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CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/01**

Paper 1 Multiple Choice

October/November 2003

1 hour

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

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, 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.

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.

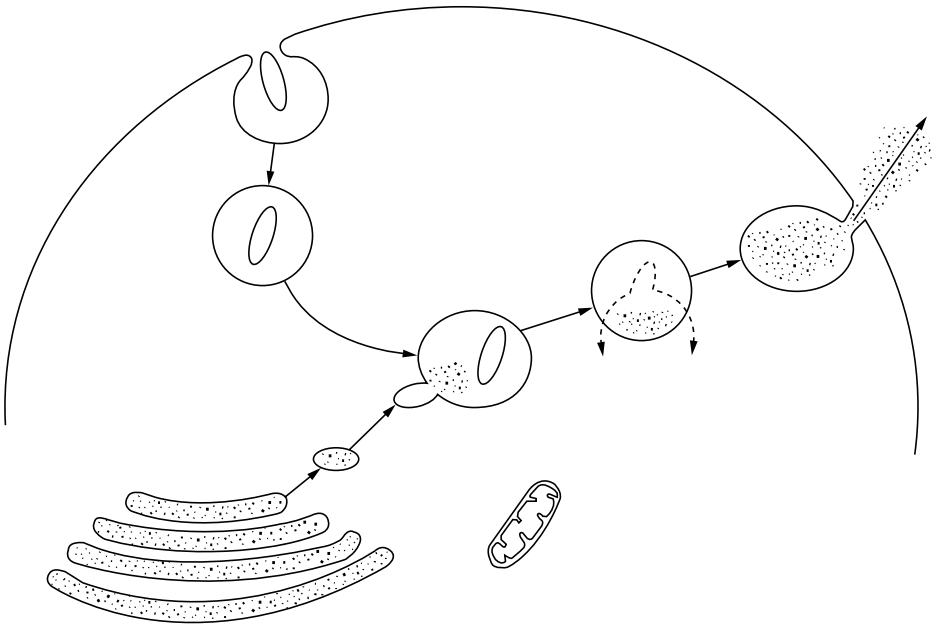
This document consists of **15** printed pages and **1** blank page.

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UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 The diagram shows several processes taking place in a cell.



Which processes are shown in the diagram and involve the cell surface membrane of the cell?

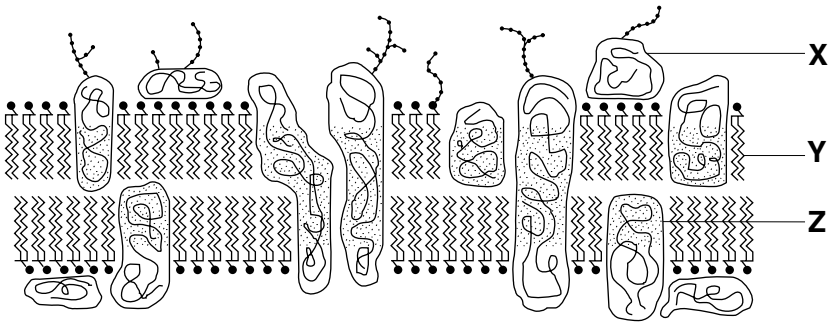
A active transport and diffusion

B diffusion and osmosis

C endocytosis and exocytosis

D endocytosis and osmosis

2 The diagram shows part of a cell surface membrane.

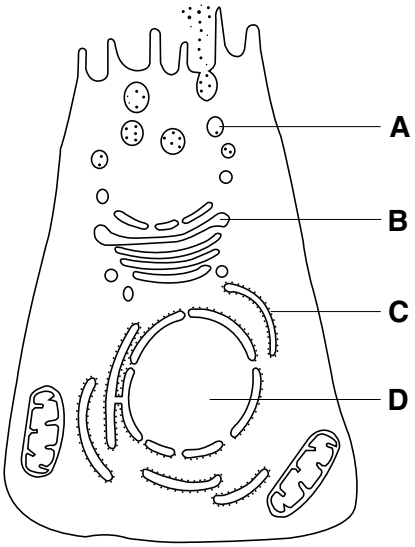


Which labels are correct?

	glycoprotein	phospholipid	protein
A	X	Y	Z
B	Y	Z	X
C	Y	X	Z
D	Z	Y	X

3 The diagram is taken from an electron micrograph of a cell which secretes digestive enzymes.

Where are these enzymes made?



