



COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice

May/June 2014

45 minutes

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

* 6 5 5 8 7 5 4 8 2 6 *

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.

A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

This document consists of **19** printed pages and **1** blank page.

1 What are characteristics of all living organisms?

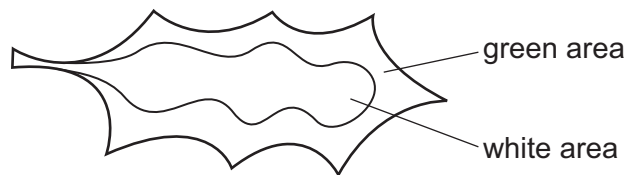
- A reproduction, nutrition, growth and sensitivity
- B respiration, nutrition, digestion and photosynthesis
- C respiration, nutrition, digestion and transpiration
- D sensitivity, respiration, growth and photosynthesis

2 Which statements about enzymes are correct?

- 1 Their activity is always increased at a higher temperature.
- 2 Their activity is affected by the pH of the solution they are in.
- 3 They are carbohydrates.
- 4 They function as biological catalysts.

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

3 The diagram shows a leaf from a plant kept in the dark for 48 hours.



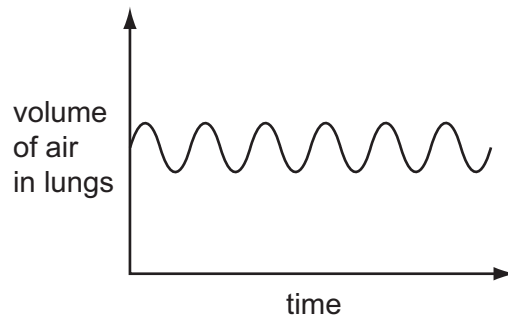
Which colours will be obtained if the leaf is then tested for starch with iodine solution?

	green area	white area
A	blue-black	blue-black
B	blue-black	brown
C	brown	blue-black
D	brown	brown

4 What causes oxygen to diffuse into the blood from an alveolus in the lungs?

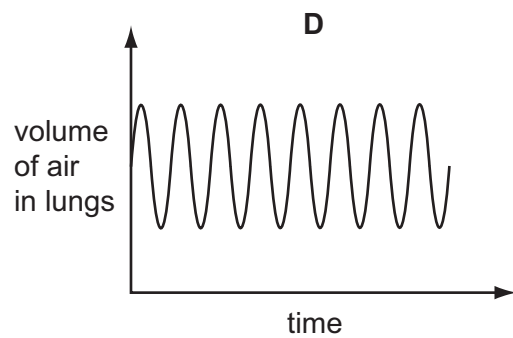
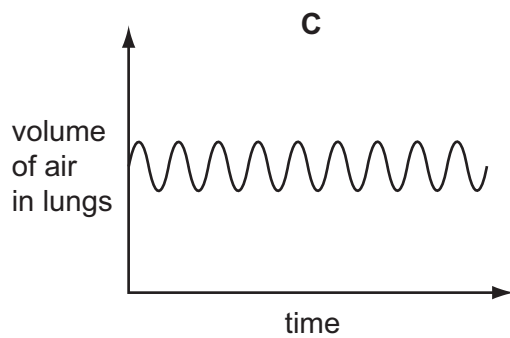
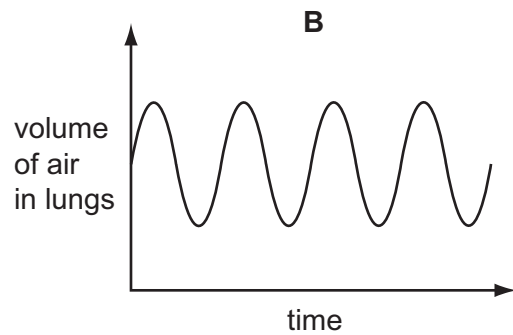
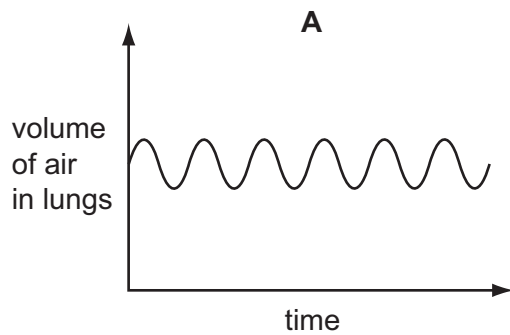
- A The oxygen concentration in the alveolus is higher than in the atmosphere.
- B The oxygen concentration in the alveolus is lower than in the blood.
- C The oxygen concentration in the atmosphere is higher than the carbon dioxide concentration.
- D The oxygen concentration in the blood is lower than in the alveolus.

- 5 The graph shows the changes in volume of air in a person's lungs while at rest.

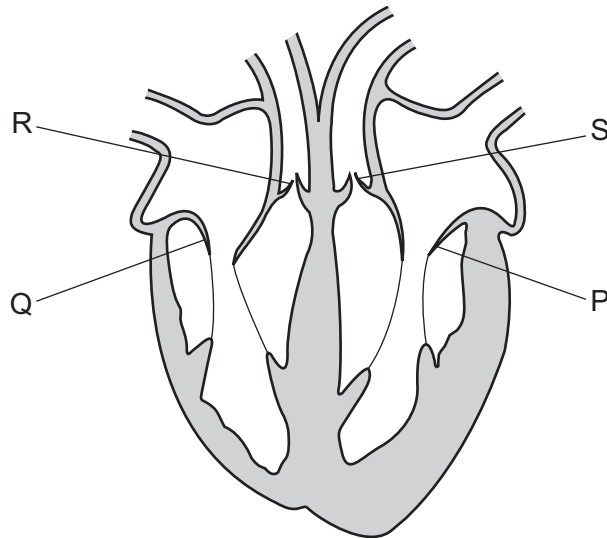


The person runs a race.

