UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Advanced Subsidiary Level

BIOLOGY **9700/01**

Paper 1 Multiple Choice

May/June 2004

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 **13** printed pages and **3** blank pages.

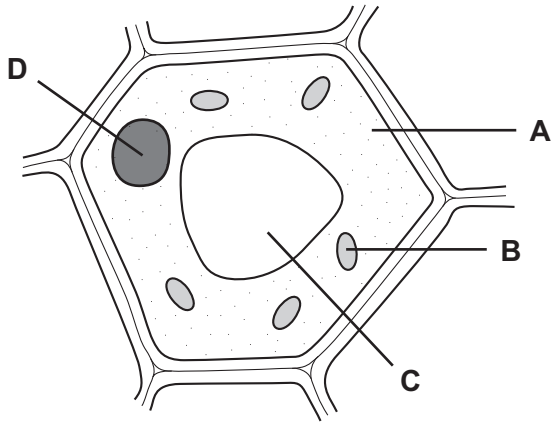
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1 What is the order of size of cell components?

	largest → smallest			
A	mitochondria	ribosomes	starch grains	nuclei
B	nuclei	chloroplasts	mitochondria	ribosomes
C	ribosomes	mitochondria	chloroplasts	starch grains
D	starch grains	mitochondria	chloroplasts	ribosomes

2 The diagram shows the structure of a typical plant cell.

Which cell component is also present in prokaryotes?



3 What is responsible for the high resolution of the electron microscope?

A high magnification

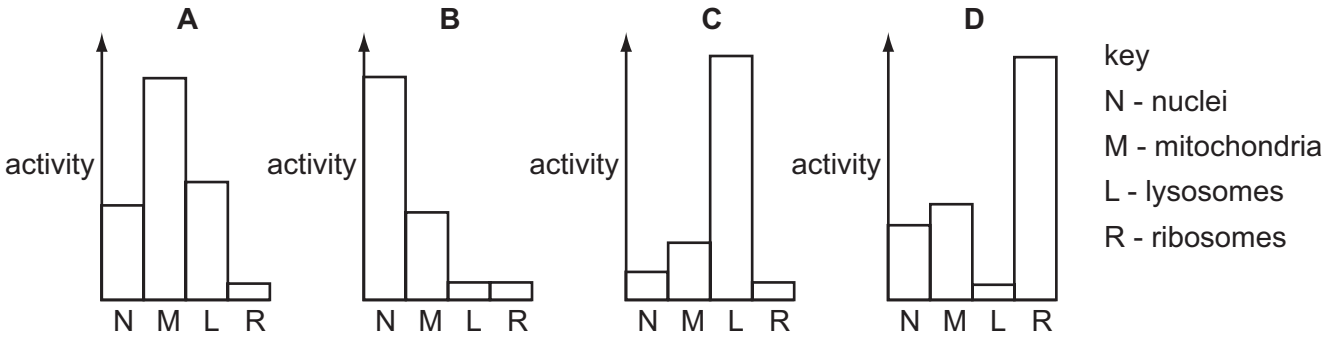
B short wavelength of the electron beam

C use of heavy metal stains

D very thin sections

4 A piece of mammalian tissue was homogenised and subjected to differential centrifugation to yield four subcellular fractions. The activity within each fraction, of four different types of enzyme, **A**, **B**, **C** and **D**, was investigated.

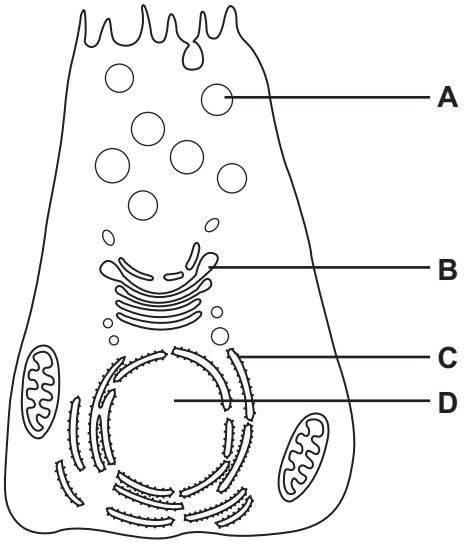
Which bar chart shows the results of investigating hydrolytic enzyme activity?



