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

BIOLOGY **9700/01**

Paper 1 Multiple Choice

October/November 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.

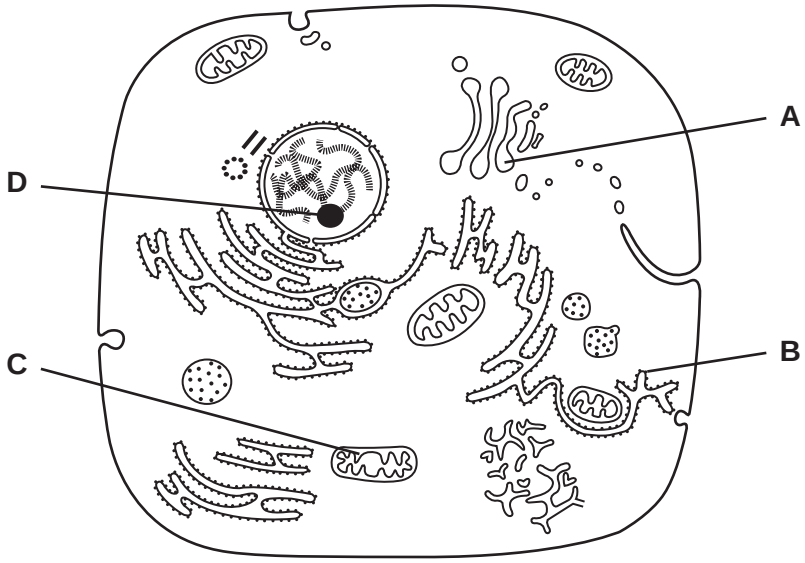
Read the instructions on the answer sheet very carefully.

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.

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1 The diagram shows the ultrastructure of a eukaryotic cell.

Which organelle does **not** contain nucleic acid?



2 Which cell structure can be seen only with an electron microscope?

A cell surface membrane

B cell wall

C chromosome

D nucleolus

3 When **not** involved in protein synthesis, ribosomes exist as separate subunits.

What do these subunits consist of?

A mRNA and lipid

B mRNA and tRNA

C rRNA and lipid

D rRNA and protein

4 Which components are present in prokaryotic cells?

A chloroplasts, DNA, nuclear envelope

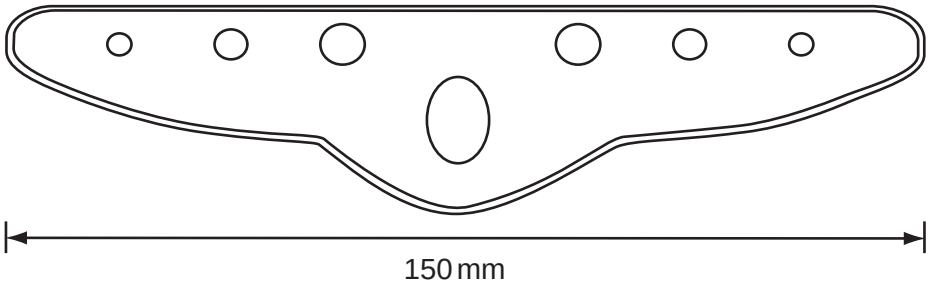
B chromosomes, mitochondria, nuclear envelope

C cytoplasm, DNA, mitochondria

D cytoplasm, DNA, ribosomes

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5 The diagram is a plan of a transverse section through a leaf, drawn using a x5 eyepiece and a x8 objective lens of a microscope.



The actual distance across the leaf section is 7.5 mm. What is the magnification of the diagram?

A x5 **B** x8 **C** x20 **D** x40

6 What describes the features of an electron microscope and its use?

	maximum magnification	resolution / nm	specimen used
A	x 2 500	250	dead
B	x 25 000	0.5	living
C	x 250 000	0.5	dead
D	x 500 000	250	living

7 Food tests are carried out on four solutions.

Which solution contains only sucrose and protein?

solution	Benedict's test	acid hydrolysis then Benedict's test	iodine in potassium iodide solution	biuret test
A	✗	✓	✗	✓
B	✓	✓	✗	✓
C	✗	✓	✓	✗
D	✓	✗	✓	✗

key

✓ = positive result

✗ = negative result

8 During the production of apple juice, enzymes are used to break down the components of the cell walls.

Which carbohydrate will be produced by this hydrolysis?

A amylose

B cellulose

C glucose

D glycogen

9 What are the features of glycogen?

	contains nitrogen	branched molecule	structural role in cell
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

10 What is the name of the bond joining glycerol and a fatty acid in the formation of a monoglyceride?

A ester

B glycosidic

C hydrogen

D peptide

11 Certain insects are able to stand on the surface of ponds.

Which property of water allows them to do this?

