Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

BIOLOGY **9700/11**

Paper 1 Multiple Choice **May/June 2014**

1 hour

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

6547058302

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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1 What best describes an electron microscope in comparison with a light microscope?

	magnification	resolution
A	higher	higher
B	higher	lower
C	lower	higher
D	lower	lower

2 Where would cisternae be found in a cell?

1 endoplasmic reticulum

2 Golgi apparatus

3 mitochondrion

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

3 Which adaptation would increase 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

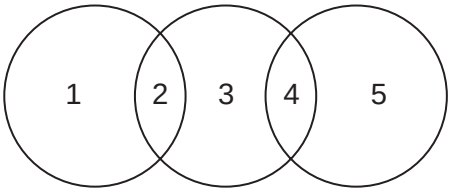
D selective permeability of the vacuole membrane

4 What is the order of size of cell structures?

	largest →			smallest
A	centrioles	ribosomes	lysosomes	nucleoli
B	lysosomes	nucleoli	centrioles	ribosomes
C	nucleoli	lysosomes	centrioles	ribosomes
D	nucleoli	centrioles	ribosomes	lysosomes

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5 The diagram shows some similarities between chloroplasts, mitochondria and typical prokaryotes.



Which row is correct?

	1	2	3	4	5
A	chloroplasts	circular DNA	mitochondria	80S ribosomes	prokaryotes
B	chloroplasts	80S ribosomes	mitochondria	circular DNA	prokaryotes
C	prokaryotes	circular DNA	mitochondria	circular DNA	chloroplasts
D	prokaryotes	70S ribosomes	chloroplasts	80S ribosomes	mitochondria

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

test for biological molecules	observation
iodine solution	orange-brown
biuret	purple
Benedict's	orange
emulsion	clear

Which three molecules may be present in this solution?

A glucose, starch, globin

B globin, glucose, collagen

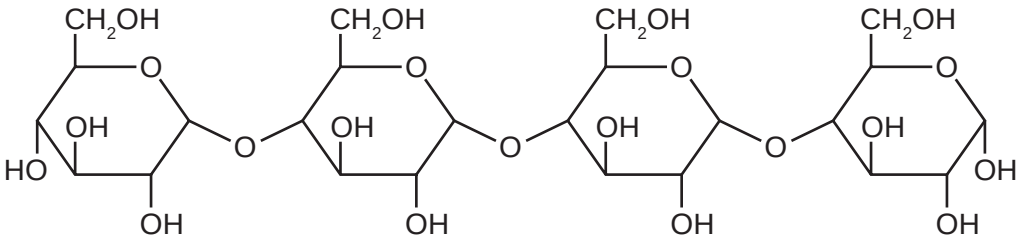
C starch, sucrose, collagen

D sucrose, globin, collagen

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[Turn over

7 The molecule shown is a polymer of reducing sugars.



Which procedures could be carried out in order to test for the presence of the reducing sugars in this molecule?

1 Add hydrolytic enzyme and then heat with Benedict's reagent.

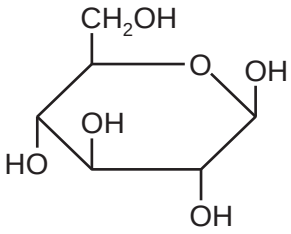
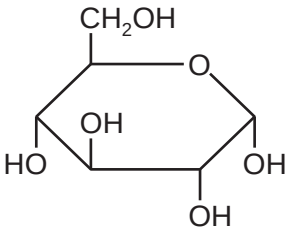
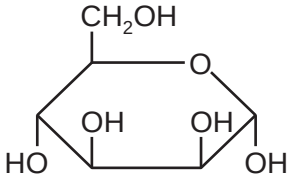
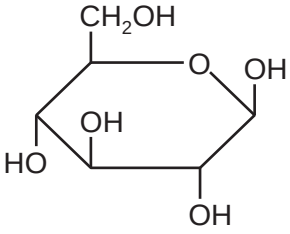
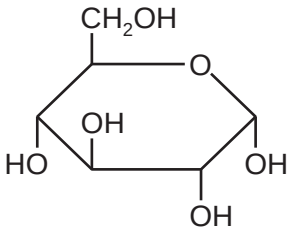
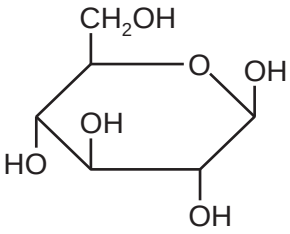
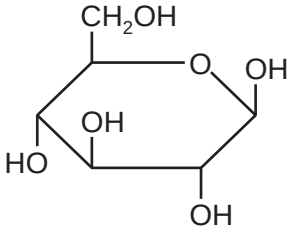
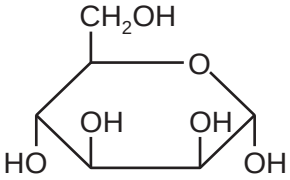
2 Dissolve in water, neutralise and then heat with Benedict's reagent.

