UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

SCIENCE (CHEMISTRY, BIOLOGY) **5126/01**

Paper 1 Multiple Choice **October/November 2011**

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.

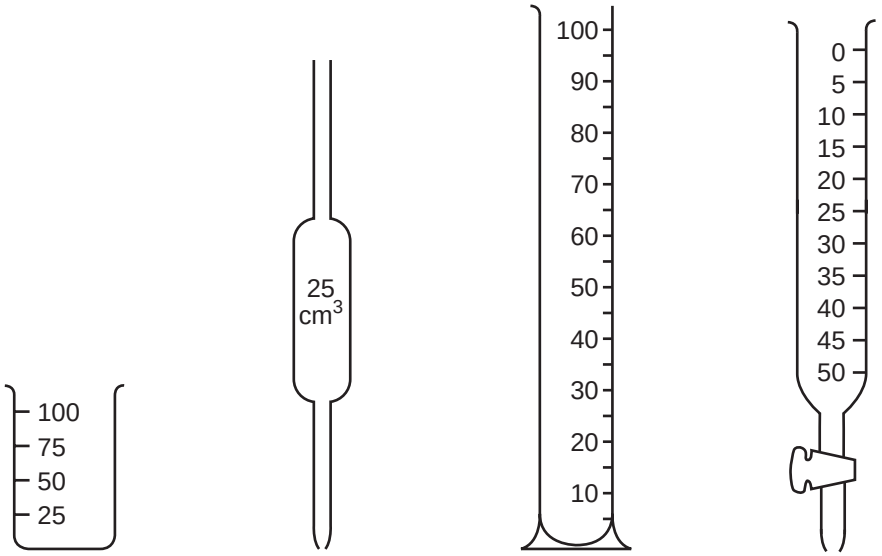
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.

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

UNIVERSITY of CAMBRIDGE International Examinations

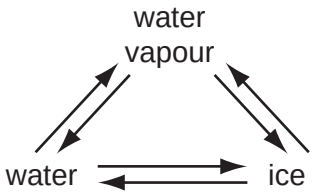
[Turn over

1 Which piece of apparatus would be most suitable to measure accurately the volume of acid needed to neutralise 25.0 cm^3 of an alkali?



A **B** **C** **D**

2 In which conversion do water molecules lose speed?



A ice → water

B ice → water vapour

C water vapour → ice

D water → water vapour

3 An atom of element X is represented by $^{7}_{3}X$.

Which statement about this atom of X is correct?

A It is in Group III of the Periodic Table.

B It is in Group VII of the Periodic Table.

C The total number of protons and electrons is 6.

D The total number of protons and neutrons is 10.

4 How does a magnesium atom form a bond with an oxygen atom?

A by giving two electrons to the oxygen atom

B by sharing one pair of electrons

C by sharing two pairs of electrons

D by taking two electrons from the oxygen atom

5 The table shows the electronic structures of four elements.

element	electronic structure
W	2, 6
X	2, 8
Y	2, 8, 1
Z	2, 8, 7

Which pair of atoms form a covalent molecule?

A two atoms of W

B two atoms of X

C an atom of W and an atom of X

D an atom of Y and an atom of Z

6 A substance contains the ions X^{4+} and Y^{2-}.

What is the simplest formula of the compound containing the ions X^{4+} and Y^{2-}?