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5 Radioactively-labelled amino acids are introduced into a cell.

In which cell structure will the radioactivity first become concentrated?



6 What is the function of nucleoli?

A the formation and breakdown of the nuclear envelope

B the formation of centromeres

C the formation of ribosomes

D the organisation of the spindle during nuclear division

7 What is the theoretical number of chemically different dipeptides that may be assembled from 12 different types of amino acids?

A 24 **B** 72 **C** 144 **D** 400

8 What are the features of triglycerides?

	polar	less dense than water	higher energy value than carbohydrates	lower proportion of hydrogen than in carbohydrates
A	✓	✓	✗	✗
B	✓	✗	✓	✓
C	✗	✓	✓	✗
D	✗	✗	✗	✓

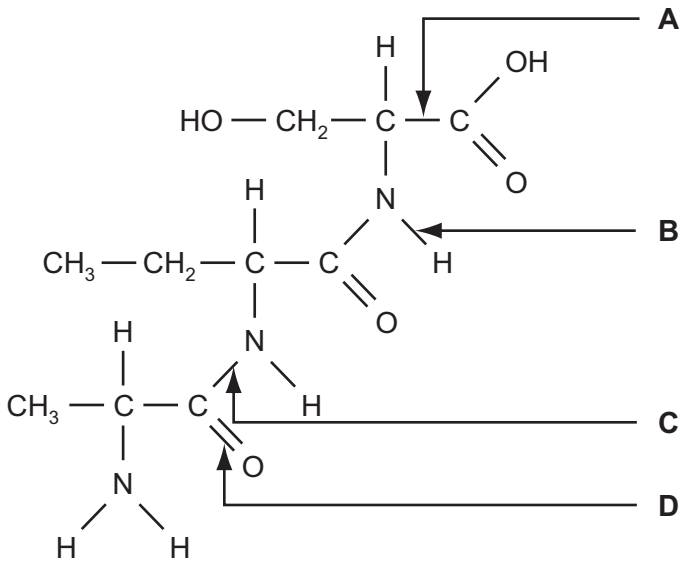
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9 Which polysaccharides are branched and which are unbranched?

	branched	unbranched
A	amylose	glycogen
B	amylopectin	cellulose
C	cellulose	amylose
D	glycogen	amylopectin

10 The diagram shows a molecule.

Which arrow labels a peptide bond?



11 Which bonds are the last to break when an enzyme is heated?

A disulphide

B hydrogen

C hydrophobic interactions

D ionic

12 How many haem groups are there in one molecule of human haemoglobin?

A 1

B 2

C 3

D 4

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13 Which substance contains carbon, hydrogen, oxygen and nitrogen?

A collagen

B glycogen

C amylopectin

D triglyceride

14 During the development of the AIDS virus, a long polypeptide is hydrolysed by a protease enzyme, producing several smaller peptides. This viral enzyme is the target of new anti-AIDS drugs.

Which feature is essential for the success of these drugs?

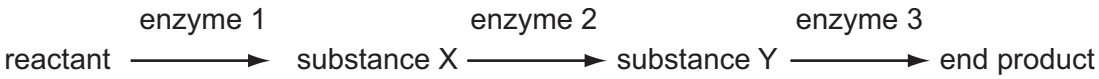
A a complex structure that inhibits many types of viral enzyme

B a molecule containing a heavy metal atom that is a non-competitive inhibitor of enzymes

C a protein that can act as a competitive inhibitor of protease enzymes

D a specific structure that inhibits only viral protease

15 A metabolic pathway is



What would be the effect of adding a small amount of a non-competitive inhibitor of enzyme 2?