3 Boil with hydrochloric acid, neutralise and then heat with Benedict's reagent.

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

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8 Which molecules show the structure of α-glucose and of β-glucose?

	α-glucose	β-glucose
A		
B		
C		
D		

9 In unsaturated lipid molecules, where are double bonds located?

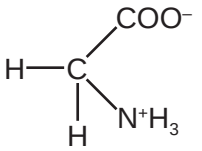
A between fatty acids and glycerol

B within fatty acids and within glycerol

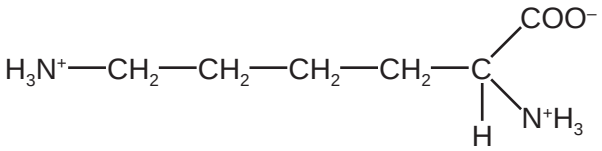
C within fatty acids only

D within glycerol only

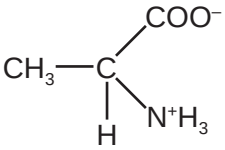
10 The diagram shows the structure of four amino acids in solution.



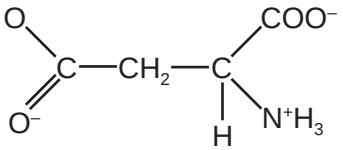
glycine



lysine



alanine



aspartate

Which of these four amino acids have an overall charge?

A alanine and aspartate

B alanine and glycine

C aspartate and lysine

D glycine and lysine

11 Which level of organisation of a haemoglobin molecule is coded by a DNA molecule?

A primary structure

B secondary structure

C tertiary structure

D quaternary structure

12 The statements are about enzymes.

1 They are globular proteins.

2 They are formed in the smooth endoplasmic reticulum.

3 They are only found attached to plasma membranes in the cell.

4 They can be inhibited by competitive inhibitors.

Which statements are correct for **all** enzymes?

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

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13 An unusual enzyme has been found in a tropical grass.

- It catalyses the hydrolysis of the fungal polysaccharide, chitin, into amino sugars.
- It also inhibits the activity of an enzyme in locust guts which catalyses the digestion of amylose.

What describes the actions of this unusual enzyme?

	reaction catalysed	reaction inhibited
A	hydrolysis of glycosidic bonds	condensation of glycosidic bonds
B	hydrolysis of glycosidic bonds	hydrolysis of glycosidic bonds
C	hydrolysis of peptide bonds	condensation of glycosidic bonds
D	hydrolysis of peptide bonds	hydrolysis of glycosidic bonds

14 The fluidity of the cell surface membrane can be changed by a number of factors.

As the fluidity of cell surface membranes decreases, which process would be **least** changed?

A active transport

B diffusion

C endocytosis

D osmosis

15 Which molecules in cell surface membranes contribute to cell recognition?

A cholesterol, glycolipids, phospholipids

B cholesterol, phospholipids, proteins

C glycolipids, glycoproteins, proteins

D phospholipids, glycoproteins, proteins

16 Which is correct for facilitated diffusion **and** active transport?

A both depend on the solubility of the transported molecule in the lipid bilayer

B both increase as the concentration of the transported molecule increases

C both require the use of ATP

D both require the use of membrane proteins

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17 Which features increase the efficiency of ion uptake by a root hair cell?