A XY_2 **B** X_2Y **C** X_2Y_4 **D** X_4Y_2

7 Which process is endothermic?

A the formation of a hydrogen-chlorine bond

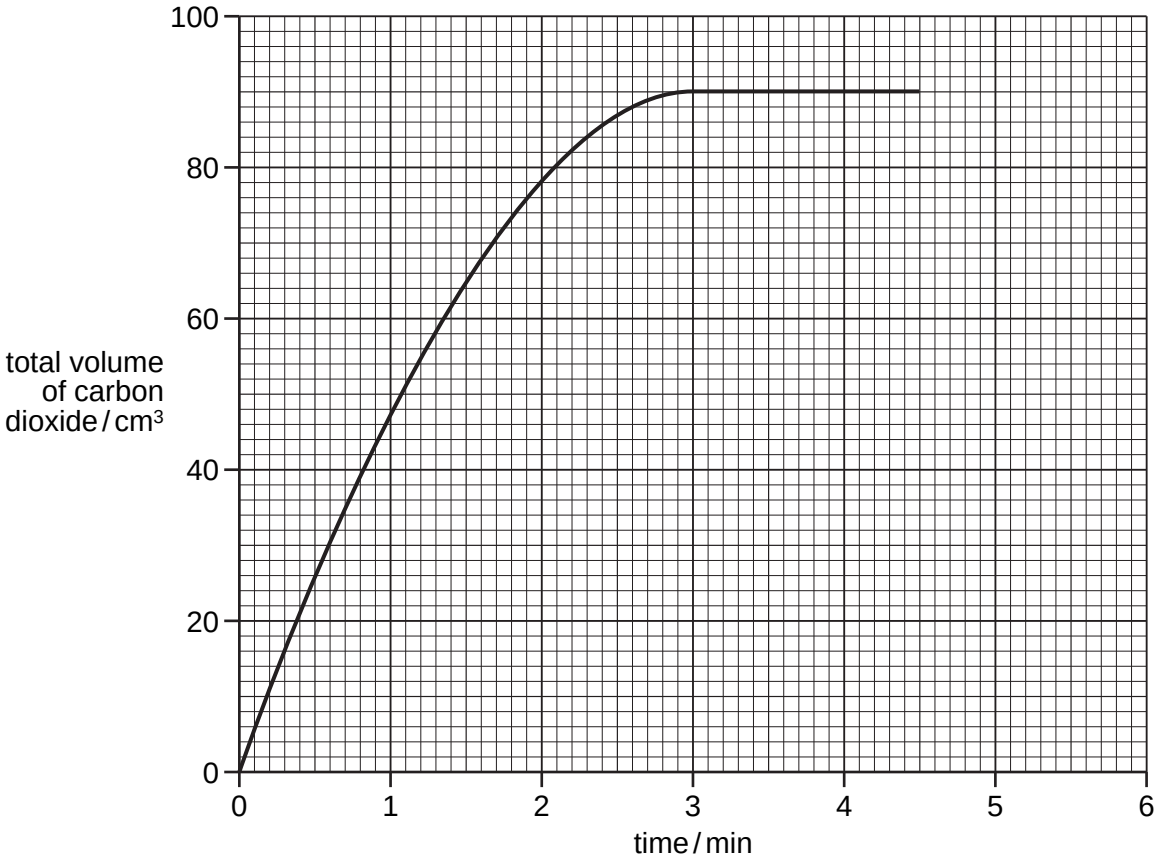
B the formation of silver from silver salts in photography

C the formation of water from oxygen and hydrogen

D the formation of water from steam

8 The rate of the reaction between a given mass of calcium carbonate and an excess of hydrochloric acid is studied by collecting the carbon dioxide in a graduated syringe.

The results are shown in the graph.



How much time is required for half the calcium carbonate to react?

A 0.95 min **B** 1.5 min **C** 2.0 min **D** 3.0 min

9 Which statement about all acids is correct?

A They contain both hydrogen and oxygen.

B They give ammonia with an ammonium salt.

C They have a pH value below 7.

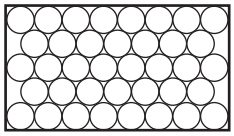
D They react with all metals to form hydrogen.

10 What are the properties of bromine?

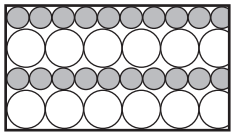
	state at room temperature	result of adding bromine to aqueous potassium iodide
A	gas	no reaction
B	gas	reaction
C	liquid	no reaction
D	liquid	reaction

11 Which diagram represents the structure of an alloy?

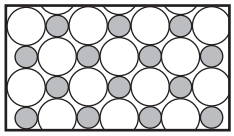
A



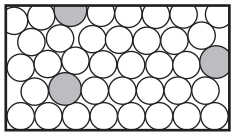
B



C



D



12 Water is formed when hydrogen is passed over the heated oxide of metal X.

No water is formed when hydrogen is passed over the heated oxide of metal Y.

What is the order of reactivity of hydrogen, metal X and metal Y?

	most reactive ⟶		least reactive
A	hydrogen	X	Y
B	X	hydrogen	Y
C	X	Y	hydrogen
D	Y	hydrogen	X

13 Aluminium is used to make saucepans because of its apparent lack of reactivity.

Which property of aluminium explains its unreactivity?

