Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **May/June 2015**

1 hour

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

5018780836

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 **18** printed pages and **2** blank pages.

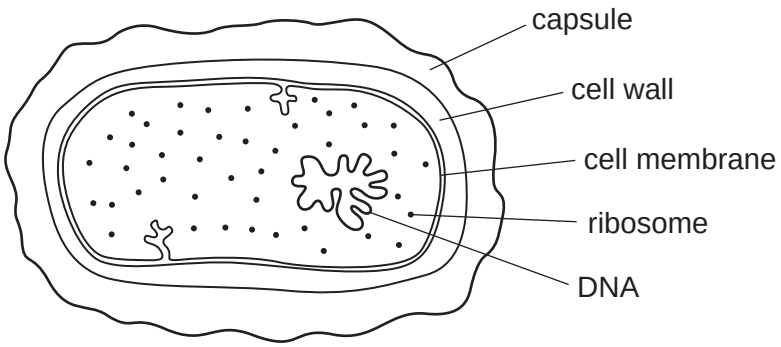
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CAMBRIDGE International Examinations

1 What are the appropriate units for measuring diameters of alveoli, diameters of white blood cells and the width of cell walls?

	diameters of alveoli	diameters of white blood cells	width of cell walls
A	mm	μm	μm
B	μm	mm	μm
C	μm	μm	nm
D	mm	mm	nm

2 The diagram shows a high-power drawing of a bacterium.



Which three components are found in **both** this bacterium and an animal cell?

A capsule, cell membrane and cell wall

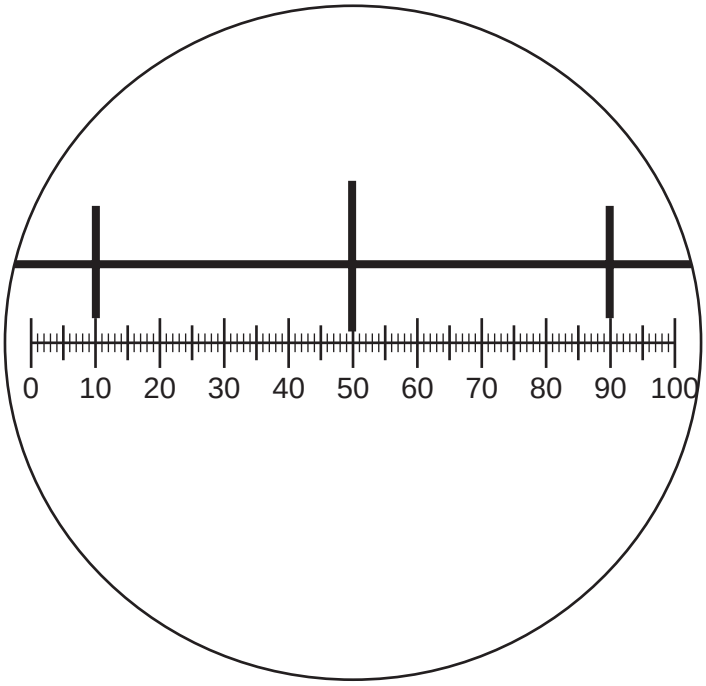
B capsule, DNA and ribosome

C cell membrane, cell wall and DNA

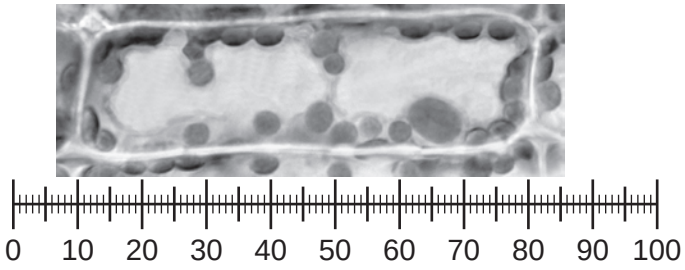
D cell membrane, DNA and ribosome

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3 The diagram shows a stage micrometer scale on which the small divisions are 0.1 mm. It is viewed through an eyepiece containing a graticule.



The stage micrometer scale is replaced by a slide of a plant cell.



