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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 2005

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.

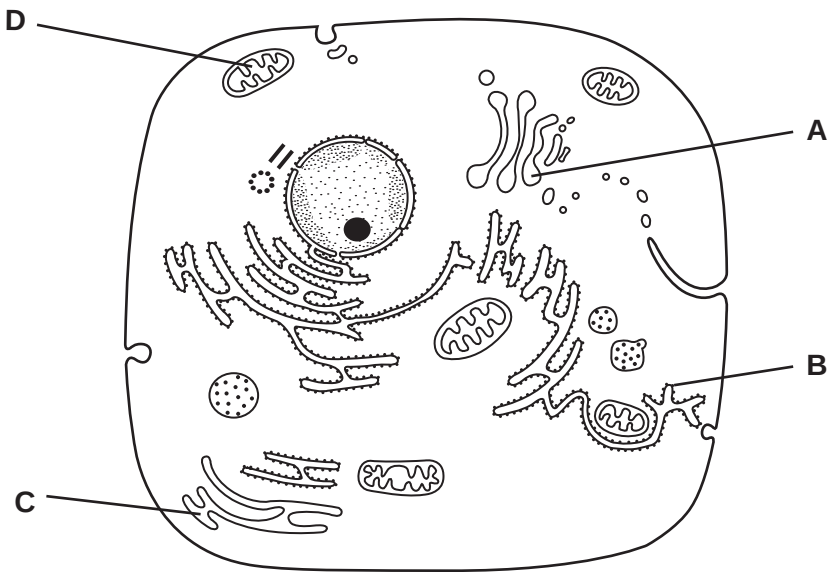
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.

This document consists of **16** printed pages.

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1 The diagram shows the ultrastructure of a typical animal cell.

Which structure synthesises and transports lipids and steroids?



2 Which structures are found in plant cells but not in animal cells?

A centrioles

B mitochondria

C nucleoli

D plasmodesmata

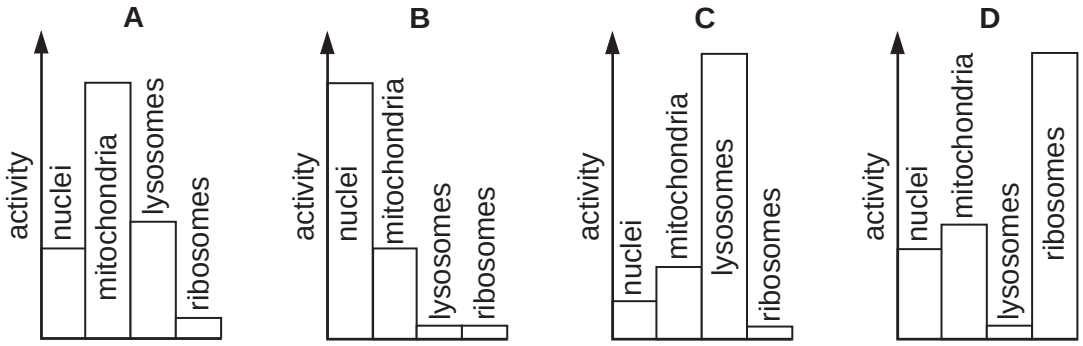
3 What is the correct order of size of organelles?

	largest →			smallest
A	mitochondrion	nucleus	lysosome	ribosome
B	mitochondrion	nucleus	ribosome	lysosome
C	nucleus	mitochondrion	lysosome	ribosome
D	nucleus	mitochondrion	ribosome	lysosome

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4 A piece of mammalian tissue was homogenised and centrifuged. The biochemical activity of four subcellular fractions was investigated.

Which diagram indicates the fraction with maximum synthesis of messenger RNA?



