



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/11**

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)

\* 8 5 2 9 0 7 0 2 6 4 \*

**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.

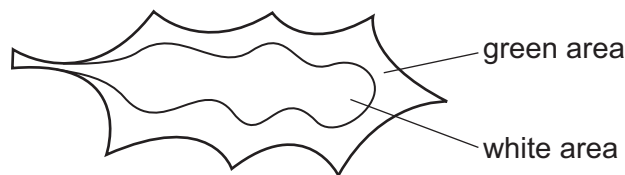
Any rough working should be done in this booklet.

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.

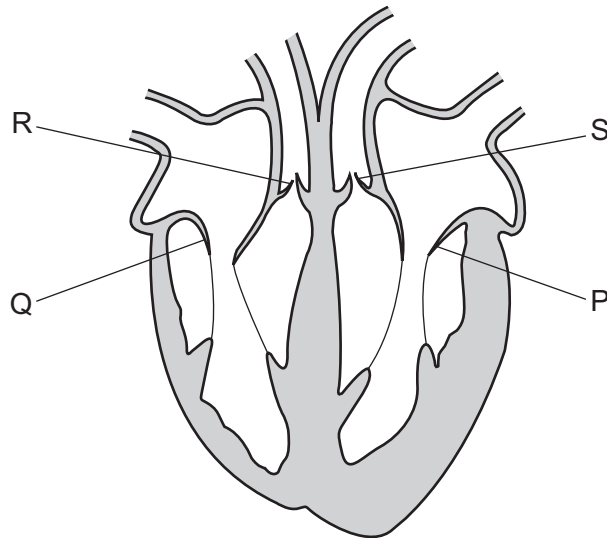
- 1 What are characteristics of all living organisms?
- A** reproduction, nutrition, growth and sensitivity  
**B** respiration, nutrition, digestion and photosynthesis  
**C** respiration, nutrition, digestion and transpiration  
**D** sensitivity, respiration, growth and photosynthesis
- 2 What causes 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.
- 3 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
- 4 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
<b>A</b>	blue-black	blue-black
<b>B</b>	blue-black	brown
<b>C</b>	brown	blue-black
<b>D</b>	brown	brown

- 5 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
<b>A</b>	✓	✓	x	x
<b>B</b>	✓	x	✓	x
<b>C</b>	x	✓	x	✓
<b>D</b>	x	x	✓	✓

key

✓ = valve open

x = valve closed

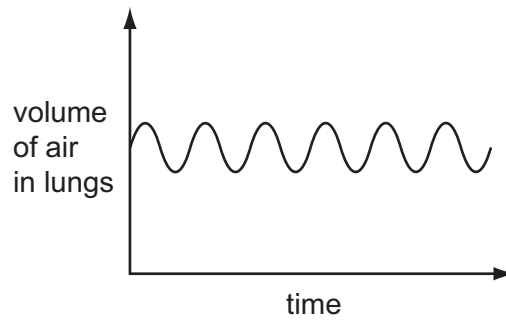
- 6 In which physical state is water when it is absorbed and when it is lost by a plant?

	absorbed	lost
<b>A</b>	liquid	liquid
<b>B</b>	liquid	vapour
<b>C</b>	vapour	liquid
<b>D</b>	vapour	vapour

- 7 Which equation represents aerobic respiration?