What is the width of a chloroplast?

A 0.5 mm **B** 10 μm **C** 50 μm **D** 100 μm

4 Which structures are found in typical eukaryotic cells?

1 70S ribosomes

2 80S ribosomes

3 linear DNA (chromosomes)

4 circular DNA

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1 and 4 only

D 2 and 3 only

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5 What is the function of the nucleolus?

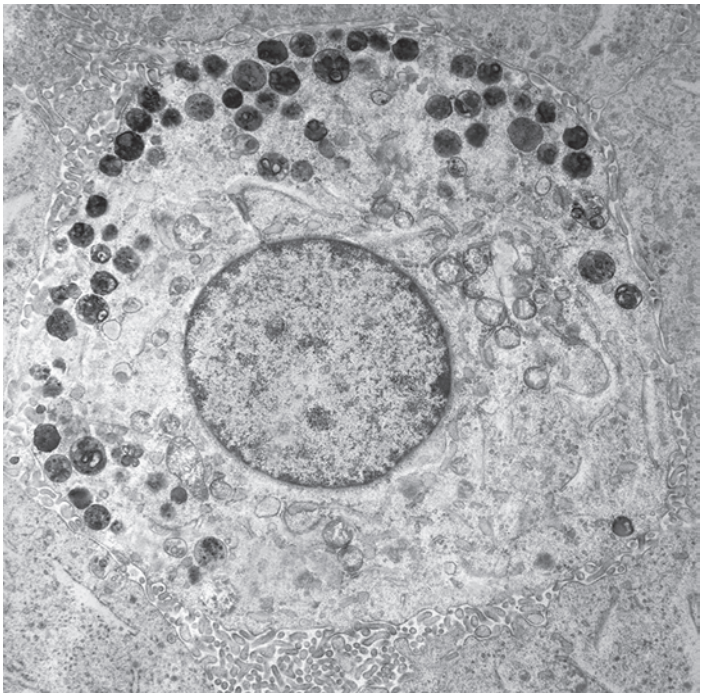
A The formation and breakdown of the nuclear envelope.

B The formation of rough endoplasmic reticulum.

C The synthesis of ribosomal proteins.

D The synthesis of rRNA.

6 The electronmicrograph shows a cell.



×5700

What is the actual diameter of the nucleus?

A 0.6 μm **B** 6 μm **C** 35 μm **D** 350 μm

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7 A student carried out four tests for biological molecules on a solution. The observations are shown in the table.

test for biological molecules	observation
iodine solution	orange
biuret	purple
Benedict's	orange
emulsion	cloudy

Which molecules may be present in this solution?

A glucose, starch, protein

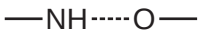
B lipid, protein, glucose

C protein, starch, sucrose

D starch, protein, lipid

8 The diagrams show different types of bond found in biological molecules.

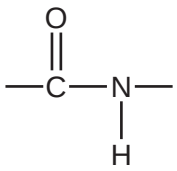
1



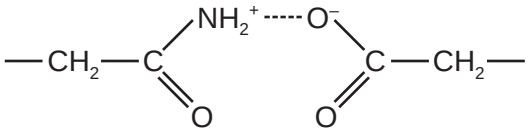
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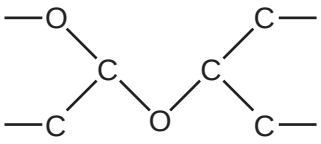
3



4



5



Which combination of bonds could **not** be found in a protein with a tertiary structure?

A 1, 2, 3 and 4 **B** 1, 2 and 4 only **C** 3 and 5 **D** 5 only

9 Which row shows the correct match between the descriptions of biological molecules and where they are found?

1 a linear polymer of 1,4 linked β-glucose molecules

2 a bipolar, phosphate containing molecule

3 a highly branched polymer of 1,4 and 1,6 linked α-glucose molecules

	1	2	3
A	eukaryote and prokaryote cell walls	cell surface membranes of both eukaryotes and prokaryotes	forming storage granules in the cells of prokaryotes
B	eukaryote cell walls	cell surface membranes of both eukaryotes and prokaryotes	forming storage granules in the cells of some eukaryotes
C	eukaryote cell walls	cell surface membranes of both eukaryotes and prokaryotes	forming starch grains in the cells of all eukaryotes
D	forms storage granules in the cells of eukaryotes	prokaryote cell walls	eukaryote cell walls