A It has a high electrical conductivity.

B It has a layer of oxide on its surface.

C It has a low density.

D It is in Group III of the Periodic Table.

14 Ammonia may be obtained from ammonium chloride by heating with

A aqueous calcium chloride.

B aqueous sodium hydroxide.

C dilute hydrochloric acid.

D water.

15 The table shows the boiling point ranges of fractions collected from distillation of a sample of petroleum (crude oil).

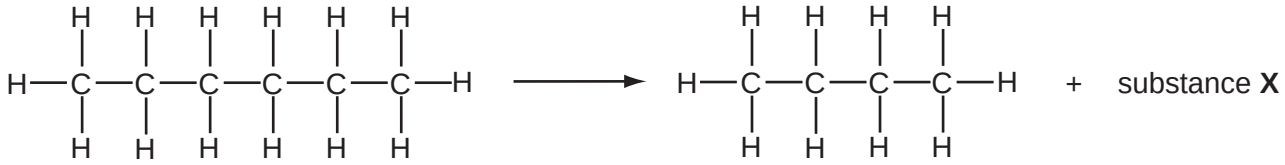
Which fraction contains the smallest molecules?

fraction	boiling point range
A	20 – 50°C
B	50 – 100°C
C	100 – 150°C
D	150 – 250°C

16 Which is the molecular formula of an alkane?

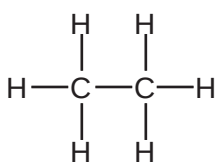
A C_3H_6 **B** C_4H_{10} **C** C_6H_{12} **D** C_7H_{18}

17 The equation shows a molecule of hexane being cracked into two smaller molecules by heating to a high temperature.

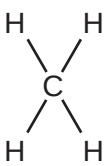


What is the structure of substance **X**?

A



B



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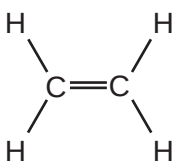

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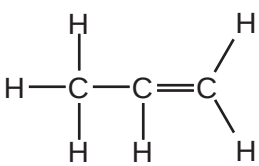
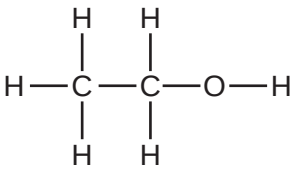
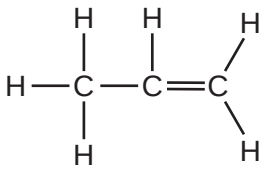


18 Which substance turns aqueous bromine from brown to colourless?

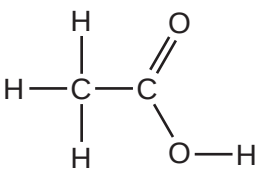
A



B



C



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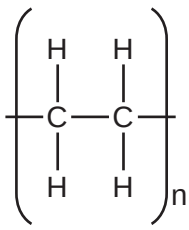


19 Which substance can be oxidised to form ethanoic acid?

A CH_3OH **B** C_2H_5OH **C** C_3H_7OH **D** C_4H_9OH

20 What is formed when proteins are hydrolysed?

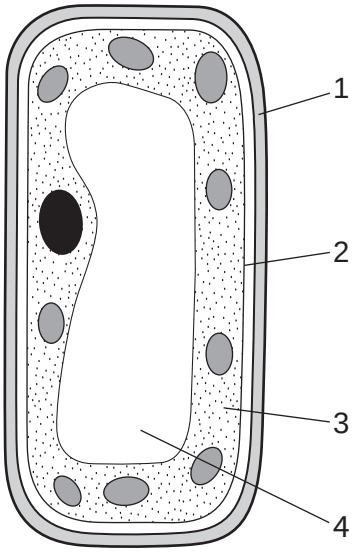
A alcohols

B amino acids

C esters

D fats

21 The diagram shows a plant cell.



Which structures are the cell membrane, cell wall and cytoplasm?