A adhesion with other molecules

B cohesion between water molecules

C low viscosity

D maximum density at 4 °C

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12 Which term describes the type of bonding responsible for stabilising the secondary structure of a protein?

A disulphide

B hydrogen

C hydrophobic

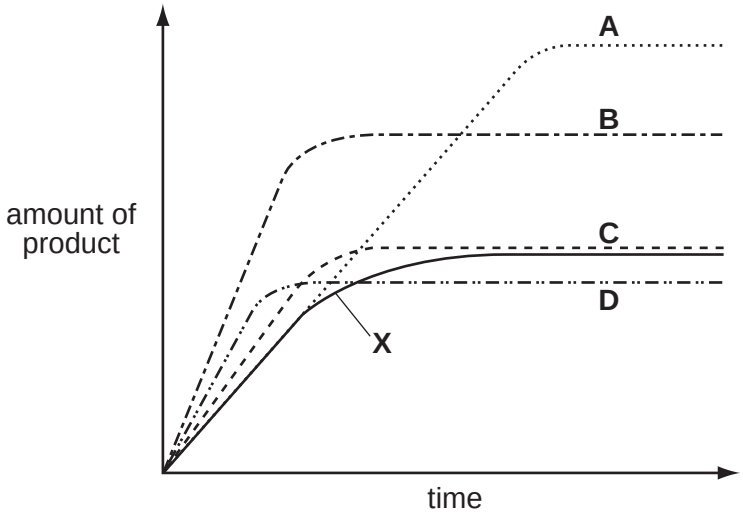
D ionic

13 How many different polypeptides, each consisting of *r* amino acids, can be made if the number of different amino acids available is *n*?

A n^r **B** r^n **C** $n \times r$ **D** $\frac{n}{r}$

14 The curve **X** shows the activity of an enzyme at 20 °C. Curves **A** to **D** show the effect of different conditions on the activity of the enzyme.

Which curve shows the effect of increasing the temperature by 10 °C and adding extra substrate?



15 What is the effect of increasing substrate concentration on the degree of inhibition of an enzyme-controlled reaction?

	competitive inhibition	non-competitive inhibition
A	decreased	increased
B	decreased	no change
C	increased	decreased
D	no change	increased

16 Which part of a phospholipid molecule makes up most of the thickness of a cell surface membrane?

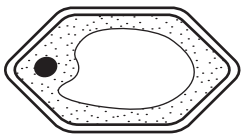
A glycerol

B hydrocarbon chains

C hydrophilic head

D phosphate group

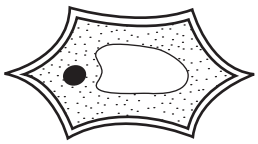
17 The diagram shows a plant cell.



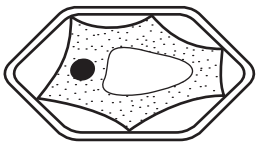
The plant cell is put into a solution with a water potential less negative (higher) than the cell contents.

What will happen to the appearance of the cell?

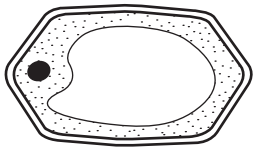
A



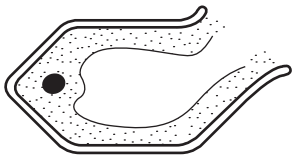
B



C



D



18 Which structures are present in large numbers at sites of active transport?

A Golgi bodies

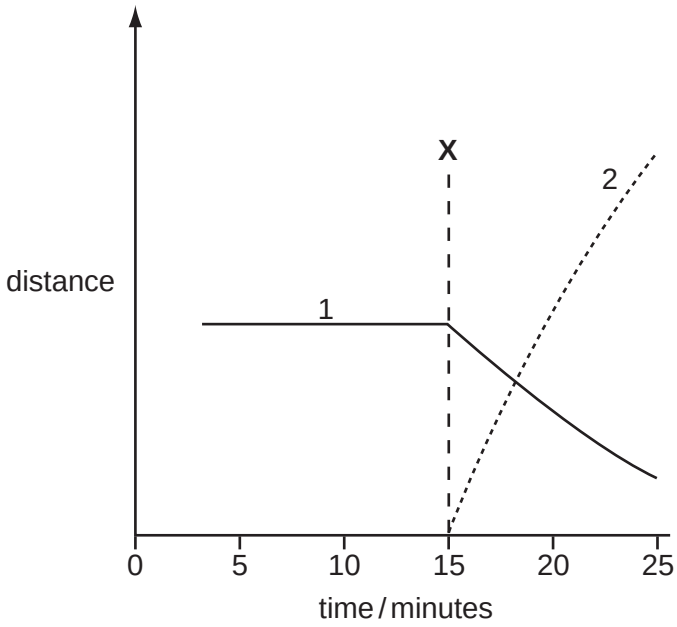
B lysosomes

C mitochondria

D rough endoplasmic reticulum

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19 The graph shows measurements taken during one mitotic cell cycle.