10 Which is the correct description for the structure of amylose and cellulose?

	amylose	cellulose
A	α-glucose 180° rotation 1,4 and 1,6 linkages	β-glucose no rotation 1,4 linkages
B	α-glucose no rotation 1,4 linkages	β-glucose 180° rotation 1,4 linkages
C	α-glucose no rotation 1,4 linkages	α-glucose 180° rotation 1,4 and 1,6 linkages
D	β-glucose no rotation 1,4 linkages	α-glucose 180° rotation 1,4 linkages

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11 Which description is correct?

A A collagen molecule has a high proportion of the amino acid glycine, which has a very small side chain.

B A group of three collagen fibres forms a strong, insoluble coiled structure termed a triple helix.

C Each of the collagen polypeptides in a collagen molecule has a regular spiral arrangement of many alpha helices.

D Peptide bonds are present between amino acids of the same polypeptide and between the different polypeptides forming the collagen molecule.

12 Polar molecules form hydrogen bonds with each other.

Which properties of water result from its molecules being polar?

1 good solvent

2 high specific heat capacity

3 high surface tension

4 cohesive

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 2 and 4 only

D 3 and 4 only

13 Which statements about the effect of **all** enzyme inhibitors are correct?

1 change the shape of the active site

2 denature the enzyme

3 reduce the rate of the enzyme-catalysed reaction

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

14 The graphs show the rate of reaction of an enzyme-catalysed reaction.

Which graph shows the effect of increasing the concentration of the substrate at two different concentrations of a competitive inhibitor?

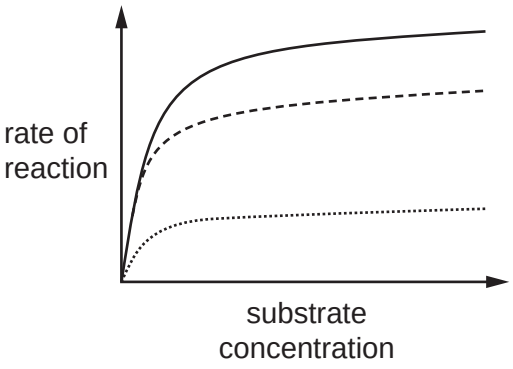
key

——— no inhibitor

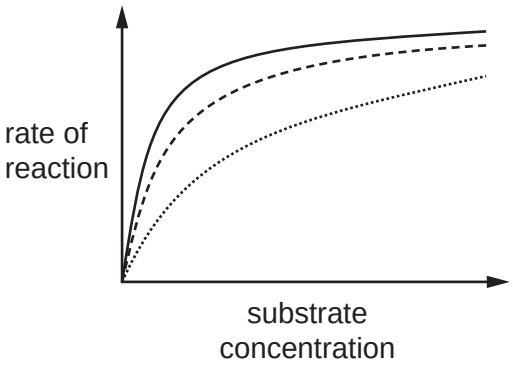
- - - - - - low concentration of inhibitor