5 The action of which cell depends on large numbers of lysosomes?

A ciliated epithelial cell

B goblet cell

C lymphocyte

D phagocyte

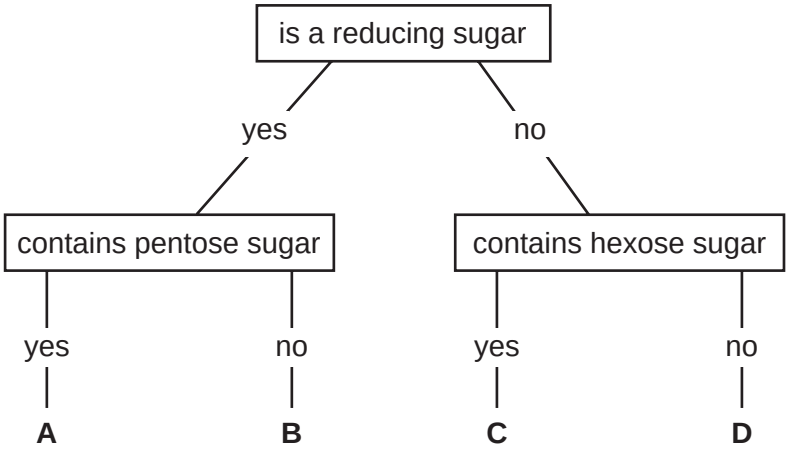
6 An amino acid enters a cell and is used to synthesise an enzyme secreted by the cell.

What is the sequence of cell components involved in this pathway?

	first →			last
A	endoplasmic reticulum	Golgi apparatus	ribosome	exocytotic vesicle
B	endoplasmic reticulum	ribosome	Golgi apparatus	cell surface membrane
C	ribosome	Golgi apparatus	endoplasmic reticulum	cell surface membrane
D	ribosome	endoplasmic reticulum	Golgi apparatus	exocytotic vesicle

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7 Which molecule in the key is sucrose?



8 Bonds are formed by condensation in cellulose, sucrose and haemoglobin.

What are the names of these bonds?

	cellulose	sucrose	haemoglobin
A	glycosidic	ester	ester
B	glycosidic	glycosidic	peptide
C	peptide	glycosidic	ester
D	peptide	ester	peptide

9 What will break an ionic bond between amino acids?

A condensation

B hydrolysis

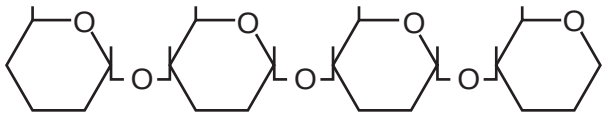
C low temperature

D pH change

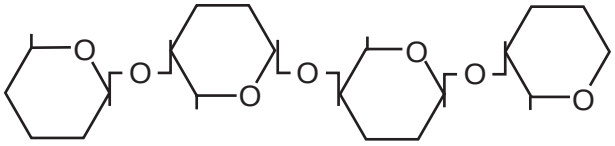
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10 Diagrams 1, 2 and 3 show the structural formulae of three polysaccharides.

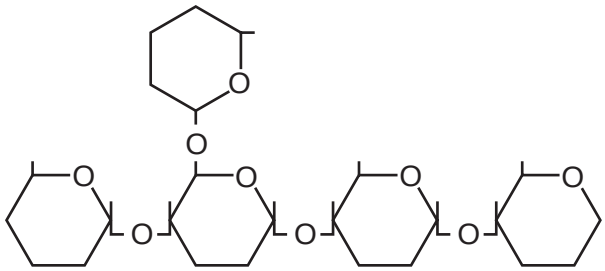
1



2



3



What are the names of these polysaccharides?

	1	2	3
A	amylose	cellulose	glycogen
B	amylose	glycogen	cellulose
C	cellulose	glycogen	amylose
D	glycogen	amylose	cellulose

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[Turn over

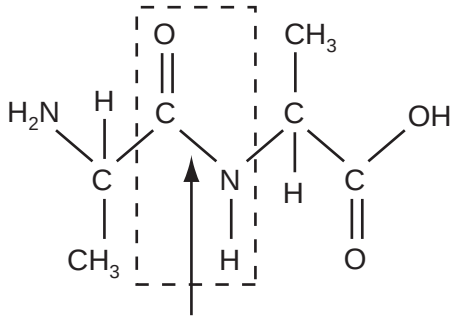
11 Four sugar solutions were tested with a standard Benedict's solution. The table shows the colour of the solutions after testing.