4 What is the resolution, in nanometres, of an electron microscope and of a light microscope?

	electron microscope	light microscope
A	0.5	20
B	0.5	200
C	5.0	20
D	5.0	200

5 Which adaptation would increase the efficiency of active transport of carbohydrates from a plant cell?

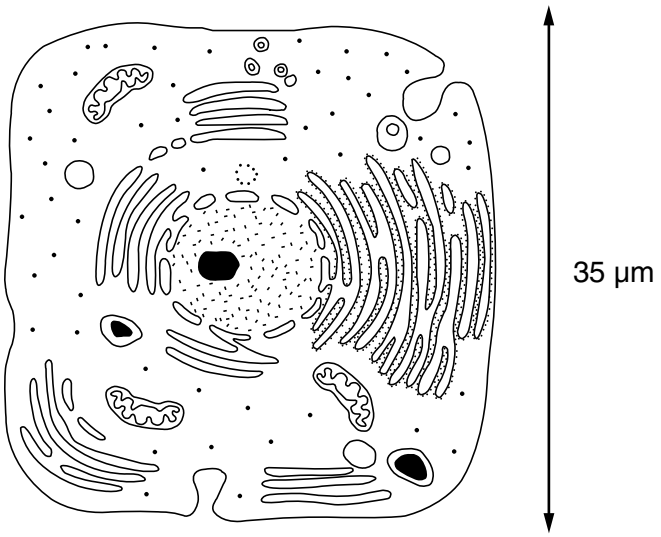
A areas where the cell wall is thin

B increased permeability of the cell wall

C large surface area of the cell surface membrane

D large volume of the cell vacuole

6 The diagram shows a drawing of an electronmicrograph.



What is the approximate length of one mitochondrion in this cell?

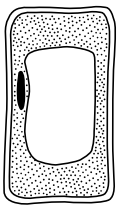
A 5 to 6 µm

B 7 to 8 µm

C 8 to 10 µm

D 10 to 15 µm

7 Turgid plant tissue is placed in a solution which has the same solute potential as the contents of the cells. The diagram shows a cell after one hour.



Which equation describes the value of the pressure potential for this cell?

A pressure potential = solute potential of the cell

B pressure potential = solute potential of the external solution

C pressure potential = water potential of the cell

D pressure potential = zero

8 Urea is a reagent which disrupts all bonds except covalent bonds in protein molecules.

Which level of protein structure would remain intact when a protein is treated with urea?

A primary

B secondary

C tertiary

D quaternary

9 Which feature distinguishes starch from glycogen?

A Starch contains alpha glucose.

B Starch contains 1,6 glycosidic bonds.

C Starch has an unbranched component.

D Starch is a polysaccharide.

10 What is the function of iron in the haemoglobin molecule?

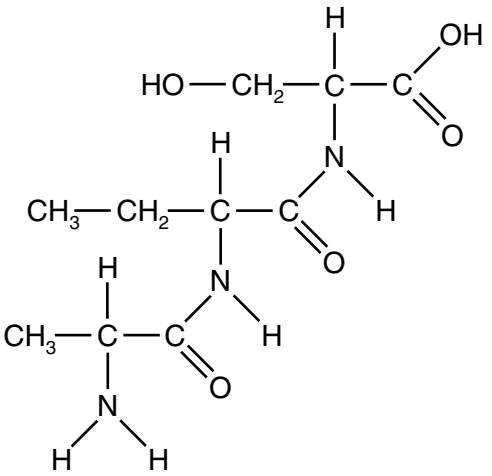
A It binds oxygen to the haemoglobin molecule.

B It makes the haemoglobin more soluble in the red blood cell.

C It stabilises the quaternary structure of the protein.

D It undergoes reversible oxidation and reduction.

11 The diagram shows a molecule.



Which type of molecule is it?

A phospholipid

B triglyceride

C tripeptide

D trisaccharide

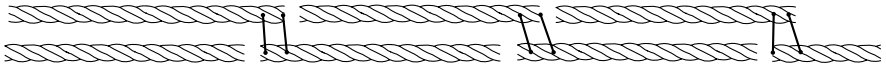
12 The equation shows a reversible reaction.

$$\text{sucrose} + \text{water} \underset{\textbf{2}}{\overset{\text{sucrase}}{\overset{\textbf{1}}{\rightleftharpoons}}} \text{glucose} + \text{fructose}$$

In this reaction, on which molecule or molecules do active sites occur and what types of reaction occur at **1** and **2**?

	active site present on	reaction at **1**	reaction at **2**
A	glucose and fructose	condensation	hydrolysis
B	glucose and fructose	hydrolysis	condensation
C	sucrase only	condensation	hydrolysis
D	sucrase only	hydrolysis	condensation

13 The diagram shows part of a macromolecule in the form of triple helices, lying side by side with covalent cross links between them.