..... high concentration of inhibitor

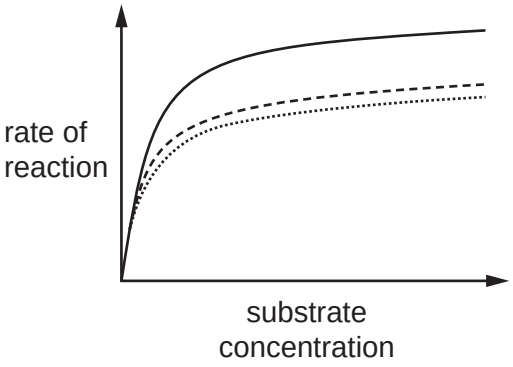
A



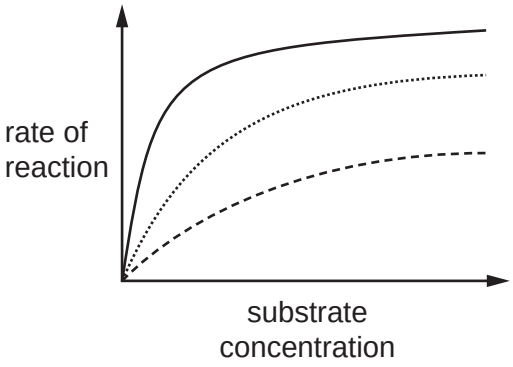
B



C



D



15 Which type of cell has a large number of glycoproteins on the cell surface membrane?

A ciliated cell

B goblet cell

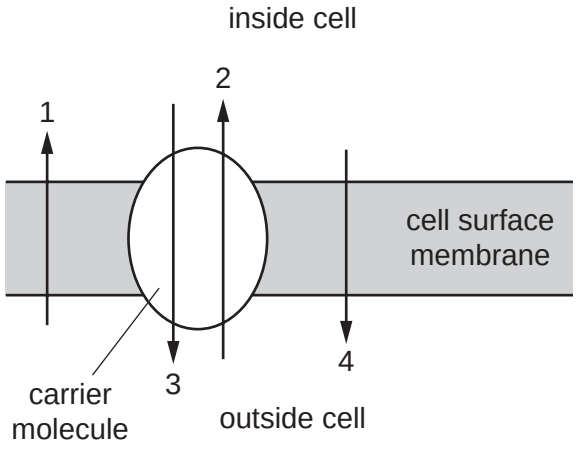
C lymphocyte

D red blood cell

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16 The diagram shows the transport of ions across the cell surface membrane. Inside the cell there is a low concentration of sodium ions (Na^+) and a high concentration of potassium ions (K^+). Outside the cell there is a low concentration of K^+ and a high concentration of Na^+.

The carrier molecule is a pump which exchanges Na^+ for K^+.



Which ionic movements are represented by the arrows?

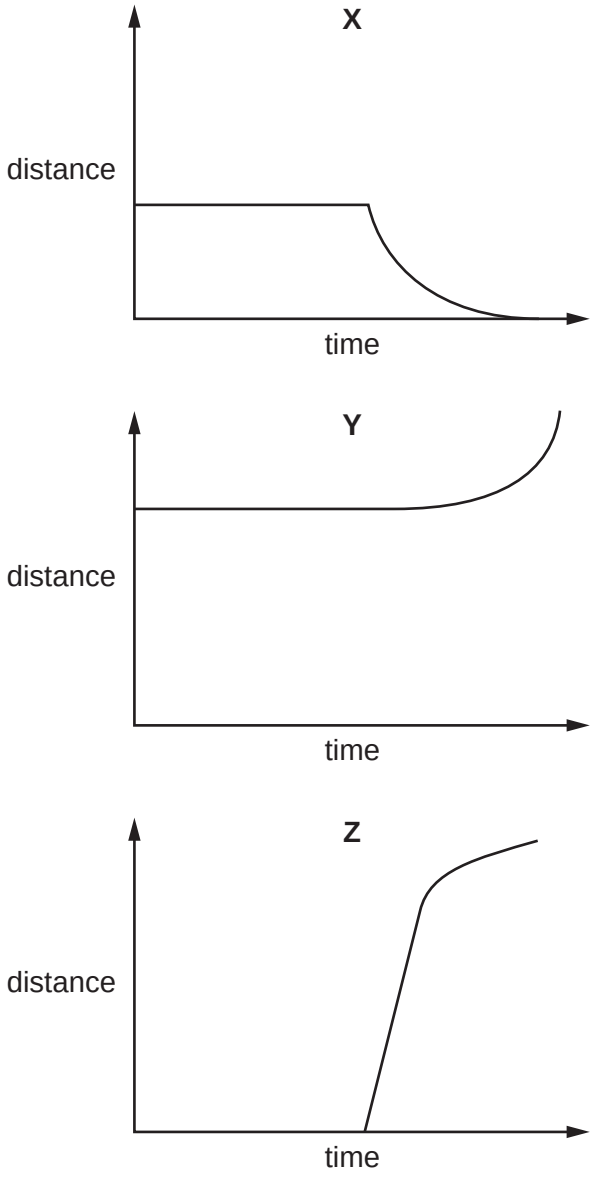
	active transport of K^+	active transport of Na^+	diffusion of Na^+	diffusion of K^+
A	2	3	1	4
B	2	3	4	1
C	3	2	1	4
D	3	2	4	1