solution	colour
1	green
2	blue
3	brick red
4	yellow

What is the best interpretation of the results?

	solution 1	solution 2	solution 3	solution 4
A	0.05 % reducing sugar	0.5 % non-reducing sugar	1.0 % reducing sugar	0.1% reducing sugar
B	0.5 % non-reducing sugar	0.05 % reducing sugar	0.1 % reducing sugar	1.0% reducing sugar
C	1.0 % reducing sugar	1.0 % non-reducing sugar	1.5 % reducing sugar	0.5 % reducing sugar
D	1.0 % non-reducing sugar	0.5 % reducing sugar	0.5 % non-reducing sugar	0.1 % non-reducing sugar

12 The diagram shows part of a polymer.



Which molecule is used to break the bond indicated by the arrow?

A amino acid

B amylase

C peptide

D water

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13 Which statement is true of all enzymes?

A They are denatured at temperatures above 60 °C.

B They are inactivated at low pH values.

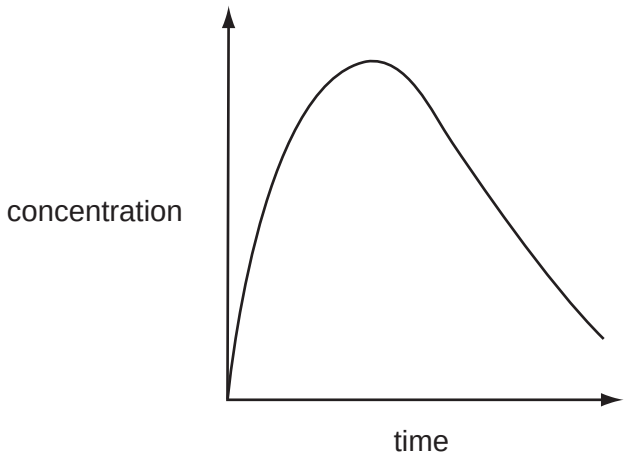
C They catalyse the breakdown of large molecules into smaller ones.

D They reduce the amount of energy required to start a reaction.

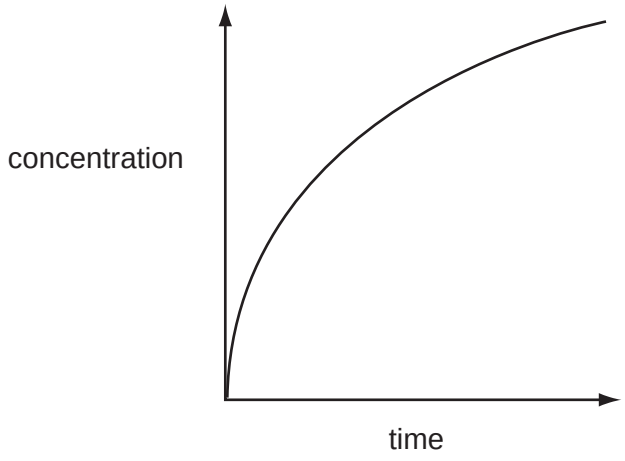
14 A quantity of an enzyme was added to a quantity of its substrate. The graphs show the changes in concentration of the enzyme, the substrate, the enzyme-substrate complex and the product over time.

Which graph shows the change in the concentration of the enzyme-substrate complex?