	cell membrane	cell wall	cytoplasm
A	1	2	3
B	1	2	4
C	2	1	3
D	2	1	4

22 A mature xylem vessel has

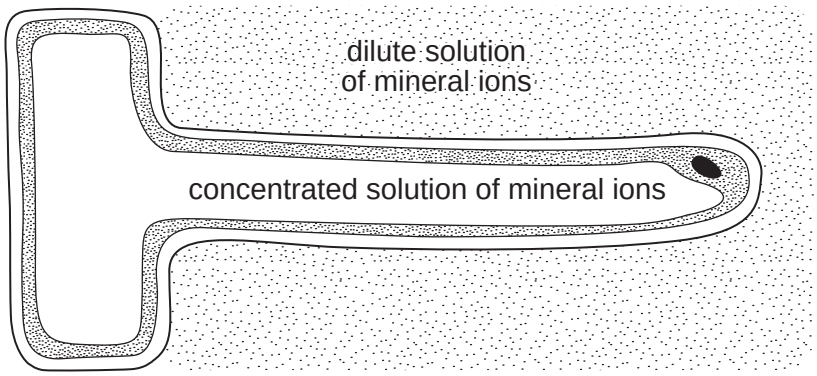
A a cell wall only.

B a cell wall and cytoplasm only.

C a cell membrane, cytoplasm and a nucleus.

D cytoplasm, a cell wall and a nucleus.

23 The diagram shows a root hair, surrounded by a dilute solution of mineral ions.



Which statement describes what happens?

A Water molecules move into the root hair because their concentration is lower inside.

B Water molecules move into the root hair because their concentration is lower outside.

C Water molecules move out of the root hair because their concentration is lower inside.

D Water molecules move out of the root hair because their concentration is lower outside.

24 An experiment is performed to investigate the germination of barley grains, as follows.

- Three petri dishes are set up as shown in diagram 1.
- The dishes are left for 3 days.
- Iodine solution is added to the starch-agar substrate.

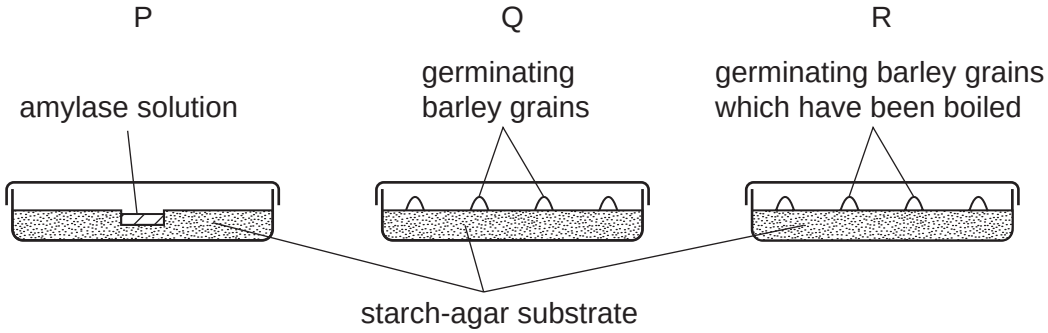


diagram 1
petri dishes viewed from the side

The results are shown in diagram 2. The shaded areas went blue-black.

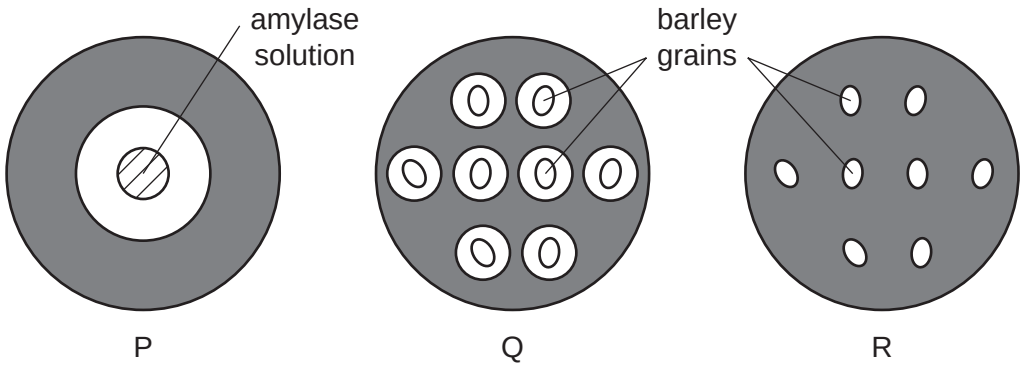


diagram 2
after 3 days, the same petri dishes viewed from above

Which is the **best** explanation of the results?

A Amylase is produced by barley grains that have been boiled.