Which graph shows the changes in the volume of air immediately after the person finishes the race? All five graphs use the same scales.



- 6 The diagram shows a section through the human heart. The four heart valves are labelled P, Q, R and S.



Which valves are open when the atria contract?

	P	Q	R	S
A	✓	✓	x	x
B	✓	x	✓	x
C	x	✓	x	✓
D	x	x	✓	✓

key

✓ = valve open

x = valve closed

- 7 In which physical state is water when it is absorbed and when it is lost by a plant?

	absorbed	lost
A	liquid	liquid
B	liquid	vapour
C	vapour	liquid
D	vapour	vapour

- 8 Which equation represents aerobic respiration?

- A** carbon dioxide + glucose → oxygen + water
B carbon dioxide + water → glucose + oxygen
C glucose + oxygen → carbon dioxide + water
D glucose + water → carbon dioxide + oxygen

- 9 Which situation is most likely to cause an increase in the secretion of adrenaline?
- A A person eats a meal rich in glucose.
 B A person is awoken suddenly by thunder and lightning.
 C A person's blood glucose level decreases because they have not eaten.
 D A person's pulse rate falls while they are asleep.
- 10 What is the function of the sepals in most insect-pollinated plants?
- A to attract insects with colour
 B to make nectar
 C to manufacture pollen
 D to protect flower buds
- 11 Diagram 1 shows a growing seedling after the first few days' growth.

The seedling was then rotated, held in the position shown in diagram 2 and placed in the dark for three days.

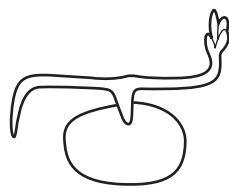


diagram 1

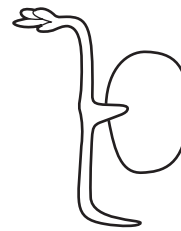


diagram 2

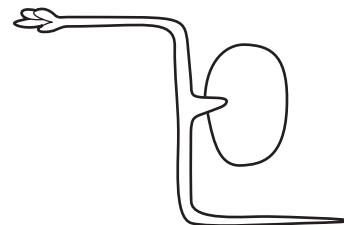
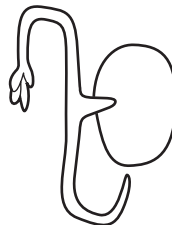
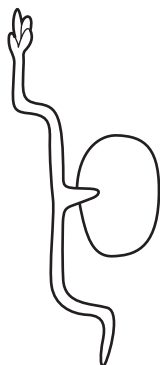
What is the shape of the seedling three days later?

A

B

C

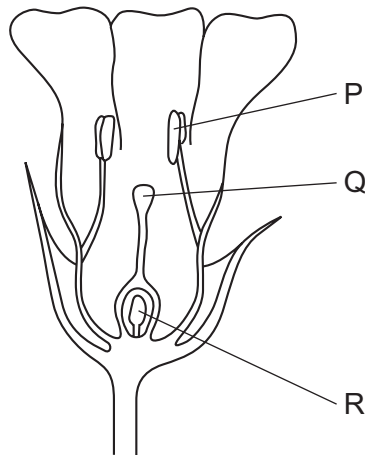
D



12 Which process absorbs carbon dioxide from the atmosphere?

- A combustion
- B decay
- C photosynthesis
- D respiration

13 The diagram shows a section through a flower.



Where are the male and female gametes (sex cells) made?

	male gametes	female gametes
A	P	Q
B	P	R
C	Q	P
D	Q	R

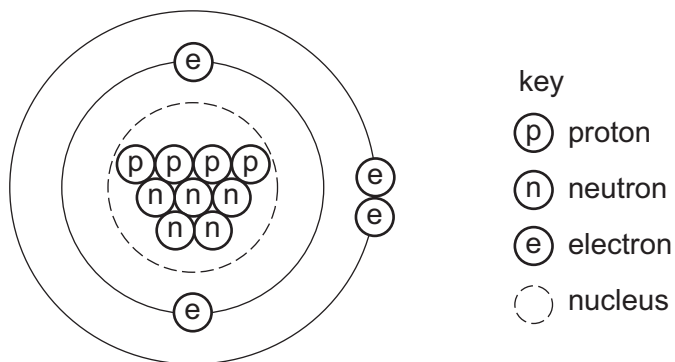
14 The table shows the formulae of three substances.

substance	formula
methane	CH ₄
water	H ₂ O
oxygen	O ₂

Which statement is correct?

- A Methane is made from five types of atom.
- B Methane, water and oxygen are molecules.
- C Only methane and water are molecules.
- D Oxygen is made from two types of atom.

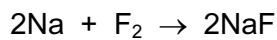
15 The diagram represents an atom.



What is the nucleon number of this atom?