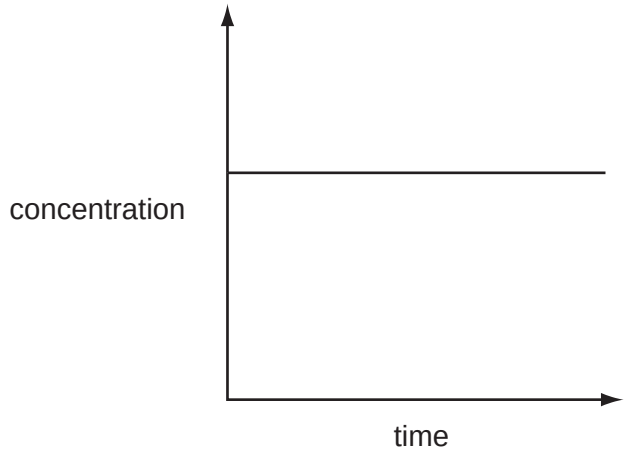
A



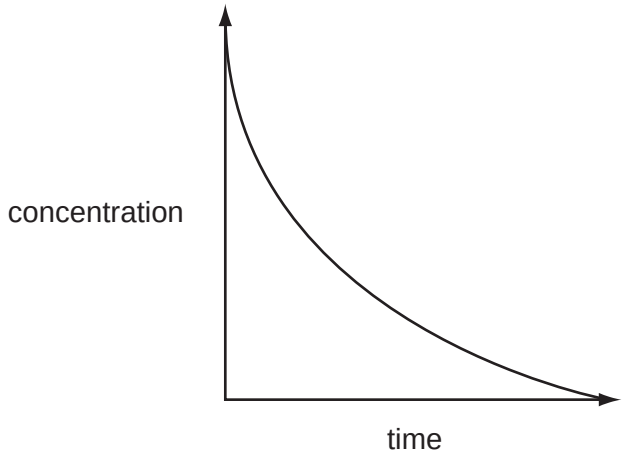
B



C



D



15 What are the features of facilitated diffusion?

	uses protein channels in membrane	uses ATP	molecules move down a concentration gradient
A	✗	✓	✗
B	✗	✗	✓
C	✓	✗	✓
D	✓	✓	✗

16 The table shows three processes that contribute to transport across cell surface membranes.

Which processes are the result of random movement of molecules?

	diffusion	endocytosis	osmosis
A	✗	✗	✗
B	✗	✓	✓
C	✓	✗	✓
D	✓	✓	✗

key

✓ = random

✗ = non random

17 Red blood cells were placed in a solution of sodium chloride with a water potential higher (less negative) than the cell contents. Haemoglobin was released from the cells.

By what process was the haemoglobin released?

A active transport

B exocytosis

C facilitated diffusion

D lysis of cell

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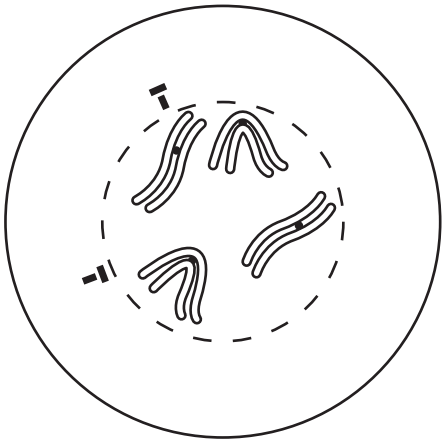
18 The following events take place in the mitotic cell cycle.

1 Chromosomes condense. Centrioles separate and move to opposite poles of the cell.
2 Chromosomes unwind. Cytokinesis occurs.
3 Nuclear envelope disappears. Centromeres arranged at equator of spindle.
4 Sister chromatids pulled towards centrioles.

What is the sequence of these events?

	first →			last
A	1	3	4	2
B	1	4	2	3
C	3	2	4	1
D	3	4	1	2

19 The diagram shows an animal cell which is undergoing mitotic division.

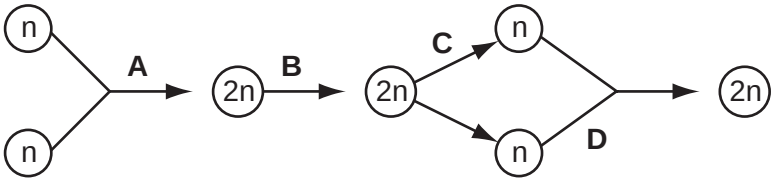


Which stage of mitosis has been reached?

A anaphase
B metaphase
C prophase
D telophase

20 The diagram represents the life cycle of an animal.

At which stage in the life cycle does mitosis occur?

