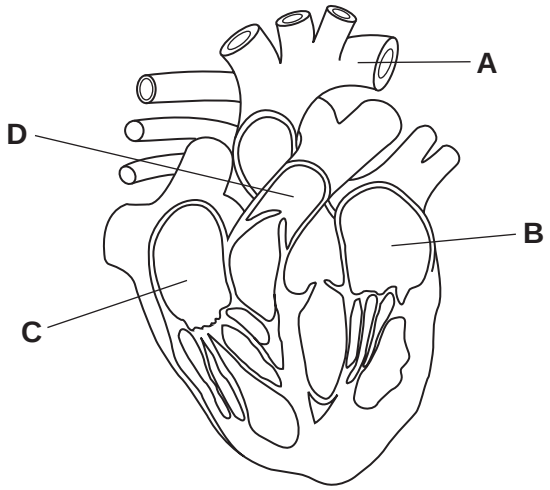
B Its affinity for oxygen changes with altitude.

C It can combine reversibly with carbon monoxide.

D It can combine with carbon dioxide.

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29 The diagram shows a section through the heart.



Which label is correct?

A pulmonary artery

B left ventricle

C right atrium

D aorta

30 What is the reason for the increase in red blood cells in humans at high altitudes?

A to compensate for the low percentage saturation of haemoglobin

B to enable haemoglobin to unload more oxygen in the tissues by the Bohr effect

C to ensure that haemoglobin is almost 90% saturated when it reaches the tissues

D to increase the number of mitochondria in the blood for ATP production

31 Which statement explains why the oxygen dissociation curve for haemoglobin is S-shaped?

A At high oxygen concentrations, oxygen dissociates from the haemoglobin molecule.

B Haemoglobin becomes saturated at low partial pressures of oxygen.

C Oxygenated haemoglobin accepts hydrogen ions from carbonic acid.

D The shape of the haemoglobin molecule changes when oxygen binds to it.

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32 Which reactions take place in a capillary in an alveolus?

1 carbon dioxide + water → carbonic acid

2 carbon dioxide + haemoglobin → carbaminohaemoglobin

3 haemoglobinic acid → haemoglobin + hydrogen ions

4 hydrogencarbonate ions + hydrogen ions → carbon dioxide + water

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

33 A student viewed three slides at both low magnification and high magnification. Each slide was a section through a different airway of the gas exchange system.

The student observed three features in each slide.

slide	three features observed by student
1	irregular arrangement of cartilage highly folded inner layer cilia on epithelial cells
2	very few goblet cells cilia on epithelial cells thick layer of smooth muscle relative to wall thickness
3	smooth muscle tissue blood vessels many goblet cells

Which row is the correct set of identifications for the three slides?

	slide 1	slide 2	slide 3
A	bronchus	bronchiole	trachea
B	bronchus	trachea	bronchiole
C	trachea	bronchiole	bronchus
D	trachea	bronchus	bronchiole

34 Which organelle is present in large quantities in ciliated epithelial cells?

A Golgi body

B lysosomes

C mitochondria

D rough endoplasmic reticulum

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35 In some cases where a person has lung disease, the partial pressure of oxygen in the pulmonary veins is less than the partial pressure of oxygen in the alveoli.

What could explain the difference in partial pressure of oxygen?

1 A high proportion of alveoli are collapsed and do not have enough alveolar capillaries.

2 The partial pressure of oxygen in the pulmonary arteries is lower than in the alveolar air.

3 The rate of diffusion of oxygen from the alveolar air to the surrounding alveolar capillaries is too slow.

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

36 Why is it difficult to control the spread of malaria?

1 Global air travel for commerce and tourism has increased.

2 The mosquito vector rapidly evolves resistance to insecticides.

3 The *Plasmodium* pathogen shows great antigenic variability.

4 Civil unrest and poverty result in overcrowded living conditions.

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

37 Which description gives the correct cause and transmission for TB, measles and HIV / AIDS?

	TB		measles		HIV / AIDS	
	cause	transmission	cause	transmission	cause	transmission
A	bacteria	airborne droplets	virus	airborne droplets	virus	bodily fluids
B	bacteria	water borne	bacteria	airborne droplets	protoctist	insect vector
C	protoctist	airborne droplets	bacteria	insect vector	virus	airborne droplets
D	virus	bodily fluids	protoctist	bodily fluids	bacteria	bodily fluids

38 What describes a function of a T-lymphocyte?

A They are only found in blood and secrete cytokines in response to infection.

B They can leave the blood and accumulate at sites of inflammation.

C They can leave the blood and secrete cytotoxins when exposed to bacteria.

D They circulate in the blood and always present antigens in response to infection.

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39 A person's blood group is determined by antigens present on the red blood cells.

The table shows the antigens and antibodies in the blood of people with different blood groups.

blood group	antigens on red blood cells	antibodies in plasma
A	A	antibodies to B
B	B	antibodies to A
AB	A and B	neither
O	neither	antibodies to A and B

During a blood transfusion, it is essential that the recipient's blood does not contain antibodies to the donor's blood.

Which blood group can be given to a person with blood group AB?

A AB only

B O only

C B and A only

D A, B, AB and O

40 Which statement about immunity is correct?

A Antibody donation, but not antibody production, occurs with artificial active and artificial passive immunity.

B Artificial active immunity lasts for a greater length of time than natural passive immunity.

C Natural active immunity provides a faster response to infection than artificial active immunity.

D Recognition and binding by specific B-lymphocytes only occurs with natural immunity.

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