- A** 2 **B** 4 **C** 9 **D** 13

16 Sodium and fluorine react together violently to form sodium fluoride.



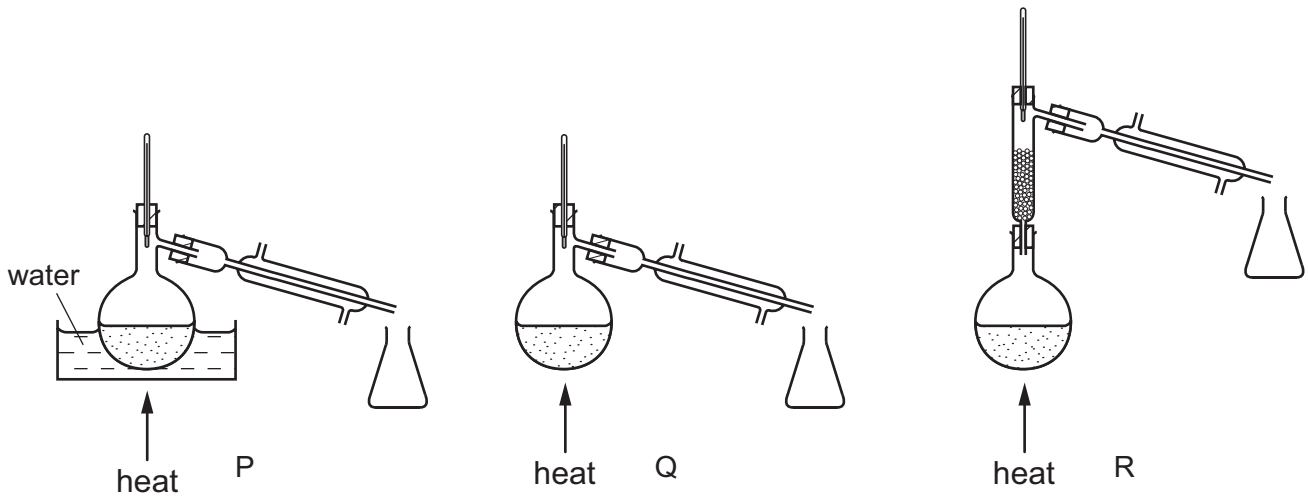
Which changes occur to each atom when sodium and fluorine react together?

	sodium atom	fluorine atom
A	gains one electron	loses two electrons
B	gains two electrons	loses one electron
C	loses one electron	gains one electron
D	loses two electrons	gains two electrons

17 A mixture contains two liquids.

One liquid has a boiling point of 120°C and the other boils at 160°C .

They are separated by fractional distillation.



Which apparatus is used to separate the two liquids?

- A** P and Q **B** P only **C** Q only **D** R only

18 A molecule of phosphoric acid contains three hydrogen atoms, one phosphorus atom and four oxygen atoms.

What is the formula of this molecule?

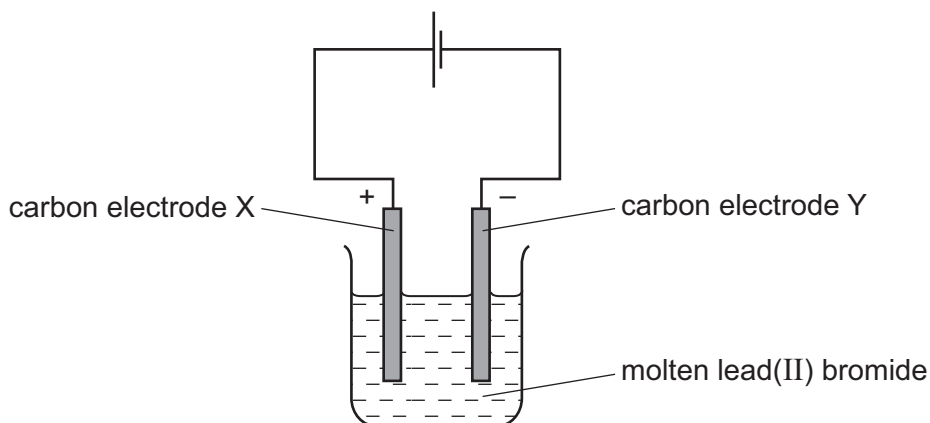
- A** H_3PO_4 **B** $\text{H}_3(\text{PO})_4$ **C** 3HPO_4 **D** $3\text{HP}_4\text{O}$

19 The formula of the hydrocarbon octane is C_8H_{18} .

What are the products of complete combustion of octane?

- A** carbon and hydrogen
B carbon and water
C carbon dioxide and water
D carbon monoxide and water

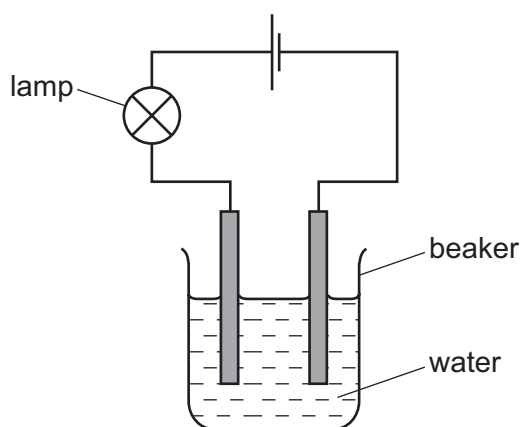
20 The diagram shows the electrolysis of molten lead(II) bromide.



Which statement is correct?

- A Bromine is formed at electrode Y.
- B Hydrogen is formed at electrode X.
- C Lead is formed at electrode Y.
- D Oxygen is formed at electrode X.

21 The apparatus shown is used to test a property of compound R.



The lamp does not light when the beaker contains pure water.

When compound R is dissolved in the water, the lamp lights.

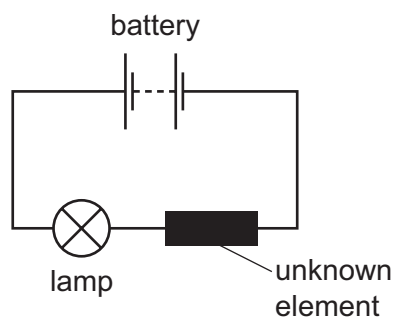
Which statements about R are correct?

	type of bonding	elements of compound R
A	covalent	a metal and a non-metal
B	covalent	non-metals only
C	ionic	non-metals only
D	ionic	a metal and a non-metal

22 Which substance does **not** react with dilute hydrochloric acid to form copper(II) chloride?

- A copper
- B copper carbonate
- C copper hydroxide
- D copper oxide

23 An unknown element is tested using the apparatus shown.



The lamp did not light.