17 Which set of factors will produce the **most** fluid cell surface membrane?

	a decrease in
A	• distance between phospholipid molecules • proportion of short fatty acid chains
B	• distance between phospholipid molecules • temperature
C	• proportion of phospholipids with saturated fatty acid chains • proportion of long fatty acid chains
D	• proportion of phospholipids with unsaturated fatty acid chains • temperature

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18 The graphs show various measurements taken from metaphase of mitosis onwards. The graphs are to scale when compared to one another.



Which row correctly identifies each graph?

	X	Y	Z
A	distance between poles of spindle	distance between sister chromatids	distance of centromere from pole of spindle
B	distance between poles of spindle	distance of centromere from pole of spindle	distance between sister chromatids
C	distance of centromere from pole of spindle	distance between poles of spindle	distance between sister chromatids
D	distance of centromere from pole of spindle	distance between sister chromatids	distance between poles of spindle

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19 A scientist counted 22 chromosomes in each of the root cells of a xerophytic plant.

What is the diploid and haploid number of chromosomes for this species?

	diploid number	haploid number
A	11	22
B	22	11
C	22	44
D	44	22

20 Which row shows two pairs of nucleotides formed during transcription?

	first base pair transcribed		second base pair transcribed	
	bases	number of hydrogen bonds	bases	number of hydrogen bonds
A	AU	2	CG	2
B	AU	2	CG	3
C	AU	2	TU	2
D	AU	3	CG	2

21 Which row correctly identifies the features of DNA and RNA molecules?

	DNA and RNA contain both purine and pyrimidine bases	DNA and RNA both contain a pentose sugar	hydrogen bonds form between bases in some RNA
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✗

key

✓ = correct statement

✗ = incorrect statement

22 Two polynucleotide strands make up a DNA molecule.

What is a correct description?

A The percentage of cytosine is 50% of that of guanine in the whole molecule.

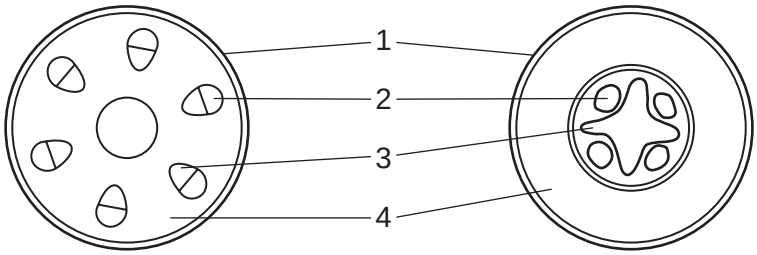
B The percentage of cytosine is the same as that of guanine in each strand.

C The percentage of cytosine is the same as that of guanine in the whole molecule.

D The percentage of cytosine is the same in each strand of the molecule.

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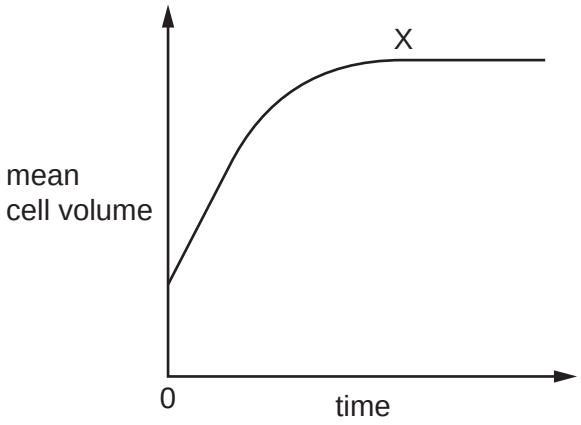
23 The diagram shows transverse sections of two plant structures.



Which row shows the correct labels?