B Amylase from barley grains is destroyed when they are boiled.

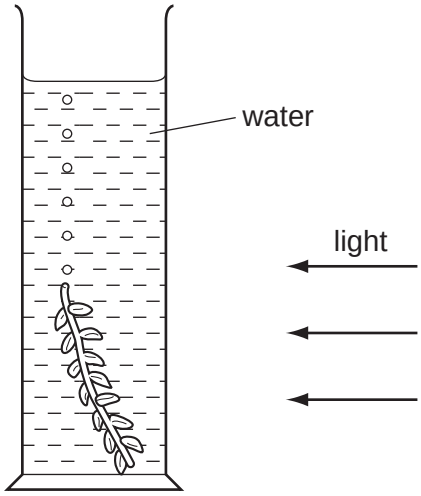
C Germinating grains prevent iodine from staining starch blue / black.

D Starch from the substrate is used by the grains as an energy source.

25 Where and how does carbon dioxide enter a plant?

	where	how
A	root hair cells	osmosis
B	root hair cells	diffusion
C	stomata	osmosis
D	stomata	diffusion

26 The diagram shows a photosynthesising water plant. The rate of photosynthesis is measured by bubbles of gas released.



After a few minutes the bubbles cease.

Which factor in the water might be limiting the rate of photosynthesis?

A carbon dioxide

B nitrate

C oxygen

D water

27 To investigate whether bacteria in the mouth produce acids, a student

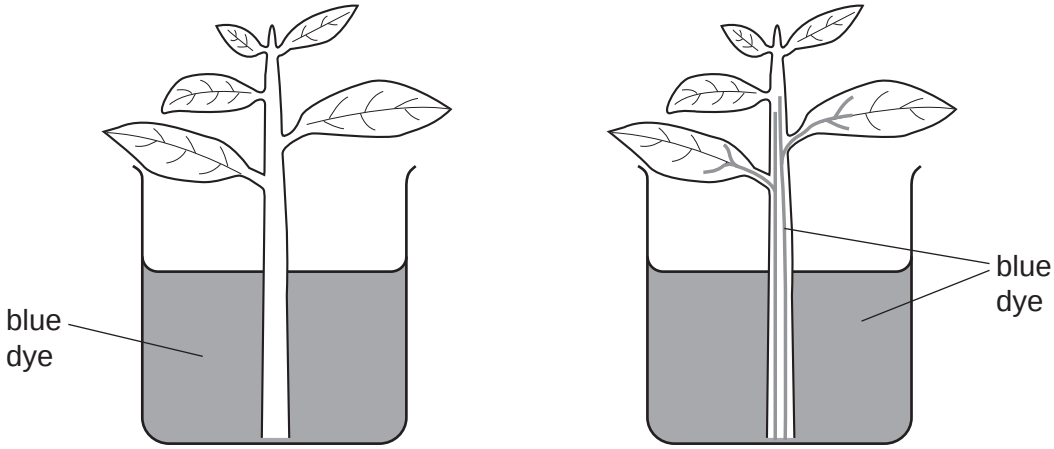
- rubbed two pieces of sterile cotton wool on his teeth,
- dipped only one of these pieces into finely powdered sugar,
- left both pieces in separate petri dishes for thirty minutes,
- covered both pieces with Universal Indicator solution.

[Universal Indicator solution colours: above pH 7, dark green to blue; pH 6-7, green; below pH 6, yellow to red]

Which colours will be observed at the end of the experiment?

	sample dipped into sugar	sample not dipped into sugar
A	green	green
B	green	red
C	red	green
D	red	red

28 A plant shoot with a transparent stem was placed in a beaker containing a blue dye and then examined 5 hours later.



Which statement explains the change in appearance?

A Blue dye diffuses through the cells of the plant.