Which statement about the element is correct?

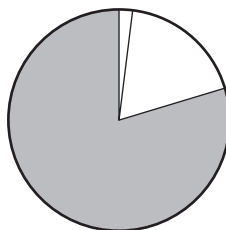
- A It is a Group I metal.
- B It is an alloy.
- C It is a non-metal.
- D It is a transition element.

24 Limestone chips react with hydrochloric acid.

Which change decreases the speed of the reaction?

- A adding a catalyst
- B decreasing the temperature
- C increasing the concentration of hydrochloric acid
- D using limestone powder

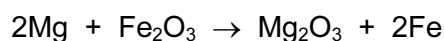
25 The diagram shows the composition of air.



Which gas is shown by the shaded part?

- A carbon dioxide
 - B nitrogen
 - C noble gases
 - D oxygen
- 26 Which statement describes a hydrocarbon?
- A a compound that burns to form carbon dioxide and hydrogen
 - B a compound that contains carbon and hydrogen only
 - C a compound that only contains ionic bonds
 - D a compound that reacts easily with metals
- 27 Magnesium can be used to extract iron from iron(III) oxide, Fe_2O_3 to give magnesium oxide and iron.

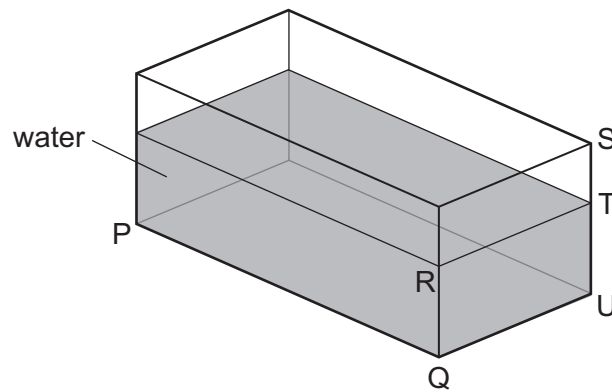
The equation for the reaction is shown.



Why is magnesium used in this reaction?

- A It is less reactive than iron and oxidises iron(III) oxide.
- B It is less reactive than iron and reduces iron(III) oxide.
- C It is more reactive than iron and oxidises iron(III) oxide.
- D It is more reactive than iron and reduces iron(III) oxide.

28 A glass tank contains some water.

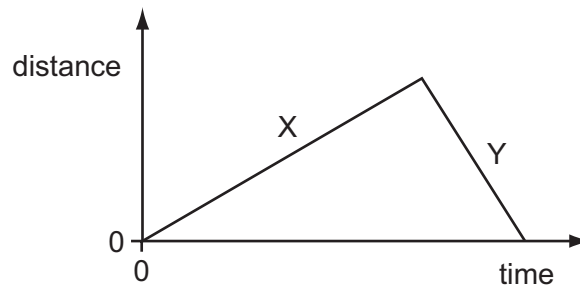


Only the length PQ and the width QU of the tank are known.

Which other distance must be known to calculate the volume of the water?

- A** RT **B** ST **C** SU **D** TU

29 The distance/time graph shows the motion of a car.



Which row describes the speed of the car in section X and the speed of the car in section Y of the graph?

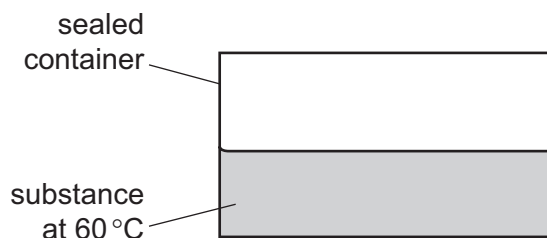
	speed in section X	speed in section Y
A	constant	constant
B	constant	decreasing
C	increasing	constant
D	increasing	decreasing

- 30 A worker on a building site lifts a heavy concrete block onto a lorry. He then lifts a lighter block the same distance in the same time.

Which row about the work done and the power exerted is correct?

	work done in lifting the blocks	power exerted by worker
A	less for the lighter block	less for the lighter block
B	less for the lighter block	the same for both blocks
C	more for the lighter block	more for the lighter block
D	the same for both blocks	more for the lighter block

- 31 A substance has a melting point of -114°C and a boiling point of 79°C . Some of the substance is placed in a container that is then sealed.