1 many mitochondria in the cell

2 high concentration of ions in the vacuole

3 protein carriers in the cell surface membrane

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

18 Which processes occur by mitosis?

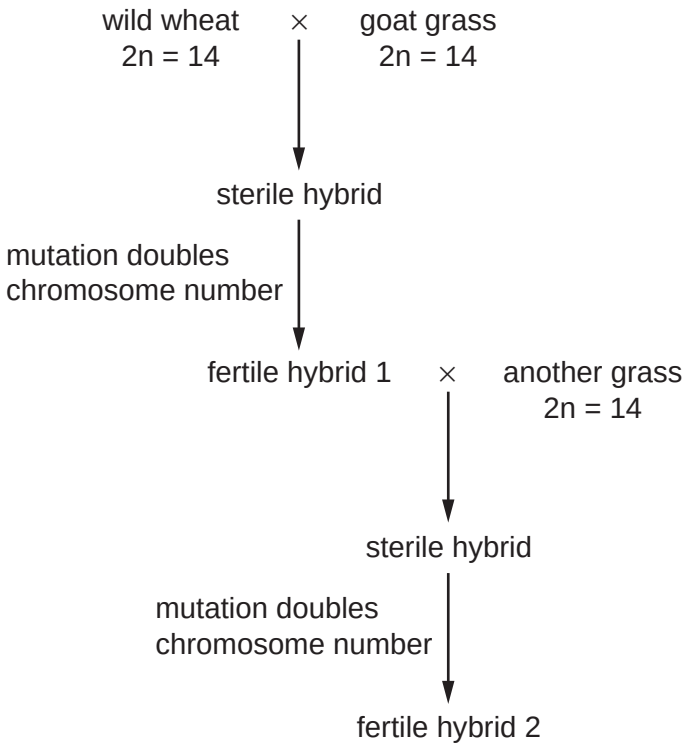
1 cloning of plasma cells

2 gamete production

3 replacing damaged cells

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

19 The diagram shows crosses between wild wheat and two types of grass.

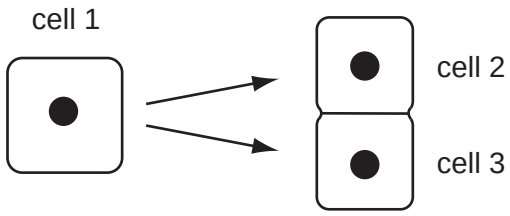


What is the chromosome number of the fertile hybrid 2?

A 28 **B** 42 **C** 56 **D** 140

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20 The diagram shows a human cell (2n = 46) at the end of prophase of mitosis (cell 1) and the daughter cells just after telophase (cells 2 and 3).

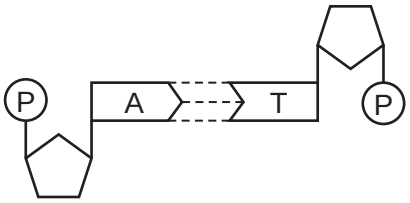


How many DNA molecules are there in the nucleus of cell 1 and cell 2?

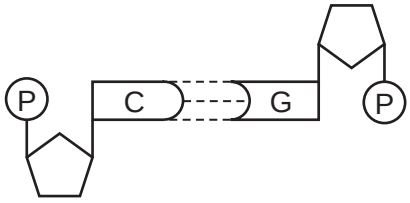
	cell 1	cell 2
A	46	23
B	46	46
C	92	23
D	92	46

21 Which diagram represents a correct base pair of DNA?

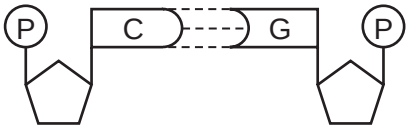
A



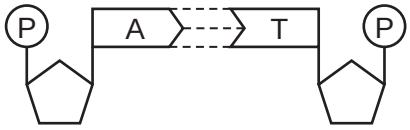
B



C



D



22 Part of the amino acid sequences in normal and sickle cell haemoglobin are shown.

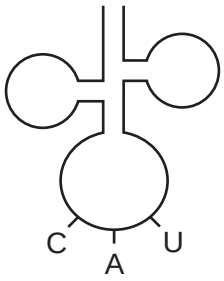
normal haemoglobin	sickle cell haemoglobin
thr-pro-glu-glu	thr-pro-val-glu

Possible mRNA codons for these amino acids are shown below.

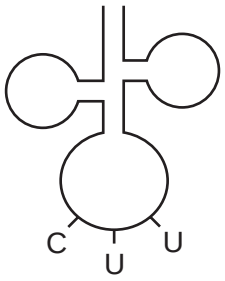
glutamine (glu) GAA GAG	proline (pro) CCU CCC
threonine (thr) ACU ACC	valine (val) GUA GUG

Which tRNA molecule is **not** involved in the formation of this part of the sickle cell haemoglobin?