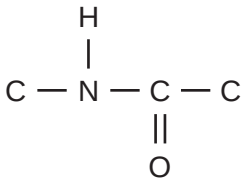


21 Which diagram shows the bond linking the individual units of a nucleic acid?

A



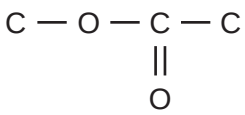
B



C



D



22 Tuberculosis (TB) is treated with a combination of antibiotics including rifampicin and streptomycin.

- rifampicin inhibits polymerisation of bacterial RNA
- streptomycin binds to and inhibits bacterial ribosomes

Which stages of protein synthesis are inhibited by rifampicin and streptomycin?

	rifampicin	streptomycin
A	transcription	transcription
B	transcription	translation
C	translation	transcription
D	translation	translation

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23 A polypeptide has the amino acid sequence glycine – arginine – lysine – serine.

The table gives possible tRNA anticodons for each amino acid.

amino acid	tRNA anticodons
arginine	UCC GCG
glycine	CCA CCU
lysine	UUC UUU
serine	AGG UCG

Which sequence of bases on DNA would code for the polypeptide?

A CCACGCAAGAGC

B CCTTCCTTCTCG

C GGAAGGAAAAGC

D GGTTGGTTGTGC

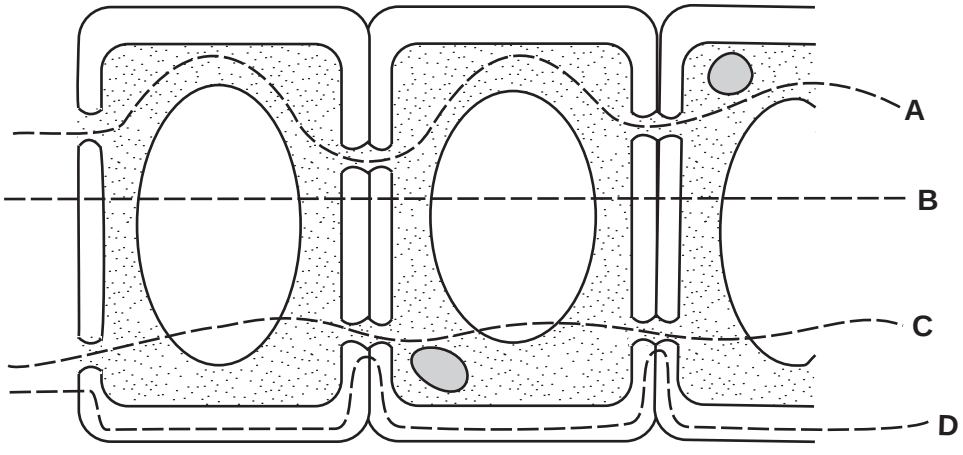
24 The table shows the percentages of nitrogenous bases in four samples of nucleic acids.

Which base is adenine?

sample	bases				
	A	**B**	**C**	**D**	uracil
1	19	31	30	19	nil
2	27	23	24	26	nil
3	25	25	nil	25	25
4	17	32	33	18	nil

25 The diagram shows some adjacent cells from the root of a plant.

Which is the symplast pathway of water movement?



26 How is sucrose transported into companion cells and then into phloem sieve tubes?

	transport into companion cell	transport into sieve tubes
A	by active transport against a concentration gradient	through plasmodesmata
B	by diffusion against a concentration gradient	through plasmodesmata
C	by active transport down a concentration gradient	by diffusion
D	by diffusion down a concentration gradient	by diffusion

27 In which combination of environmental conditions are the stomata of a plant most likely to close?

	atmospheric humidity	soil water potential	wind speed
A	high	high	high
B	high	low	low
C	low	high	low
D	low	low	high