A Enzyme 2 would be partially denatured.

B Substance X would increase in concentration.

C Substance Y would no longer be formed.

D The initial reactant would no longer be metabolised.

16 Which process is the movement of molecules that are too large to diffuse in through a cell surface membrane?

A active transport

B endocytosis

C facilitated diffusion

D osmosis

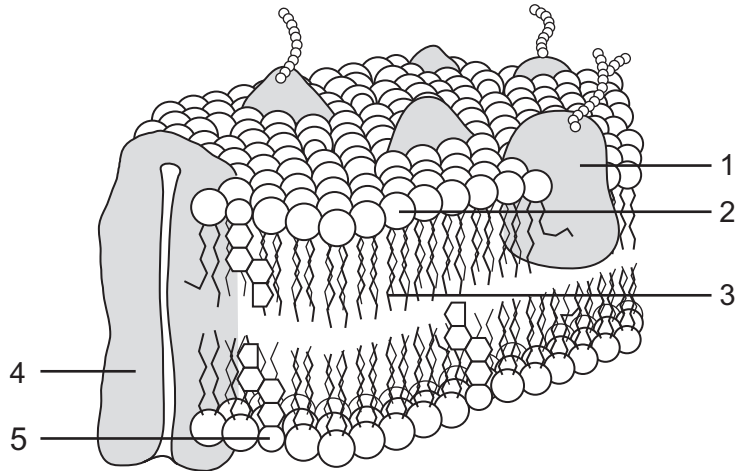
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17 A plant cell is placed in a solution with a less negative (higher) water potential than the cell contents.

Which change occurs in the cell and what causes the change?

	change	cause
A	cell becomes more flaccid	solution diffuses out of the cell
B	cell becomes more flaccid	water diffuses out of the cell
C	cell becomes more turgid	solution diffuses into cell
D	cell becomes more turgid	water diffuses into cell

18 The diagram shows part of the cell surface membrane.



Which components help to maintain the fluidity of the membrane?

A 1 and 3

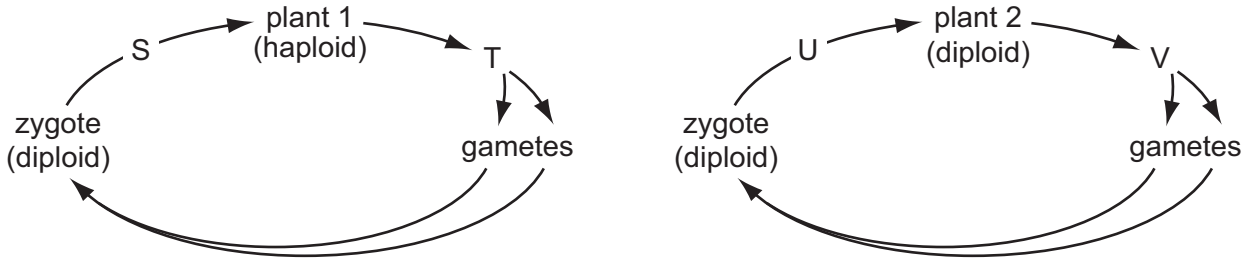
B 1 and 4

C 2 and 4

D 3 and 5

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19 The diagram shows the life-cycles of two types of simple plant.



Where will reduction divisions occur in the life cycles?

A at S and U

B at S and V

C at T and U

D at T and V

20 Colchicine is a chemical that stops chromatids from separating during mitosis.

Which phase will the cell reach and then stop dividing?

A anaphase

B interphase

C metaphase

D telophase

21 Which statement describes events during interphase of mitosis?

A Chromosomes start to coil, becoming shorter and fatter.

B Chromosomes line up on the equator of the spindle.

C Chromatids are pulled apart by spindle fibres.

D Chromosomes are replicated ready for the next division.