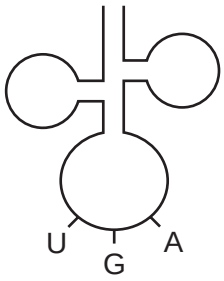
A



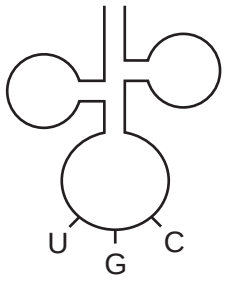
B



C



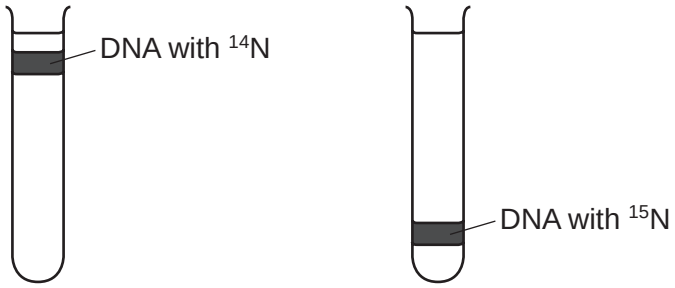
D



23 Two sets of bacteria were grown using different types of nitrogen-containing growth media.

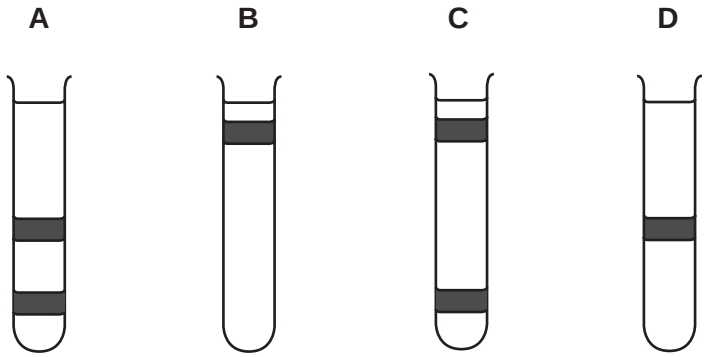
One set was grown in a medium containing the 'heavy' isotope of nitrogen, ^{15}N, until all the DNA was labelled. The other set were grown in a medium containing the 'light' isotope of nitrogen, ^{14}N, until all the DNA was labelled.

The DNA from each set of bacteria was extracted and centrifuged. The diagram shows the position in the centrifuge tubes of this DNA.



Bacteria with ^{15}N labelled DNA were transferred to a medium containing ^{14}N and allowed to reproduce once. The DNA of the new generation of bacteria was extracted and centrifuged.

Which tube shows the position of DNA from this new generation of bacteria?



24 Which processes are involved in transpiration?

1 the diffusion of water vapour from stomata

2 the mass flow of water through the xylem

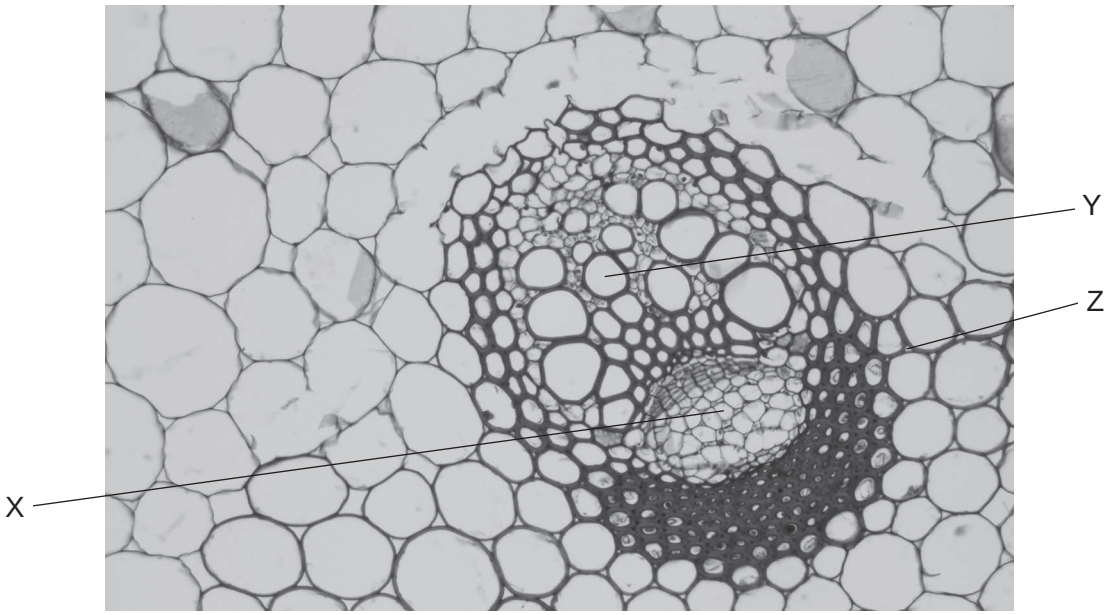
3 the evaporation of water from the surface of mesophyll cells