	1	2	3	4
A	cuticle	phloem	xylem	pith
B	cuticle	xylem	phloem	cortex
C	epidermis	phloem	xylem	cortex
D	epidermis	xylem	phloem	pith

24 A tissue composed of plasmolysed plant cells was put into distilled water. The graph shows how the mean cell volume changes with time.



What is the cause of the plateau at X?

1 water potential in the plant cell has become more negative

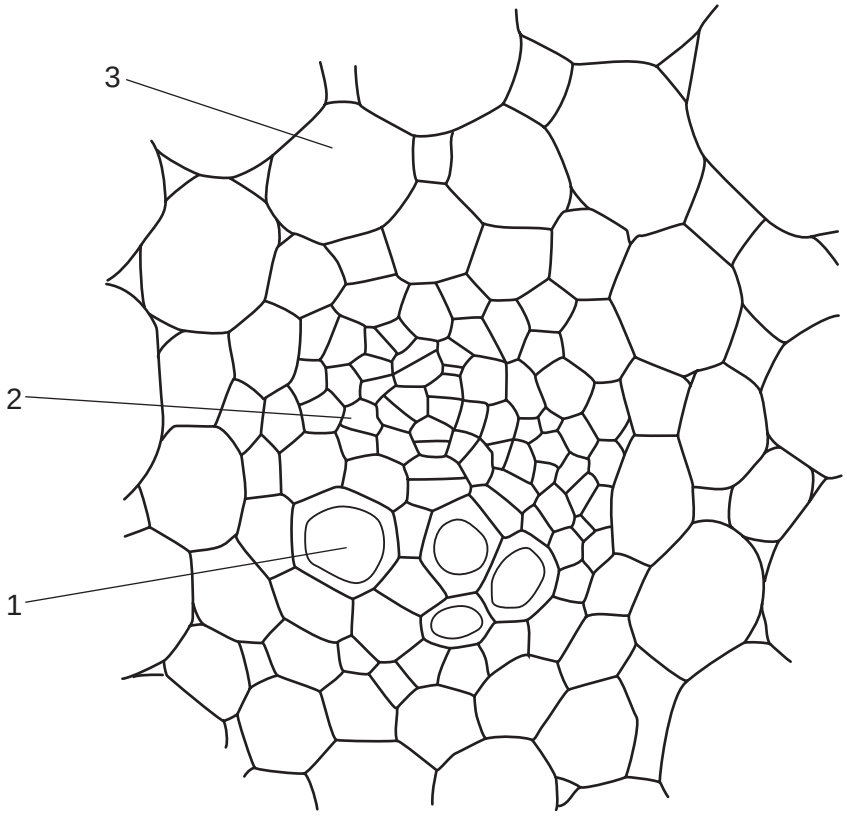
2 cells have become fully turgid

3 no net movement of water into cells

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

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25 The diagram shows a vascular bundle from the stem of a plant.



Which row describes the functions of the labelled cells?

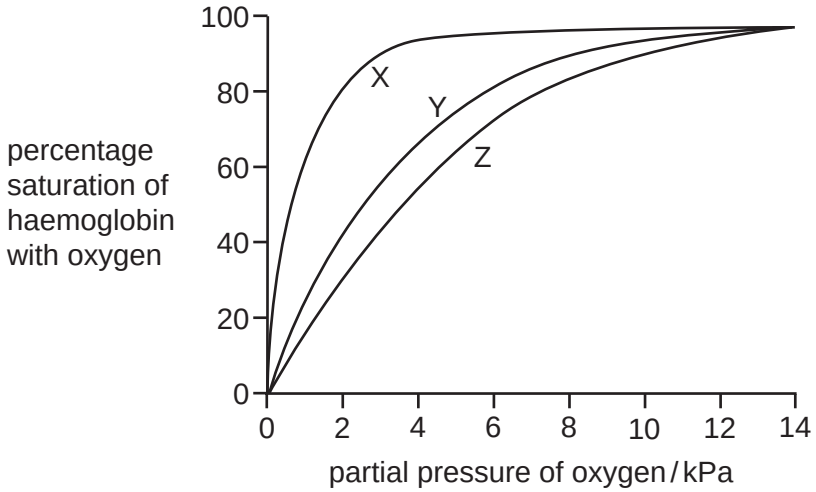
	transports sucrose	transports ions	stores starch
A	1	2	3
B	2	1	3
C	2	3	1
D	3	1	2