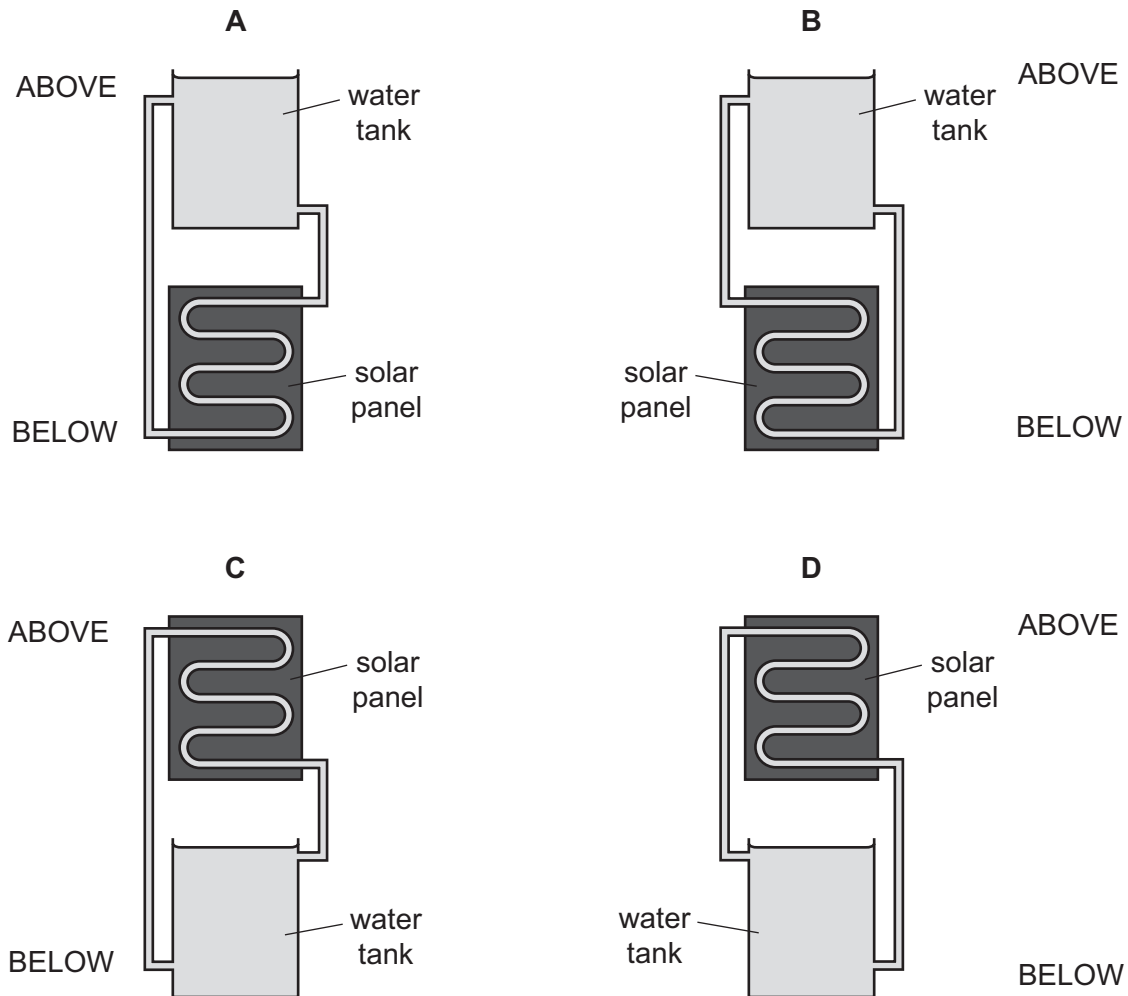
The substance and the sealed container are kept at a temperature of 60°C for several hours.

In which state or states is the substance after this time?

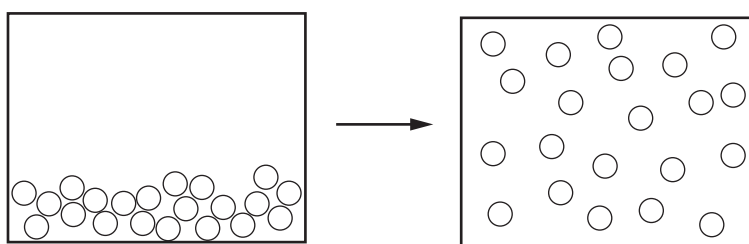
- A** solid only
- B** solid and liquid
- C** liquid only
- D** liquid and gas

- 32 A solar panel is used to heat water. The hot water is then stored in a water tank. Water stored in the water tank is returned to the solar panel for further heating when the water cools. There is no pump to move the hot water to the water tank and the cooler water back to the panel.

Which arrangement enables the hot water from the solar panel to move freely to the water tank and the cooler water to return to the solar panel?

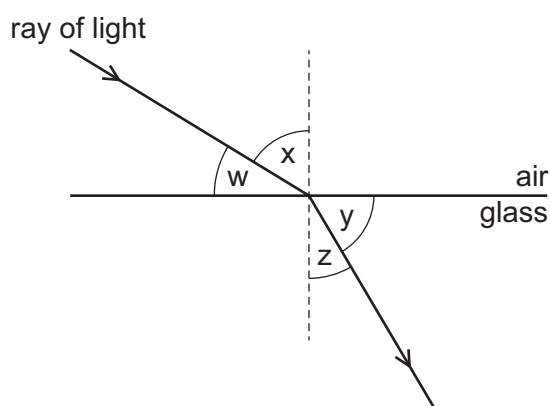


- 33 The diagram shows how the arrangement of the atoms in a substance changes during a change of state.



Which change of state is shown?

- A gas to liquid
 - B liquid to gas
 - C liquid to solid
 - D solid to liquid
- 34 The diagram shows a ray of light passing from air into glass.



Which labelled angles are the angle of incidence and the angle of refraction?

	angle of incidence	angle of refraction
A	w	y
B	w	z
C	x	y
D	x	z

35 The diagram shows the electromagnetic spectrum.

radio waves	microwaves	infra-red waves	visible light	ultraviolet waves	X-rays	gamma rays
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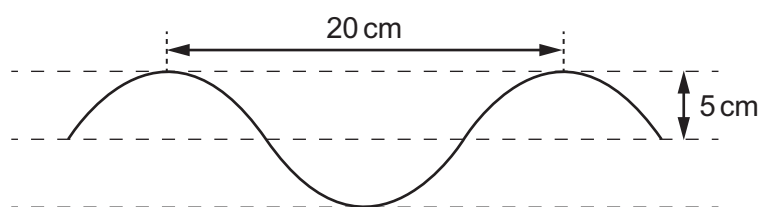
Which statement about electromagnetic waves is correct?