4 the evaporation of water vapour from air spaces

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

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

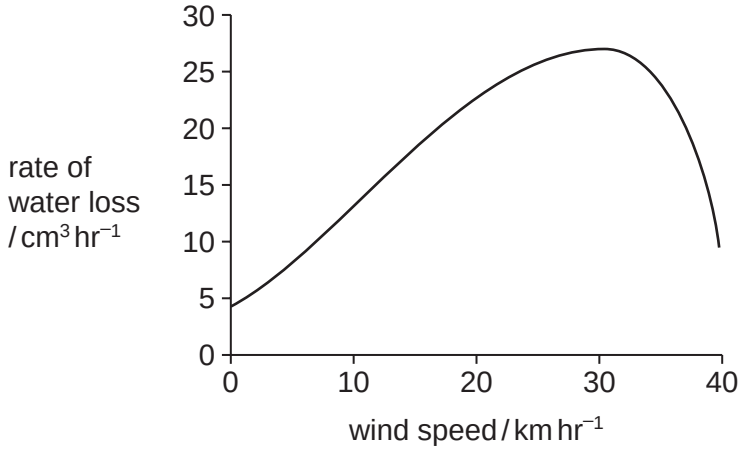


What are the correct labels for structures X, Y and Z?

	X	Y	Z
A	companion cell	sieve tube element	air space
B	sieve tube element	xylem vessel element	air space
C	xylem vessel element	companion cell	sieve tube element
D	xylem vessel element	sieve tube element	companion cell

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26 The graph shows the results of using a potometer to measure the effect of wind speed on the rate of water loss in a plant.



Which statement explains the results obtained from the investigation?

A As wind speed increases, it becomes harder for the plant to obtain carbon dioxide. At high wind speeds the stomata are fully open so rate of water loss is high.

B As wind speed increases, moist air around the stomata is removed and replaced by dry air. At high wind speeds the transpiration rate is lower.

C As wind speed increases, the rate of water loss increases due to an increased diffusion gradient. At high wind speeds, the stomata close.

D As wind speed increases, transpiration rate and rate of photosynthesis increases. At high wind speeds more water is used for photosynthesis.

27 Land flooded by the sea is not suitable for growing plants after the salty flood water has drained away.

Which values of water potential in the xylem and soil water help to explain why the land flooded with salty water is unsuitable for growth of plants?

	water potential / kPa	
	xylem	soil water
A	–1800	–700
B	–700	–1800
C	–700	–300
D	0	–1800