28 Which feature enables the aorta to withstand high pressure at ventricular systole?

A collagen fibres and elastin fibres

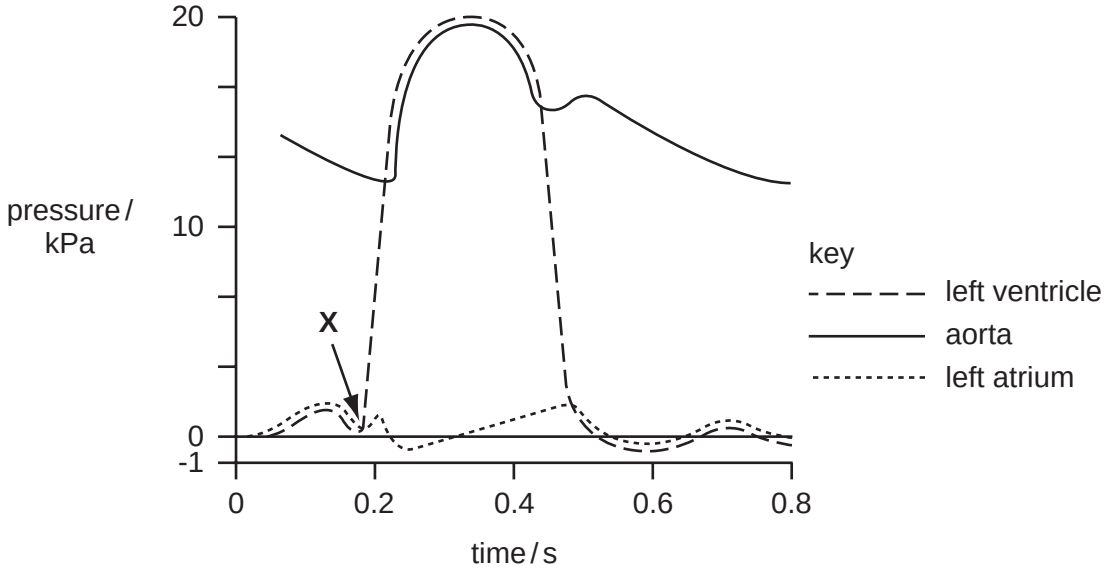
B collagen fibres and semilunar valves

C elastin fibres and large lumen

D semilunar valves and smooth muscle

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29 The diagram shows pressure changes in the left side of the heart during the cardiac cycle.



What happens at **X**?

A atrioventricular valves close

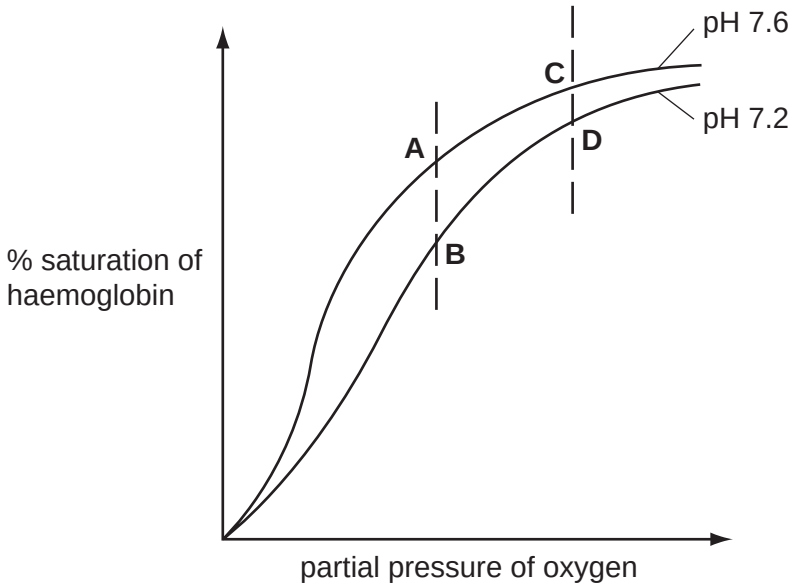
B atrioventricular valves open

C semilunar valves close

D semilunar valves open

30 The graph shows the oxygen haemoglobin dissociation curves at pH 7.6 and at pH 7.2.

Which point on the graph shows the percentage saturation of haemoglobin in the blood leaving an active muscle?