- A Microwaves are used in television remote controllers.
- B Microwaves have larger wavelengths than visible light.
- C Radio waves are used to send television signals from satellites to Earth.
- D Radio waves have higher frequencies than X-rays.

36 The diagram shows a section of a rope.

Four waves pass along the rope every second.

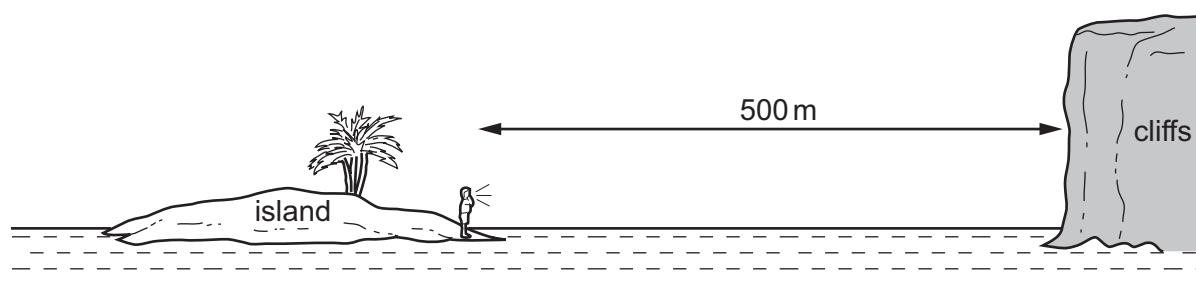
Each wave travels 80 cm in one second.



What is the speed of the wave?

- A 4.0 cm/s
- B 5.0 cm/s
- C 20 cm/s
- D 80 cm/s

37 A boy on an island is 500 m from some cliffs.



He shouts and he hears an echo from the cliffs.

Sound travels at 340 m/s through the air.

What is the time interval between when the boy shouts and when he hears the echo?

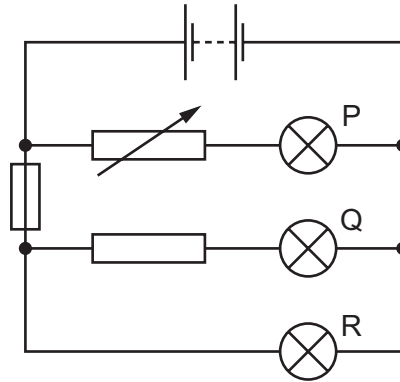
- A $\frac{500}{340}$ s
- B $\frac{2 \times 500}{340}$ s
- C $\frac{340}{500}$ s
- D $\frac{2 \times 340}{500}$ s

38 Which group contains a material that prevents electrical charge from flowing through it?

- A aluminium, copper, mercury
- B brass, nickel, steel
- C glass, gold, zinc
- D silver, iron, lead

39 The diagram shows a circuit containing three lamps P, Q and R.

All the lamps are lit.

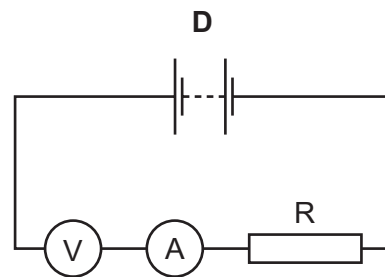
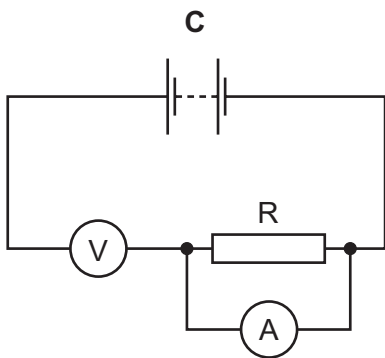
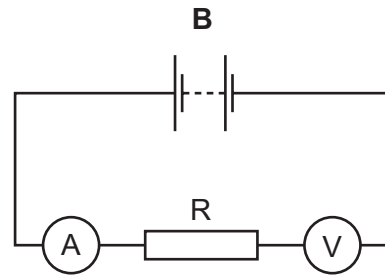
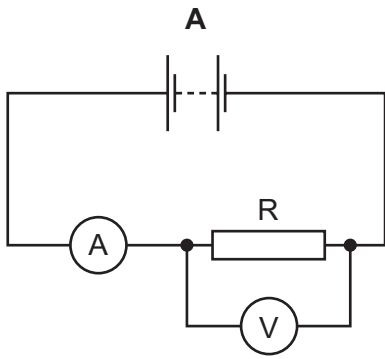


The fuse melts (blows).

Which lamps go out?