What is the name of the molecule?

A cellulose

B collagen

C glycogen

D triglyceride

14 Solutions of four food substances are tested for sugars. The table shows the colours of the solutions after testing.

Which food is a non-reducing sugar?

	heated with Benedict's solution	boiled with hydrochloric acid, neutralised, then heated with Benedict's solution
A	blue	blue
B	blue	orange
C	orange	blue
D	orange	orange

15 The enzyme lysozyme secreted from tear glands forms deposits on contact lenses.

Which ingredient would be effective in a contact lens cleaner for removing these deposits?

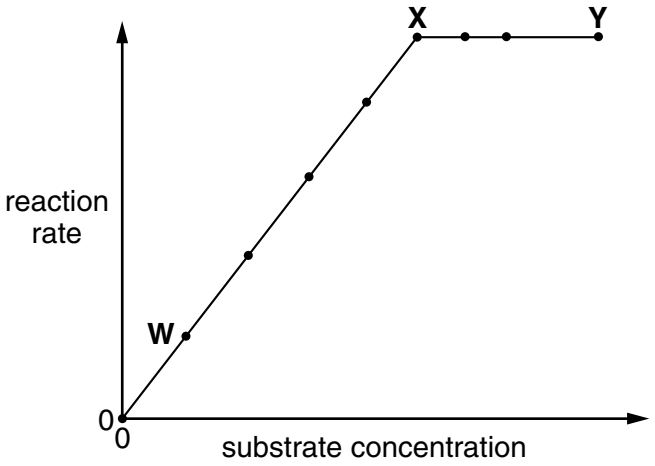
A antibodies

B lysosomes

C pH buffers

D proteases

16 The graph shows the effect of substrate concentration on the rate of an enzyme-controlled reaction. The enzyme concentration is constant.



Which statement about the graph is correct?

A Between **W** and **X**, the number of enzyme molecules is limiting.

B Between **X** and **Y**, the number of enzyme molecules is limiting.

C Between **X** and **Y**, the number of substrate molecules is limiting.

D Between **X** and **Y**, the product concentration remains the same.

17 Immediately after which stage in mitosis in an animal cell does the cytoplasm start to divide?

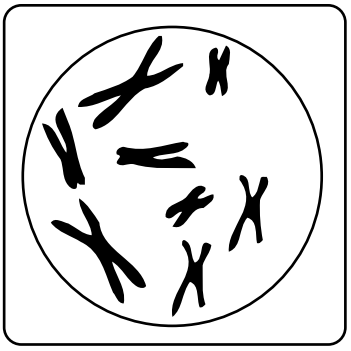
A anaphase

B metaphase

C prophase

D telophase

18 The diagram shows a diploid cell during mitosis.



Which stage of mitosis is shown?

A anaphase

B metaphase

C prophase

D telophase

19 Which structural feature of the DNA molecule varies?

A the arrangement of the sugar-phosphate groups

B the double helical arrangement

C the order of bases on a single nucleotide chain

D the pairing of purines with pyrimidines

20 Three polypeptides were made using synthetic mRNA molecules as shown.

synthetic mRNA used	polypeptide produced
UUUUUUUUUUUU	phenylalanine-phenylalanine-phenylalanine-phenylalanine
AAAAAAAAAAAA	lysine-lysine-lysine-lysine
UUUAAAUUUAAA	phenylalanine-lysine-phenylalanine-lysine

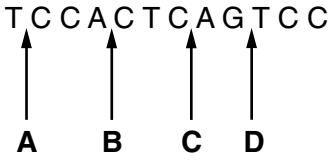
What are the DNA codes for the amino acids phenylalanine and lysine?

	phenylalanine	lysine
A	AAA	TTT
B	AAA	UUU
C	TTT	GGG
D	UUU	AAA

[Turn over

21 The RNA triplet UAG acts as a stop codon, terminating the synthesis of a polypeptide. The diagram shows a strand of DNA which codes for four amino acids.

Where would a mutation, introducing a thymine nucleotide, result in the termination of transcription?