26 Which changes to the water potential and the volume of liquid in the phloem occur when amino acids are moved into a sink from phloem sieve tubes?

	water potential in a phloem sieve tube	volume of liquid in phloem sieve tubes
A	higher	decreased
B	higher	increased
C	lower	decreased
D	lower	increased

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27 The graph shows the oxygen dissociation curves for haemoglobin from three different animals.



Which of the haemoglobins, X, Y or Z, would be present in each of the animals 1, 2 or 3?

1 an adult human

2 a fish living in water that has a very low oxygen concentration

3 a very active mammal whose tissues have a much higher rate of respiration than an adult human

	1	2	3
A	X	Y	Z
B	Y	X	Z
C	Y	Z	X
D	Z	Y	X

28 What explains how the uptake of oxygen is maximised as blood passes through the capillaries of the lungs?

A Each haemoglobin molecule can temporarily bind to four oxygen atoms.

B Oxyhaemoglobin formation increases the capacity of red blood cells to transport oxygen.

C The binding of the first oxygen molecule to haemoglobin decreases the molecule's affinity for binding other oxygen molecules.

D The dissociation of carbon dioxide from carboxyhaemoglobin allows more haemoglobin to be available for oxygen binding.

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29 What happens after carbonic anhydrase has catalysed a reaction involved in the transport of carbon dioxide?

A the dissociation of oxyhaemoglobin to haemoglobin and oxygen

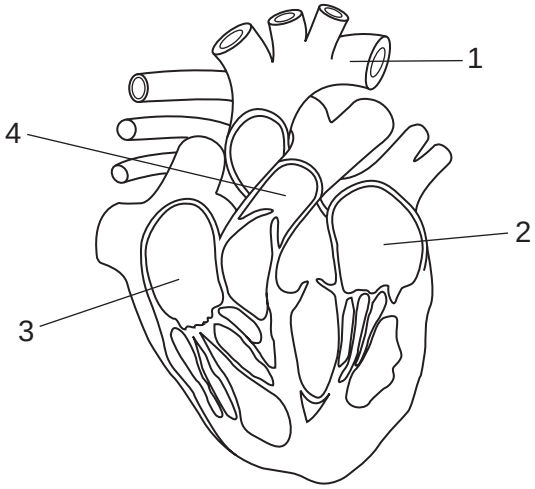
B the formation of carbaminohaemoglobin from carbon dioxide and haemoglobin

C the formation of carbon dioxide and water from carbonic acid

D the formation of oxyhaemoglobin from haemoglobin and oxygen

30 The diagram shows a section through the heart and the associated blood vessels.

What is correct for the flow of blood through the heart?