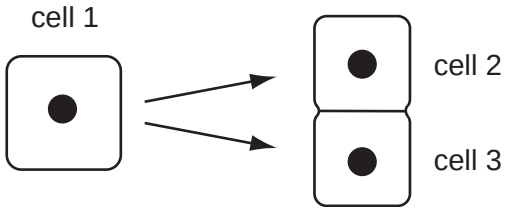
Which stage of mitosis begins at **X** and which measurements are shown by curves 1 and 2?

	stage beginning at **X**	distance between centromeres of chromosomes and poles of spindle	distance between centromeres of sister chromatids
A	anaphase	1	2
B	anaphase	2	1
C	metaphase	1	2
D	metaphase	2	1

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20 Human cells contain 46 chromosomes.

The diagram shows a human cell in prophase of mitosis (cell 1) and the daughter cells just after telophase (cells 2 and 3).



How many DNA molecules are there in the nucleus of cell 1 and cell 2?

	cell 1	cell 2
A	46	23
B	46	46
C	92	23
D	92	46

21 Which process occurs during prophase of mitosis in an animal cell?

A division of centromeres

B formation of chromosomes

C replication of DNA

D separation of centrioles

22 In the DNA sequence for sickle cell anaemia, adenine replaces thymine in a CTT triplet, forming the triplet CAT. During synthesis of the sickle cell haemoglobin molecule, the amino acid valine is incorporated instead of glutamic acid.

What is the anticodon in the transfer RNA molecule carrying this valine?

A CAT **B** CAU **C** GTA **D** GUA

23 In transcription, what is transcribed and what is the product?

	transcribed	product
A	DNA	mRNA
B	DNA	polypeptide
C	mRNA	DNA
D	mRNA	polypeptide

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24 The table shows mRNA triplets and their corresponding amino acids.

mRNA triplet	GCA	GCG	GAA	GAG	AAA	AAG
amino acid	ala	ala	glu	glu	lys	lys

A tripeptide is glu-lys-ala.

Which sequence of bases in DNA could code for this tripeptide?

A CTCCGTTTT

B CTTTTCCGT

C TTCCGTCTT

D TTTCTCCGC

25 Analysis of DNA produced the following ratios of nitrogenous bases.

source of DNA	ratio of purines to pyrimidines
bean seeds	0.99
cow heart	1.01
human liver	1.02
rat bone marrow	1.00

Which statement explains the difference in the ratios?

A Animal DNA contains more purines than pyrimidines.

B Different parts of organisms contain different proportions of purines and pyrimidines.

C DNA contains thymine instead of uracil.

D There are variations in the accuracy of analytical techniques.

26 Which structures are found in both arteries and capillaries?

A collagen fibres

B elastic fibres

C endothelial cells

D smooth muscle cells

27 Which function can be carried out by a mature red blood cell?

A active transport

B cell division

C phagocytosis

D protein synthesis

28 What is the function of the Purkyne (Purkinje) tissue in the mammalian heart?

A to conduct a wave of electrical excitation over the atria

B to conduct a wave of electrical excitation over the ventricles

C to reduce the spontaneous contraction rate of the heart

D to separate oxygenated blood from deoxygenated blood

29 A region of a stem of a plant is heated to kill the cells in the living vascular tissues.

How will this treatment affect the transport between roots and leaves via xylem and phloem?

	xylem	phloem
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

✓ transport continues
✗ transport stops

30 Some soil-borne fungi cause wilting in crop plants by growing within the xylem vessels.

Which process will be directly affected by these fungi?