22 Which statement about the strands of a newly replicated DNA molecule is correct?

A Both strands are made up of newly assembled nucleotides.

B Both strands contain some nucleotides from the original molecule.

C One strand is new and the other is part of the original molecule.

D The sugar-phosphate chains are conserved and new bases are inserted between them.

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23 A polypeptide molecule contains the amino acid sequence, glycine – leucine – lysine – valine.

The table shows the DNA codes for these amino acids.

glycine	leucine	lysine	valine
CCC	GAA	TTT	CAA

Transfer RNA molecules with which anticodons are needed for the synthesis of this polypeptide?

A CCC GAA TTT CAA

B CCC GAA UUU CAA

C GGG CUU AAA GUU

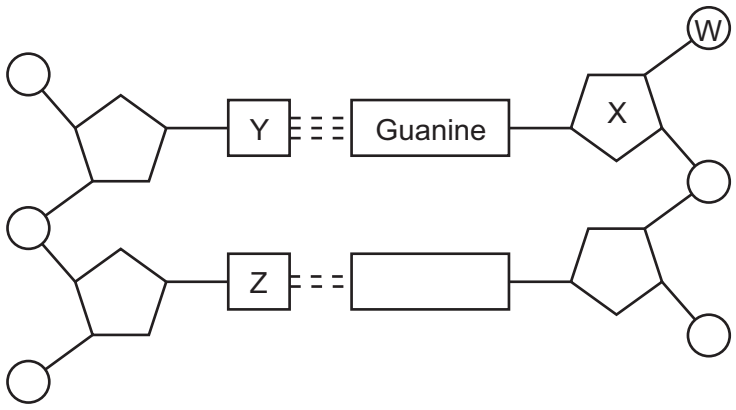
D GGG CUU UUU GUU

24 A protein contains all the common amino acids.

What would be the hypothetical minimum number of types of tRNA molecules needed for the synthesis of this protein?

A 3 **B** 4 **C** 20 **D** 64

25 The diagram shows part of a DNA molecule.



Which letters indicate cytosine, deoxyribose, phosphate and thymine?

	cytosine	deoxyribose	phosphate	thymine
A	W	X	Y	Z
B	Y	X	W	Z
C	Z	W	X	Y
D	Y	Z	X	W

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26 Fish oils are thought to have beneficial effects on the conduction of electrical excitation through the ventricles of the heart.

What could the fish oils influence?

A atrioventricular node

B Purkyne tisssue

C sinoatrial node

D vagus nerve

27 Why is the mass flow of sap through sieve elements described as an active process?

A Phloem sap is able to flow in sieve elements against the pull of gravity.

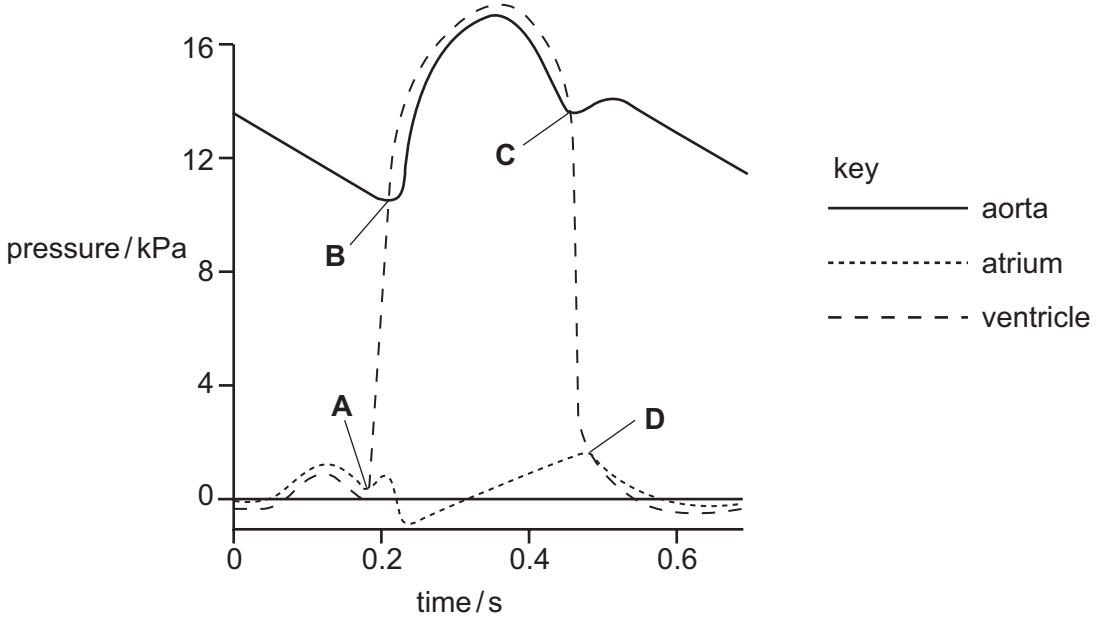
B Sucrose is loaded into a sieve element against a concentration gradient.