A 1 → 2 → 3 → 4

B 2 → 1 → 3 → 4

C 3 → 4 → 1 → 2

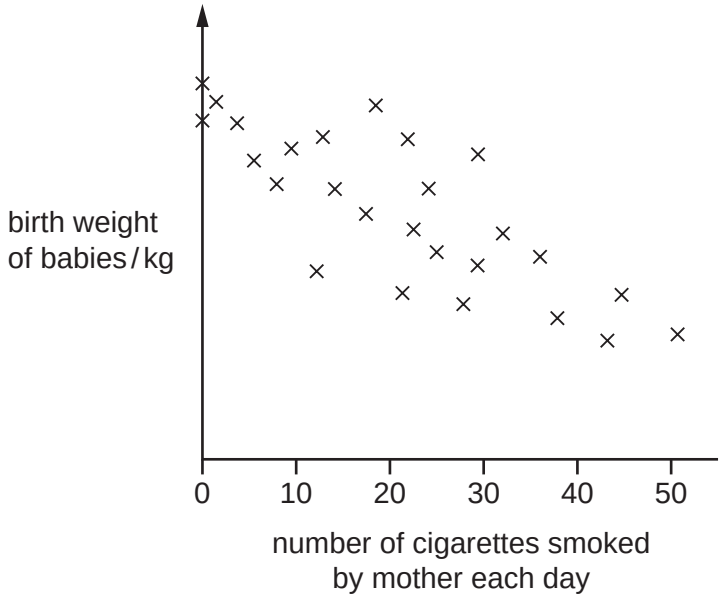
D 4 → 3 → 2 → 1

31 Which row shows a function of each of the named tissues in the gas exchange system?

	cartilage	ciliated epithelium	smooth muscle	elastic fibres
A	keep the airways open	move mucus out of the airways	change the diameter of the bronchioles	allows alveoli to expand during breathing in
B	prevent choking	secrete mucus	contracts to increase air flow	helps to support the trachea
C	prevent the trachea collapsing when coughing	keep a layer of mucus lining the air ways	trap bacteria and dirt in air	cause elastic recoil when breathing out
D	support the small bronchioles	trap bacteria and dirt in air	control the flow of air to and from the alveoli	allows stretching of trachea for movement

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32 The graph shows the results of a study to determine whether there is a link between the number of cigarettes smoked by a mother and the birth weight of her baby.



Which conclusions can be drawn from this graph?

1 As the number of cigarettes smoked increases, the weight of the baby always decreases.

2 Factors, other than smoking, affect the birth weight of a baby.

3 Nicotine, tar and carbon monoxide slow the growth of an unborn baby.

4 The majority of all smokers smoke between 10 and 35 cigarettes per day.

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

33 What is a feature of coronary bypass surgery?

A A section of a healthy vein or artery is attached to the aorta at one end and a coronary artery at the other end to bypass diseased sections of coronary artery.

B A section of healthy vein or artery is used to bypass the diseased section of aorta in the region where the branches to the coronary arteries occur.

C Blockages in coronary arteries with atherosclerosis are cleared surgically by temporarily using an artificial heart to re-route blood and bypass the heart.

D The section of diseased coronary artery is removed and then replaced by using a section of a healthy vein or artery of a similar diameter.

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34 The first column in the table contains statements about disease. Columns headed 1-4 represent four different named diseases.

statements	1	2	3	4
infectious disease		✓	✓	✓
can be treated with antibiotics			✓	✓
caused by a virus		✓		
degeneration of lung tissue	✓			✓

key
✓ = true

What is the correct set of column headings for the table above?

	1	2	3	4
A	bronchitis	measles	TB	smallpox
B	emphysema	HIV / AIDS	cholera	TB
C	emphysema	measles	cholera	lung cancer
D	lung cancer	HIV / AIDS	measles	TB

35 Which row is correct for malaria?

	nature of disease	method of transmission	pathogen
A	infectious	insect vector	species of *Plasmodium*
B	infectious	water-borne	species of *Vibrio*
C	non-infectious	insect vector	species of *Plasmodium*
D	non-infectious	water-borne	species of *Vibrio*

36 During an outbreak of a very infectious disease, vulnerable people need immediate protection.

Which type of immunity would be given to these people?

	natural	artificial
active	**A**	**B**
passive	**C**	**D**

37 Which cells become memory cells in the immune response?

1 B-lymphocytes

2 T-lymphocytes

3 phagocytes

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

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38 Which soil would have the smallest number of denitrifying bacteria?

A compressed agricultural soil

B poorly drained forest soil

C water-logged clay soil

D well-aerated garden soil

39 In an ecosystem, at which stage is most energy lost?

A sunlight → trophic level 1

B trophic level 1 → trophic level 2

C trophic level 2 → trophic level 3

D trophic level 3 → trophic level 4

40 Two species of animal are found in the same area of forest and grassland. In the spring and summer they eat the same plant food. However, in the autumn and winter one eats nuts in the forest and the other eats roots on the grassland.

Both species are preyed upon by the same predator. Numbers of root-eating animals are reduced most by this, but they recover faster since they reproduce faster.

What can be concluded about these two species of animals?

1 They are part of the same community.

2 They are at different trophic levels.

3 They occupy different habitats.

4 They have different niches.

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

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