- A P and Q
- B P only
- C Q and R
- D Q only

40 Which circuit can be used to determine the resistance of resistor R?



DATA SHEET
The Periodic Table of the Elements

Group		I	II	III	IV	V	VI	VII	0
		1 H Hydrogen 1							2 He Helium 2
3 7 Li Lithium 4	9 Be Beryllium 4							19 F Fluorine 9	20 Ne Neon 10
11 23 Na Sodium 11	12 24 Mg Magnesium 12			5 11 B Boron 5	6 12 C Carbon 6	7 14 N Nitrogen 7	8 16 O Oxygen 8	9 17 Cl Chlorine 17	10 18 Ar Argon 18
19 39 K Potassium 19	20 40 Ca Calcium 20			13 27 Al Aluminium 13	14 28 Si Silicon 14	15 31 P Phosphorus 15	16 32 S Sulfur 16	17 35.5 Cl Chlorine 17	18 40 Ar Argon 18
37 85 Rb Rubidium 37	38 88 Sr Strontium 38			31 65 Zn Zinc 30	32 73 Ge Germanium 32	33 75 As Arsenic 33	34 79 Se Selenium 34	35 80 Br Bromine 35	36 84 Kr Krypton 36
55 133 Cs Caesium 55	56 137 Ba Barium 56			44 101 Ru Ruthenium 44	45 103 Rh Rhodium 45	46 106 Pd Palladium 46	47 108 Ag Silver 47	51 122 Sb Antimony 51	52 127 I Iodine 53
87 226 Fr Francium 87	88 227 Ra Radium 88			59 122 Fe Iron 26	60 126 Cobalt Cobalt 27	61 127 Ni Nickel 28	62 128 Cu Copper 29	63 129 Zn Zinc 30	64 131 Ga Gallium 31
				62 132 Cr Chromium 24	63 135 Mn Manganese 25	64 136 Co Cobalt 27	65 138 Ni Nickel 28	66 140 Cu Copper 29	67 143 Zn Zinc 30
				66 141 Fe Iron 26	67 144 Mn Manganese 25	68 146 Co Cobalt 27	69 148 Ni Nickel 28	70 150 Cu Copper 29	71 152 Zn Zinc 30
				69 149 Cr Chromium 24	70 151 Mn Manganese 25	71 153 Co Cobalt 27	72 155 Ni Nickel 28	73 157 Cu Copper 29	74 159 Zn Zinc 30
				72 157 Cr Chromium 24	73 158 Mn Manganese 25	74 160 Co Cobalt 27	75 163 Ni Nickel 28	76 165 Cu Copper 29	77 167 Zn Zinc 30
				73 159 Cr Chromium 24	74 161 Mn Manganese 25	75 163 Co Cobalt 27	76 166 Ni Nickel 28	77 168 Cu Copper 29	78 170 Zn Zinc 30
				74 162 Cr Chromium 24	75 164 Mn Manganese 25	76 166 Co Cobalt 27	77 169 Ni Nickel 28	78 171 Cu Copper 29	79 173 Zn Zinc 30
				75 163 Cr Chromium 24	76 165 Mn Manganese 25	77 167 Co Cobalt 27	78 170 Ni Nickel 28	79 172 Cu Copper 29	80 174 Zn Zinc 30
				76 164 Cr Chromium 24	77 166 Mn Manganese 25	78 168 Co Cobalt 27	79 171 Ni Nickel 28	80 173 Cu Copper 29	81 175 Zn Zinc 30
				77 165 Cr Chromium 24	78 167 Mn Manganese 25	79 169 Co Cobalt 27	80 172 Ni Nickel 28	81 174 Cu Copper 29	82 176 Zn Zinc 30
				78 166 Cr Chromium 24	79 168 Mn Manganese 25	80 170 Co Cobalt 27	81 173 Ni Nickel 28	82 175 Cu Copper 29	83 177 Zn Zinc 30
				79 167 Cr Chromium 24	80 169 Mn Manganese 25	81 171 Co Cobalt 27	82 174 Ni Nickel 28	83 176 Cu Copper 29	84 178 Zn Zinc 30
				80 168 Cr Chromium 24	81 170 Mn Manganese 25	82 172 Co Cobalt 27	83 175 Ni Nickel 28	84 177 Cu Copper 29	85 179 Zn Zinc 30
				81 169 Cr Chromium 24	82 171 Mn Manganese 25	83 173 Co Cobalt 27	84 176 Ni Nickel 28	85 178 Cu Copper 29	86 180 Zn Zinc 30
				82 170 Cr Chromium 24	83 172 Mn Manganese 25	84 174 Co Cobalt 27	85 177 Ni Nickel 28	86 179 Cu Copper 29	87 181 Zn Zinc 30
				83 171 Cr Chromium 24	84 173 Mn Manganese 25	85 175 Co Cobalt 27	86 178 Ni Nickel 28	87 180 Cu Copper 29	88 182 Zn Zinc 30
				84 172 Cr Chromium 24	85 174 Mn Manganese 25	86 176 Co Cobalt 27	87 179 Ni Nickel 28	88 181 Cu Copper 29	89 183 Zn Zinc 30
				85 173 Cr Chromium 24	86 175 Mn Manganese 25	87 177 Co Cobalt 27	88 180 Ni Nickel 28	89 182 Cu Copper 29	90 184 Zn Zinc 30
				86 174 Cr Chromium 24	87 176 Mn Manganese 25	88 178 Co Cobalt 27	89 181 Ni Nickel 28	90 183 Cu Copper 29	91 185 Zn Zinc 30
				87 175 Cr Chromium 24	88 177 Mn Manganese 25	89 179 Co Cobalt 27	90 182 Ni Nickel 28	91 184 Cu Copper 29	92 186 Zn Zinc 30
				88 176 Cr Chromium 24	89 178 Mn Manganese 25	90 180 Co Cobalt 27	91 183 Ni Nickel 28	92 185 Cu Copper 29	93 187 Zn Zinc 30
				89 177 Cr Chromium 24	90 179 Mn Manganese 25	91 181 Co Cobalt 27	92 184 Ni Nickel 28	93 186 Cu Copper 29	94 188 Zn Zinc 30
				90 178 Cr Chromium 24	91 180 Mn Manganese 25	92 182 Co Cobalt 27	93 185 Ni Nickel 28	94 187 Cu Copper 29	95 189 Zn Zinc 30