22 Which enzyme rejoins sections of DNA in genetic engineering?

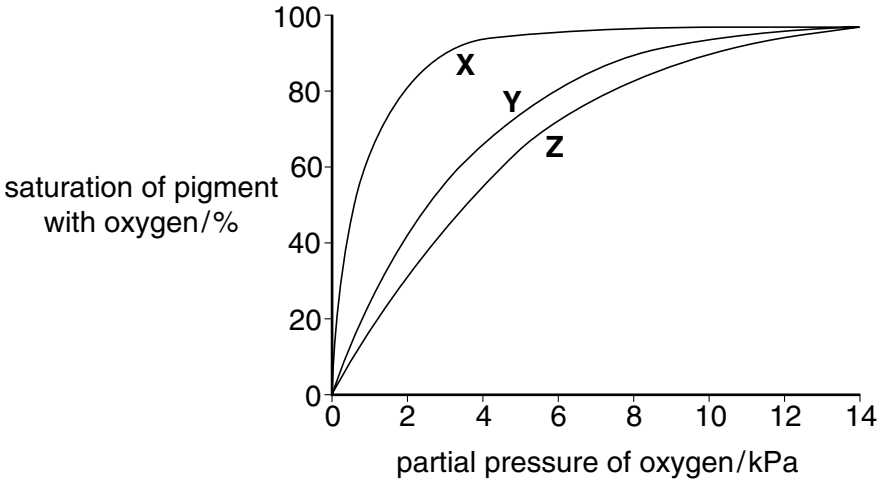
A DNA ligase

B DNA polymerase

C restriction enzyme

D reverse transcriptase

23 The graph shows the dissociation curves for three respiratory pigments.



Myoglobin, found in muscle, only releases oxygen when partial pressures are very low. Fetal haemoglobin has a higher affinity for oxygen than adult haemoglobin.

What are **X**, **Y** and **Z**?

	adult haemoglobin	fetal haemoglobin	myoglobin
A	**X**	**Y**	**Z**
B	**Y**	**Z**	**X**
C	**Y**	**X**	**Z**
D	**Z**	**Y**	**X**

24 A water potential gradient causes water to move through xylem.

Which process is mainly responsible for this water potential gradient?

A active transport

B osmosis

C root pressure

D transpiration

25 Which combination of features is characteristic of phloem sieve tubes?

	solute concentration of the cell content	lignification of the cell wall
A	high	absent
B	high	present
C	low	absent
D	low	present

26 Which event occurs during contraction of the left ventricle?

A The bicuspid valve opens.

B The semilunar valve in the aorta closes.

C The pressure in the left atrium becomes greater than the pressure in the left ventricle.

D The pressure in the left ventricle becomes greater than the pressure in the aorta.

27 Which condition is **not** a result of malnutrition?

A cholera

B night blindness

C obesity

D rickets

28 The EAR (estimated average requirement) for vitamin C is 25 mg per day.

What conclusion can be drawn from this information?

A 5% of the population require more than 25 mg of vitamin C per day.

B 25% of the population require more than 25 mg of vitamin C per day.

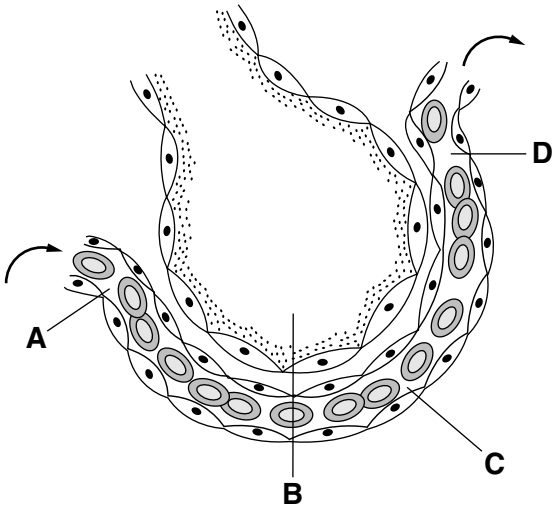
C 50% of the population require more than 25 mg of vitamin C per day.

D 95% of the population require more than 25 mg of vitamin C per day.

[Turn over

29 The diagram shows an alveolus and associated blood capillary. The arrows indicate the direction of blood flow.

Which region has the lowest oxygen concentration?