C Sucrose passes out of the phloem into regions where cells are dividing.

D Water follows sucrose into a sieve element down a water potential gradient.

28 The diagram gives information about blood pressure in various parts of the circulatory system during the cardiac cycle.

At which point does the semilunar valve of the aorta close?



29 What is systolic blood pressure?

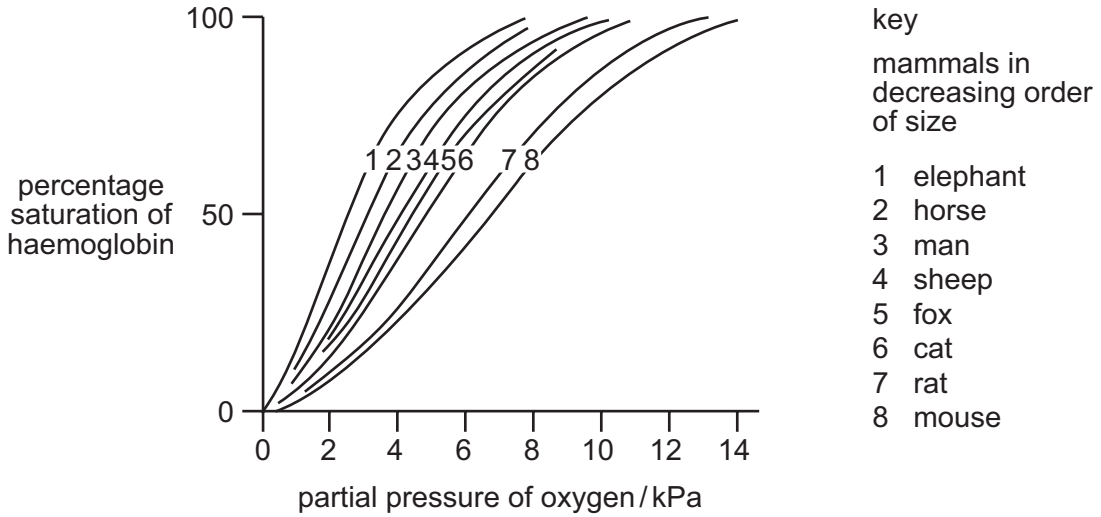
A the maximum blood pressure in the arteries

B the blood pressure in the left ventricle at the end of a contraction

C the maximum blood pressure in the right ventricle

D the blood pressure in the arteries when the heart is relaxing

30 The graph shows the oxygen dissociation curves of haemoglobin for eight mammals.



Which conclusion can be drawn from the graph?

A The activity of the mammal is directly proportional to the ability of its haemoglobin to release oxygen.

B The haemoglobin of larger mammals will release oxygen at a higher pO_2 than that of smaller mammals.

C The haemoglobin of smaller mammals will release oxygen at a higher pO_2 than that of larger mammals.