				91 179 Cr Chromium 24	92 181 Mn Manganese 25	93 183 Co Cobalt 27	94 186 Ni Nickel 28	95 188 Cu Copper 29	96 190 Zn Zinc 30
				92 180 Cr Chromium 24	93 182 Mn Manganese 25	94 184 Co Cobalt 27	95 187 Ni Nickel 28	96 189 Cu Copper 29	97 191 Zn Zinc 30
				93 181 Cr Chromium 24	94 183 Mn Manganese 25	95 185 Co Cobalt 27	96 188 Ni Nickel 28	97 190 Cu Copper 29	98 192 Zn Zinc 30
				94 182 Cr Chromium 24	95 184 Mn Manganese 25	96 186 Co Cobalt 27	97 189 Ni Nickel 28	98 191 Cu Copper 29	99 193 Zn Zinc 30
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				96 184 Cr Chromium 24	97 186 Mn Manganese 25	98 188 Co Cobalt 27	99 191 Ni Nickel 28	100 193 Cu Copper 29	101 195 Zn Zinc 30
				97 185 Cr Chromium 24	98 187 Mn Manganese 25	99 189 Co Cobalt 27	100 192 Ni Nickel 28	101 194 Cu Copper 29	102 196 Zn Zinc 30
				98 186 Cr Chromium 24	99 188 Mn Manganese 25	100 190 Co Cobalt 27	101 193 Ni Nickel 28	102 195 Cu Copper 29	103 197 Zn Zinc 30
				99 187 Cr Chromium 24	100 189 Mn Manganese 25	101 191 Co Cobalt 27	102 194 Ni Nickel 28	103 196 Cu Copper 29	104 198 Zn Zinc 30
				100 188 Cr Chromium 24	101 190 Mn Manganese 25	102 192 Co Cobalt 27	103 195 Ni Nickel 28	104 197 Cu Copper 29	105 199 Zn Zinc 30
				101 189 Cr Chromium 24	102 191 Mn Manganese 25	103 193 Co Cobalt 27	104 196 Ni Nickel 28	105 198 Cu Copper 29	106 200 Zn Zinc 30
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				103 191 Cr Chromium 24	104 193 Mn Manganese 25	105 195 Co Cobalt 27	106 198 Ni Nickel 28	107 200 Cu Copper 29	108 202 Zn Zinc 30
				104 192 Cr Chromium 24	105 194 Mn Manganese 25	106 196 Co Cobalt 27	107 199 Ni Nickel 28	108 201 Cu Copper 29	109 203 Zn Zinc 30
				105 193 Cr Chromium 24	106 195 Mn Manganese 25	107 197 Co Cobalt 27	108 200 Ni Nickel 28	109 202 Cu Copper 29	110 204 Zn Zinc 30
				106 194 Cr Chromium 24	107 196 Mn Manganese 25	108 198 Co Cobalt 27	109 201 Ni Nickel 28	110 203 Cu Copper 29	111 205 Zn Zinc 30
				107 195 Cr Chromium 24	108 197 Mn Manganese 25	109 199 Co Cobalt 27	110 202 Ni Nickel 28	111 204 Cu Copper 29	112 206 Zn Zinc 30
				108 196 Cr Chromium 24	109 198 Mn Manganese 25	110 200 Co Cobalt 27	111 203 Ni Nickel 28	112 205 Cu Copper 29	113 207 Zn Zinc 30
				109 197 Cr Chromium 24	110 199 Mn Manganese 25	111 201 Co Cobalt 27	112 204 Ni Nickel 28	113 206 Cu Copper 29	114 208 Zn Zinc 30
				110 198 Cr Chromium 24	111 200 Mn Manganese 25	112 202 Co Cobalt 27	113 205 Ni Nickel 28	114 207 Cu Copper 29	115 209 Zn Zinc 30
				111 199 Cr Chromium 24	112 201 Mn Manganese 25	113 203 Co Cobalt 27	114 206 Ni Nickel 28	115 208 Cu Copper 29	116 210 Zn Zinc 30
				112 200 Cr Chromium 24	113 202 Mn Manganese 25	114 204 Co Cobalt 27	115 207 Ni Nickel 28	116 209 Cu Copper 29	117 211 Zn Zinc 30
				113 201 Cr Chromium 24	114 203 Mn Manganese 25	115 205 Co Cobalt 27	116 208 Ni Nickel 28	117 210 Cu Copper 29	118 212 Zn Zinc 30
				114 202 Cr Chromium 24	115 204 Mn Manganese 25	116 206 Co Cobalt 27	117 209 Ni Nickel 28	118 211 Cu Copper 29	119 213 Zn Zinc 30
				115 203 Cr Chromium 24	116 205 Mn Manganese 25	117 207 Co Cobalt 27	118 210 Ni Nickel 28	119 212 Cu Copper 29	120 214 Zn Zinc 30
				116 204 Cr Chromium 24	117 206 Mn Manganese 25	118 208 Co Cobalt 27	119 211 Ni Nickel 28	120 213 Cu Copper 29	121 215 Zn Zinc 30
				117 205 Cr Chromium 24	118 207 Mn Manganese 25	119 209 Co Cobalt 27	120 212 Ni Nickel 28	121 214 Cu Copper 29	122 216 Zn Zinc 30
				118 206 Cr Chromium 24	119 208 Mn Manganese 25	120 210 Co Cobalt 27	121 213 Ni Nickel 28	122 215 Cu Copper 29	123 217 Zn Zinc 30
				119 207 Cr Chromium 24	120 209 Mn Manganese 25	121 211 Co Cobalt 27	122 214 Ni Nickel 28	123 216 Cu Copper 29	124 218 Zn Zinc 30
				120 208 Cr Chromium 24	121 210 Mn Manganese 25	122 212 Co Cobalt 27	123 215 Ni Nickel 28	124 217 Cu Copper 29	125 219 Zn Zinc 30
				121 209 Cr Chromium 24	122				