31 A person with emphysema must consciously contract muscles in order to breathe out.

What makes this muscle contraction necessary?

A constriction of the bronchioles

B excess mucus blocking the air passages

C loss of elasticity in the alveolar walls

D paralysis of cilia in the air passages

32 Which component of tobacco smoke makes the blood platelets sticky causing an increased risk of clot formation?

A carbon monoxide

B carcinogens

C nicotine

D tar

33 The table shows a person's lung volumes during quiet breathing and at full inspiration and full expiration.

	lung volume / dm^3
during quiet breathing	3–3.5
at full inspiration	5.2
at full expiration	1.5

What is this person's vital capacity?

A 1.7 dm^3 **B** 2.0 dm^3 **C** 3.7 dm^3 **D** 5.2 dm^3

34 Which disease is correctly linked to its causative agent and method of infection?

	disease	causative agent	method of infection
A	cholera	bacterium	ingestion
B	HIV / AIDS	virus	water-borne
C	malaria	bacterium	blood transfusion
D	tuberculosis (TB)	virus	inhalation

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35 Many doctors now restrict prescriptions for some antibiotics. They keep the most effective antibiotics in reserve for the most serious outbreaks of treatable diseases.

What is the main reason for this?

A Antibiotics are not as effective as other medicines.

B Antibiotics are only effective against diseases caused by bacteria.

C Resistant strains of bacteria may develop.

D Taking antibiotics may weaken the immune system.

36 In parts of London, there was an increase in the number of cases of tuberculosis (TB) in the 1990s.

Which factor is **most** likely to have contributed to this?

A increased air pollution

B increased drug abuse

C increased pathogen mutation rate

D overcrowded accommodation

37 An enzyme hydrolyses the two heavy polypeptide chains of an antibody molecule. The hydrolysis occurs at the hinge region and breaks the antibody into three fragments.

How many of these fragments are able to bind to antigen?

A 0 **B** 1 **C** 2 **D** 3

38 Why has it proved difficult to develop a vaccine against malaria?

A Mosquitoes have many stages in their life cycles.

B The human immune system does not recognise the antigens of the parasite.

C The parasites are only vulnerable to attack when outside the liver and red blood cells.

D Vaccines are rapidly broken down by proteases in the stomach.

39 Which stage of energy transfer has the lowest efficiency?

A sunlight → producer

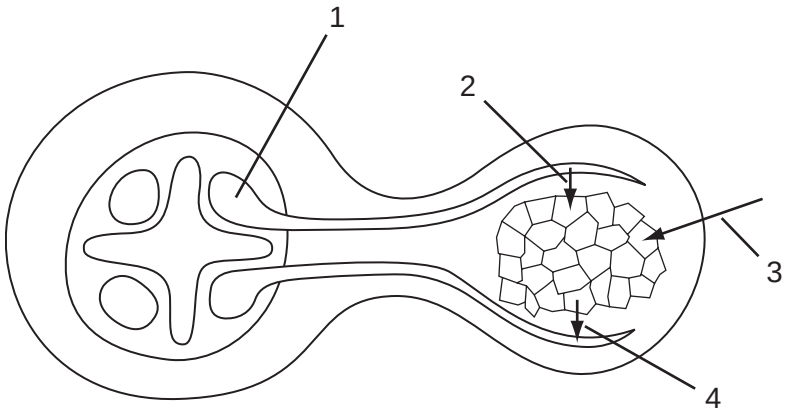
B producer → primary consumer

C primary consumer → secondary consumer

D secondary consumer → tertiary consumer

40 Leguminous plants have root nodules containing bacteria.

The diagram shows a transverse section through part of the root and root nodule of a leguminous plant.



What is indicated by the labels 1, 2, 3 and 4?

	1	2	3	4
A	phloem tissue	sugar from host	nitrogen	amino acid to host
B	phloem tissue	water from host	ammonium ions	nitrate to host
C	xylem tissue	sugar from host	nitrate ions	water to host
D	xylem tissue	water from host	carbon dioxide	sugar to host

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