A conduction in the apoplast

B development of root pressure

C stomatal movement

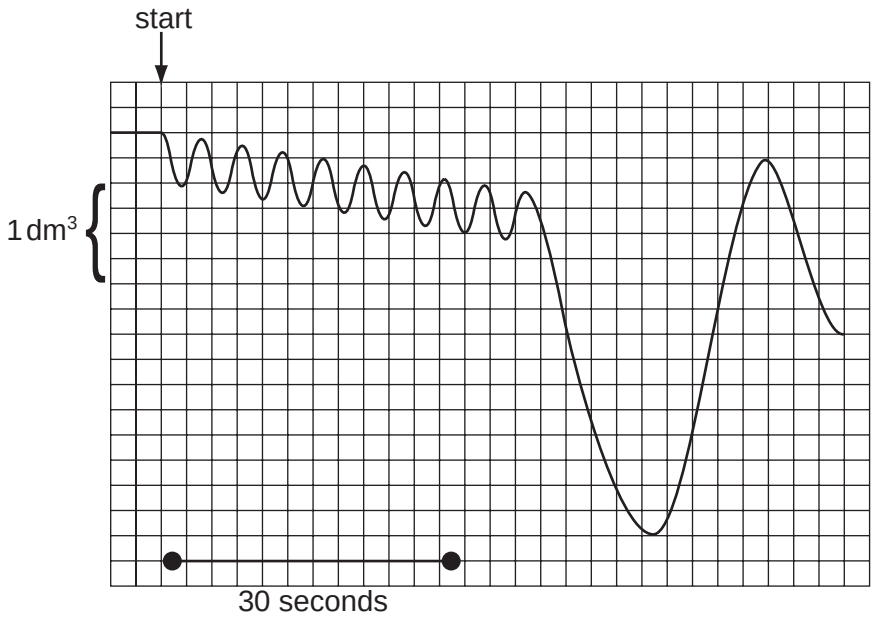
D uptake of water by root hairs

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31 Which tissues are present in a bronchus?

	cartilage	ciliated epithelium	smooth muscle
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

32 The diagram shows a record of a person's breathing. The person breathed normally at the start, breathed in as deeply as possible and then breathed out as much as possible.



What is a valid conclusion from the graph?

A The person was carrying out strenuous exercise for the first 30 seconds.

B The tidal volume was 500 cm^3, the vital capacity was 3 750 cm^3.

C The person breathed in 1 000 cm^3 during the first 50 seconds.

D The rate of breathing for the first 30 seconds was 15 breaths per minute.

33 A smoker secretes excess mucus from the epithelial lining of the respiratory system.

Which disease is likely to develop?

A asthma

B bronchitis

C emphysema

D lung cancer

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34 What are the causative agent and method of infection for cholera?

	causative agent	method of infection
A	bacterium	direct contact
B	bacterium	food and water
C	virus	inhalation
D	virus	faeces

35 Which description is correct for B-lymphocytes?

	made from bone marrow stem cells	processed in the thymus	release antibodies
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✗	✓

36 An antiserum to a snake toxin can be obtained by injecting the toxin into a horse. The antiserum is made from plasma taken from the horse a few weeks later. The antiserum is used to treat a person who has been bitten by the same species of snake.

What does the person's treatment bring about?

A artificial active immunity

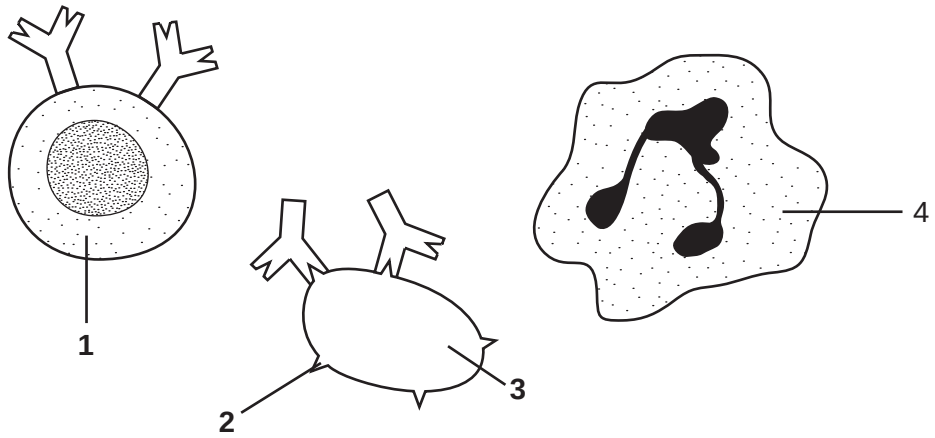
B artificial passive immunity

C natural active immunity

D natural passive immunity

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37 The diagram shows different elements concerned with the immune response in humans.



What are the parts numbered **1** to **4**?

	1	2	3	4
A	lymphocyte	antigen	pathogen	phagocyte
B	phagocyte	antibody	pathogen	lymphocyte
C	phagocyte	antibody	lymphocyte	pathogen
D	pathogen	antigen	lymphocyte	phagocyte

38 A square metre of grassland receives about 1 047 000 kJ of solar light energy each year.

The table shows what happens to this energy.

used in evaporation of water	523 500 kJ
transmitted to the ground	335 000 kJ
reflected by the leaves	165 000 kJ
used for growth	21 500 kJ
used for other life processes	1 500 kJ
respiratory heat losses	500 kJ

How much energy is used by the grass in photosynthesis?

A 2000 kJ **B** 19 500 kJ **C** 21 500 kJ **D** 23 500 kJ

39 Why does the application of nitrate fertilisers cause an increase in crop production?

A Green plants manufacture more protein.

B More nitrogen is fixed in leguminous plants.

C The fertiliser adds energy to the ecosystem.

D The number of denitrifying bacteria decreases.

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40 What name is given to all the organisms of different species living in an area?

A community

B ecosystem

C niche

D population

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