D The size of the mammal is directly proportional to the ability of its haemoglobin to release oxygen.

31 The table describes the walls of three blood vessels.

vessel 1	vessel 2	vessel 3
thick layer of elastic fibres and smooth muscle	no elastic fibres or smooth muscle	thin layer of smooth muscle with few elastic fibres

What are vessels 1, 2 and 3?

	artery	capillary	vein
A	1	2	3
B	2	3	1
C	3	1	2
D	3	2	1

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32 An oxygen molecule diffuses directly from the air in an alveolus to haemoglobin in a red blood cell.

What is the minimum number of cell surface membranes through which this molecule must pass?

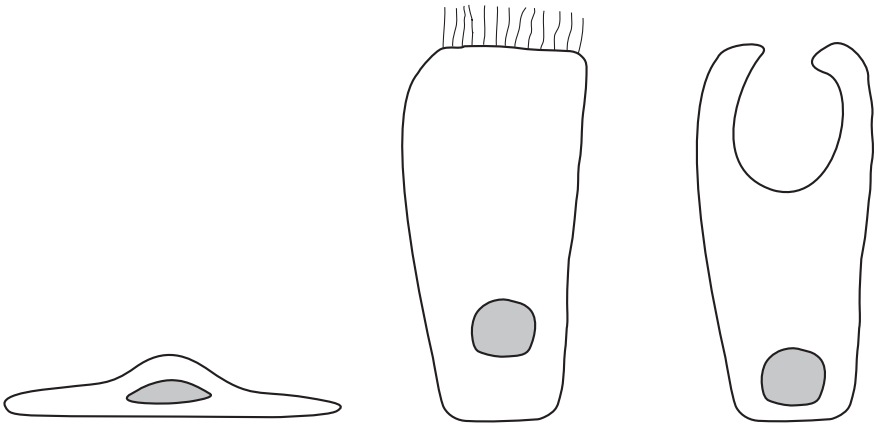
A 2

B 3

C 4

D 5

33 The diagram shows three types of cells.



X **Y** **Z**

Which cells are found in alveoli and in bronchi?

	alveoli	bronchi
A	**X**	**Y** and **Z**
B	**X** and **Y**	**Z**
C	**Y** and **Z**	**X**
D	**Z**	**X** and **Y**

34 How does nicotine in cigarette smoke increase the risk of cardiac disease?

A by binding with haemoglobin

B by constricting blood vessels

C by inhibiting nerve transmission

D by stimulating the pacemaker

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35 What are the causative agents of cholera, malaria and TB?

	cholera	malaria	TB
A	bacterium	insect	virus
B	bacterium	protozoan	bacterium
C	virus	insect	virus
D	virus	protozoan	bacterium

36 A person's blood group is determined by antigens present on the red blood cells. People have antibodies in their plasma even if they have never received a blood transfusion. It is these antibodies in the plasma of the person who receives the blood that make some blood transfusions unsafe.

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

People with which blood groups can safely receive a transfusion of group A blood?

A A and B

B A and AB

C A, B and AB

D A and O

37 What is the immune system's first line of defence against invading microorganisms?

A ingestion of the microorganisms by B-lymphocytes

B ingestion of the microorganisms by phagocytes

C production of antibodies

D production of antigens

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38 Which group could be a single population?

A all the animals and plants on an isolated island

B all the birds counted in one day in a garden

C all the bacteria in a colony of *Bacillus subtilis*

D all the insects occupying three hectares of farmland

39 What is the role of decomposers in the nitrogen cycle?

A They convert proteins to ammonium compounds.

B They fix atmospheric nitrogen.

C They oxidise ammonium compounds to nitrites.

D They oxidise nitrites to nitrates.

40 Within an ecosystem, the top consumers in a food chain are few in number.

Which statement explains this?

A Energy losses occur at each trophic level.

B Energy losses occur within the consumers' digestive systems.

C Top consumers have a low reproductive rate.

D Top consumers are large in size.

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