30 What are the characteristics of a bronchiole?

	diameter	cilia	collagen and elastic fibres	site of gas exchange
A	0.5 mm	no	no	no
B	12 mm	yes	yes	no
C	0.25 mm	yes	no	yes
D	1 mm	yes	yes	no

31 What will directly stimulate the sinoatrial node (SAN), causing an increase in heart rate?

A high blood carbon dioxide concentration

B low blood oxygen concentration

C low blood pressure

D release of adrenaline

32 Which characteristics indicate physical fitness?

	effect of exercise on pulse rate	return of pulse rate to normal
A	rapid rise	rapid
B	rapid rise	slow
C	slow rise	rapid
D	slow rise	slow

33 What is the main effect of heroin on the body?

A It affects metabolic processes in the liver.

B It causes over reaction in muscles.

C It mimics natural neurotransmitters.

D It stimulates reflex pathways through the spinal cord.

34 What are the pathogens responsible for cholera, malaria and TB?

	cholera	malaria	TB
A	bacterium	bacterium	virus
B	bacterium	eukaryotic parasite	bacterium
C	eukaryotic parasite	virus	bacterium
D	virus	eukaryotic parasite	virus

35 For which disease is vaccination the most successful method of prevention?

A cholera

B HIV / AIDS

C TB

D malaria

36 Immune responses may be specific or non-specific.

Which response is a specific immune response?

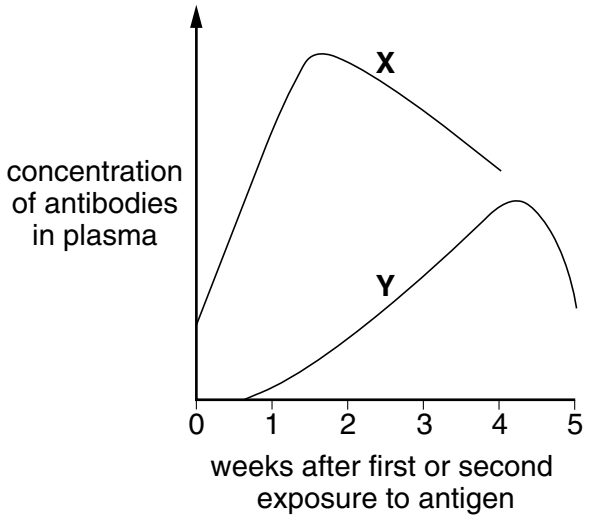
A inflammation

B phagocytosis

C production of antibodies

D release of histamine

37 The graph shows the primary and secondary responses of the immune system to antigens.



What are responses **X** and **Y**?

	X	Y
A	primary response	secondary response caused by cloning of B cells formed during the primary response
B	primary response	secondary response caused by cloning of T cells formed during the primary response
C	secondary response caused by cloning of B cells formed during the primary response	primary response
D	secondary response caused by cloning of T cells formed during the primary response	primary response

38 How does denitrification occur in the soil?

A active uptake of nitrate ions by plant roots

B bacterial reduction of nitrate ions to nitrogen gas

C drainage of manured fields

D leaching of nitrate ions

39 What name is given to all the organisms of the same species living in an area?

A community

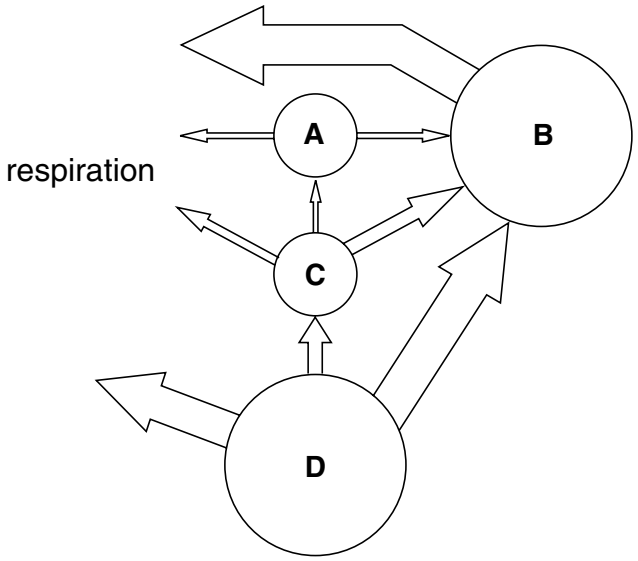
B ecosystem

C niche

D population

40 The diagram shows the energy flow model for all the species in a forest. The width of the arrows is proportional to the amount of energy transferred.

Which circle represents the decomposers?



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