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[Turn over

28 What is the role of ATP in a companion cell when sucrose is loaded into a sieve tube element?

A moving sucrose into the sieve tube element

B removing protons out of the cytoplasm of the companion cell

C removing protons from the sieve tube element

D taking up sucrose into the cytoplasm of the companion cell

29 Which features allow an artery to resist changes in the pressure of blood flowing through it?

1 smooth endothelium

2 thick elastic layer in the artery wall

3 thick layer of muscle in the artery wall

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

30 Which reactions will be taking place in blood in a capillary next to an alveolus?

1 $Hb + 4O_2 \rightarrow HbO_8$

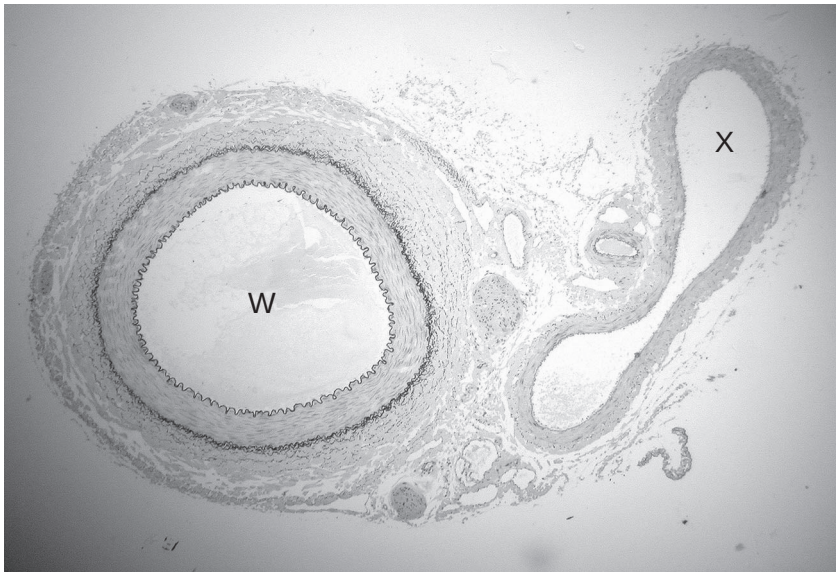
2 $H_2O + CO_2 \rightarrow H_2CO_3$

3 $HHb + 4O_2 \rightarrow HbO_8 + H^+$

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

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31 The photomicrograph shows a section through two structures found in mammals viewed using a light microscope.



×40

Which row is correct?

	W	X	feature
A	artery	vein	X contains cells with haemoglobinic acid
B	bronchiole	vein	X contains cells with oxyhaemoglobin
C	trachea	artery	the lumen of W allows air to pass through
D	vein	atrium	W contains deoxygenated blood

32 Which cells or tissues are **not correctly** paired with their function?

	cells / tissues	function
A	cartilage	supports the trachea
B	ciliated epithelial cells	move mucus over the surface of the trachea
C	goblet cells	produce enzymes to destroy bacteria
D	smooth muscle	constriction of some of the bronchioles

33 Which could lead to chronic bronchitis?

A deposition of allergens in airways causing smooth muscles to contract

B excessive secretion and accumulation of mucus and destruction of many cilia in the airways

C infection of airways leading to phagocytes destroying the elastin in the alveoli

D mutation in epithelial cells in airways caused by inhaled chemicals

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[Turn over

34 What is the minimum number of cell membranes a molecule of carbon dioxide and a molecule of oxygen pass through during gas exchange between alveoli and the capillaries?

	carbon dioxide	oxygen
A	2	4
B	3	5
C	4	5
D	4	4

35 The statements refer to the disease tuberculosis (TB).

1 The pathogen lives inside human cells so is not accessible to the immune system.

2 The bacterial pathogen reproduces slowly.

3 The pathogen is not very sensitive to antibiotics.

Which explains why antibiotic treatment for TB takes a long time?

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

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

	disease			
statement about disease	1	2	3	4
infectious disease		✓	✓	✓
can be treated with antibiotics			✓	
caused by a bacterium			✓	
degeneration of lung tissue	✓			

key

✓ = true

Which is the correct set of column headings for the diseases in the table?

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

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37 The following events occur when a phagocyte responds to the presence of a pathogen.

1 endocytosis

2 enzymic digestion

3 exocytosis

4 phagocytosis

5 vacuole formation

Which is the correct sequence of events?

	first →			last
A	1	5	2	3
B	3	2	5	1
C	4	2	5	3
D	4	5	2	1

38 Which type of immunity occurs as a result of the ingestion of antibodies by an infant through its mother's milk?

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

39 An insect lives in and feeds on the tissue of oak tree leaves and is eaten by birds.

Which ecological terms are described in this information about the insect?

	habitat	niche	trophic level
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✓

key

✓ = can be described

✗ = cannot be described

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[Turn over

40 A farmer grows a different crop in a field each year for three years.

In the fourth year the farmer plants a leguminous crop and then ploughs this into the soil. The next year the rotation starts again.

Which microorganisms will increase by the time the rotation starts again?

1 denitrifying bacteria

2 nitrifying bacteria

3 nitrogen-fixing bacteria

4 decomposing bacteria

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

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