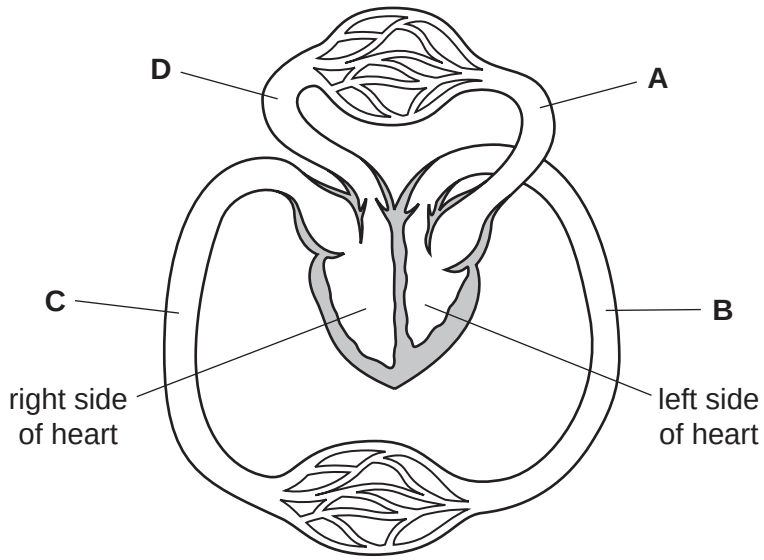
B Blue dye diffuses up the stem by osmosis.

C Blue dye moves up through the phloem.

D Blue dye moves up through the xylem.

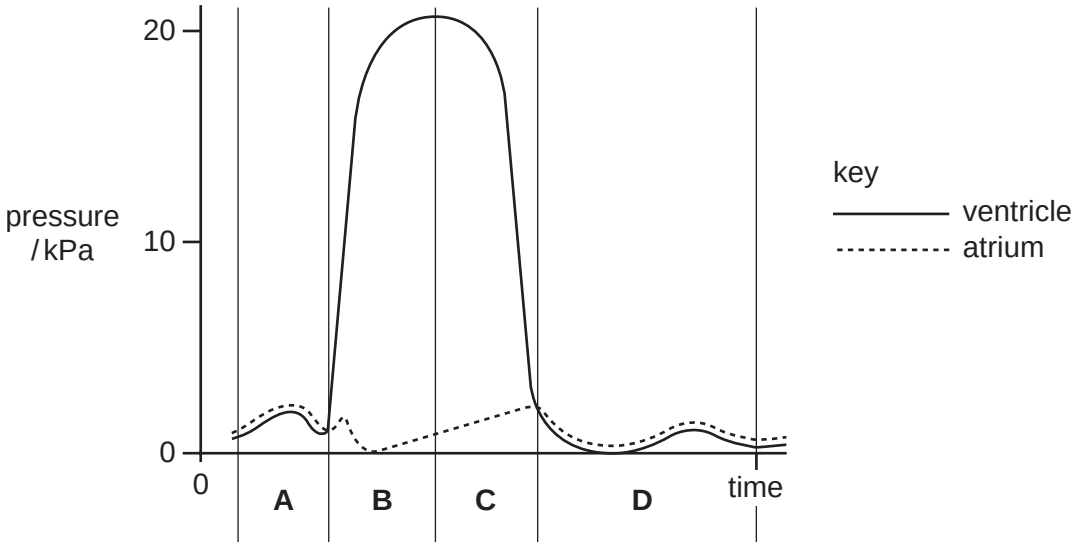
29 The diagram represents part of the human circulatory system.

Where is the blood pressure highest?



30 The graph shows pressure changes in the left ventricle and the left atrium (auricle) as the heart beats.

When is the ventricle contracting?



31 Which equation represents anaerobic respiration in yeast?

A glucose → alcohol + carbon dioxide

B glucose → alcohol + water

C glucose → lactic acid + carbon dioxide

D glucose → lactic acid + water

32 What is the excretory product in blood that is removed by the lungs?

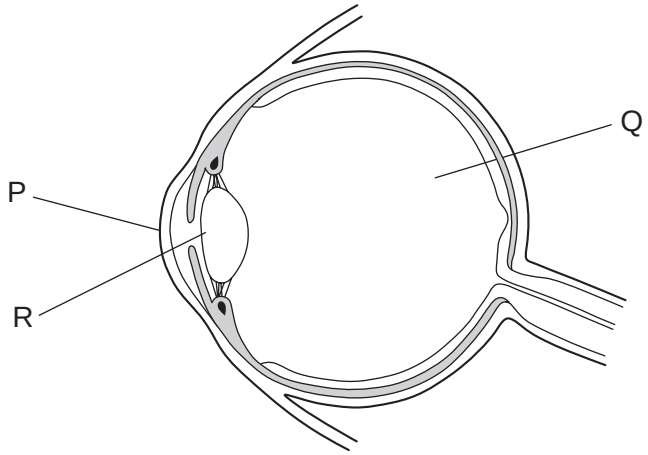
A carbon dioxide

B lactic acid

C urea

D water

33 The diagram shows a section through a human eye.



The eye produces an image by refracting (bending) light onto the retina.

How much of this refraction is created by the parts P, Q and R?

	most refraction	some refraction	no refraction
A	P	Q	R
B	P	R	Q
C	R	P	Q
D	R	Q	P

34 What is the **best** way to discover whether a bacterium would be destroyed by penicillin?

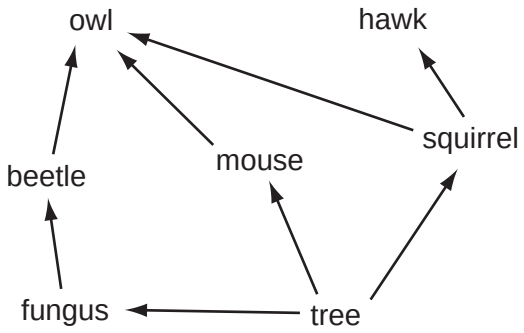
A Compare the growth of the bacterium in a nutrient medium with the growth of a similar but non-pathogenic bacterium.

B Grow the bacterium in a nutrient medium and observe the effect of adding penicillin.

C Inoculate a person with the bacterium and then observe the effect of the treatment with penicillin.

D Treat an infected person with another antibiotic and observe the result.

35 The diagram shows a food web.



Which of the organisms, shown in the food web, can survive by taking in only simple inorganic materials?

A beetle

B fungus

C owl

D tree

36 Which processes occur during the carbon cycle?

	carbon compounds absorbed by living organisms	carbon compounds excreted by living organisms
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

37 Cutting down large areas of tropical forest can lead to a reduction in rainfall.

What is the reason for the reduction in rainfall?

A a reduction in photosynthesis

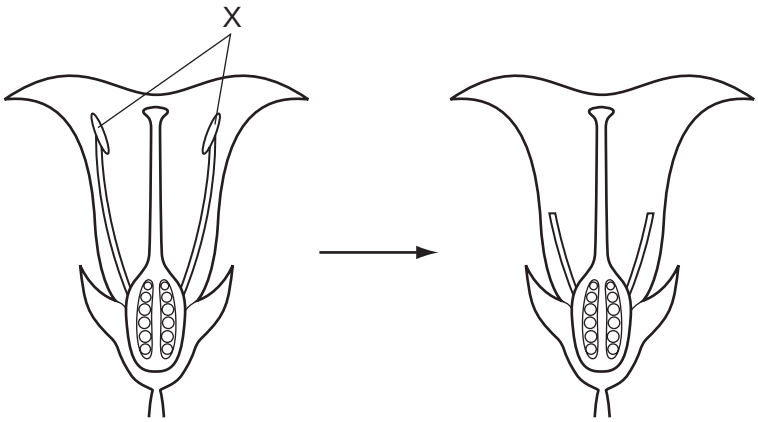
B a reduction in transpiration

C an increase in flooding

D an increase in respiration

38 The diagram shows a flower in longitudinal section.

Before they had developed fully, a plant breeder removed the structures labelled X, as shown.



What is the effect of removing these structures?

A It prevents asexual reproduction.

B It prevents the flower from being pollinated.

C It prevents the flower from producing seeds.

D It prevents the flower from pollinating itself.

39 What is a method of preventing the spread of HIV?

A avoiding sharing cups for drinking

B checking blood before transfusions

C taking the contraceptive pill

D using spermicides

40 Which two characteristics both show continuous variation?

A height and weight

B sex and sickle-cell anaemia

C sickle-cell anaemia and height

D weight and sex

DATA SHEET
The Periodic Table of the Elements

	Group																	
	I	II									III	IV	V	VI	VII	0
																4 **He** Helium 2
						1 **H** Hydrogen 1					11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
	7 **Li** Lithium 3	9 **Be** Beryllium 4									27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
	23 **Na** Sodium 11	24 **Mg** Magnesium 12									70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
	39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	112 **Cd** Cadmium 48	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
	85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	115 **In** Indium 49	115 **In** Indium 49	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
	133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
	Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).