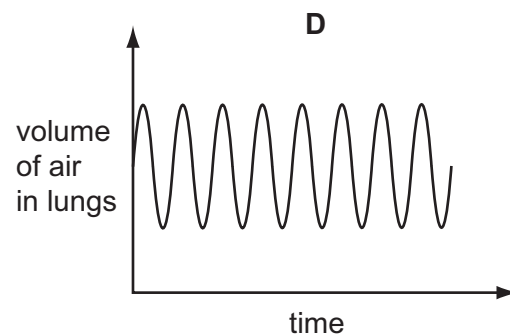
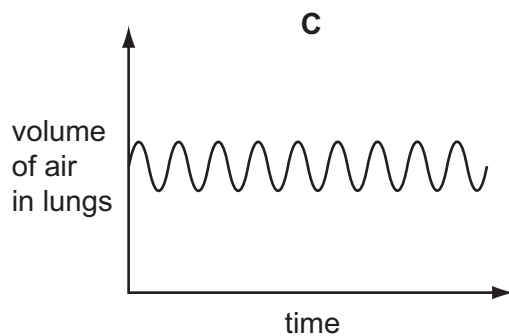
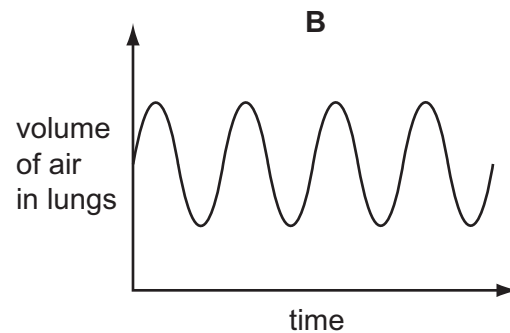
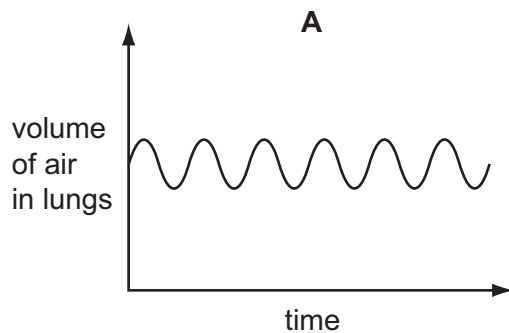
- A** carbon dioxide + glucose → oxygen + water  
**B** carbon dioxide + water → glucose + oxygen  
**C** glucose + oxygen → carbon dioxide + water  
**D** glucose + water → carbon dioxide + oxygen

- 8 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.



- 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 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.

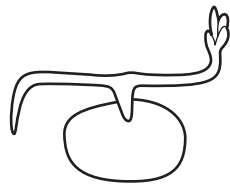


diagram 1

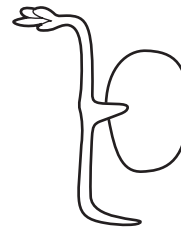


diagram 2

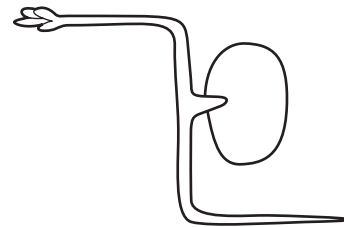
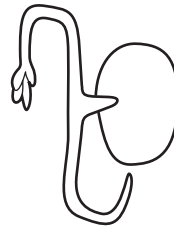
What is the shape of the seedling three days later?

**A**

**B**

**C**

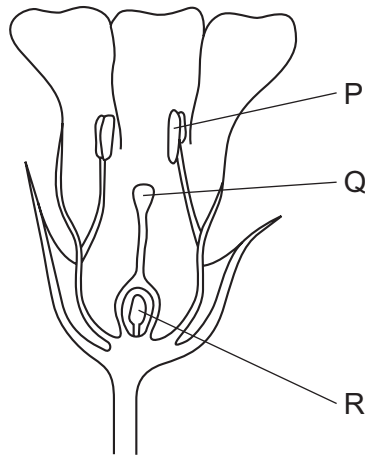
**D**



11 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

12 The diagram shows a section through a flower.



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

	male gametes	female gametes
<b>A</b>	P	Q
<b>B</b>	P	R
<b>C</b>	Q	P
<b>D</b>	Q	R

13 Which process absorbs carbon dioxide from the atmosphere?

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

14 The table shows the formulae of three substances.

substance	formula
methane	CH <sub>4</sub>
water	H <sub>2</sub> O
oxygen	O <sub>2</sub>

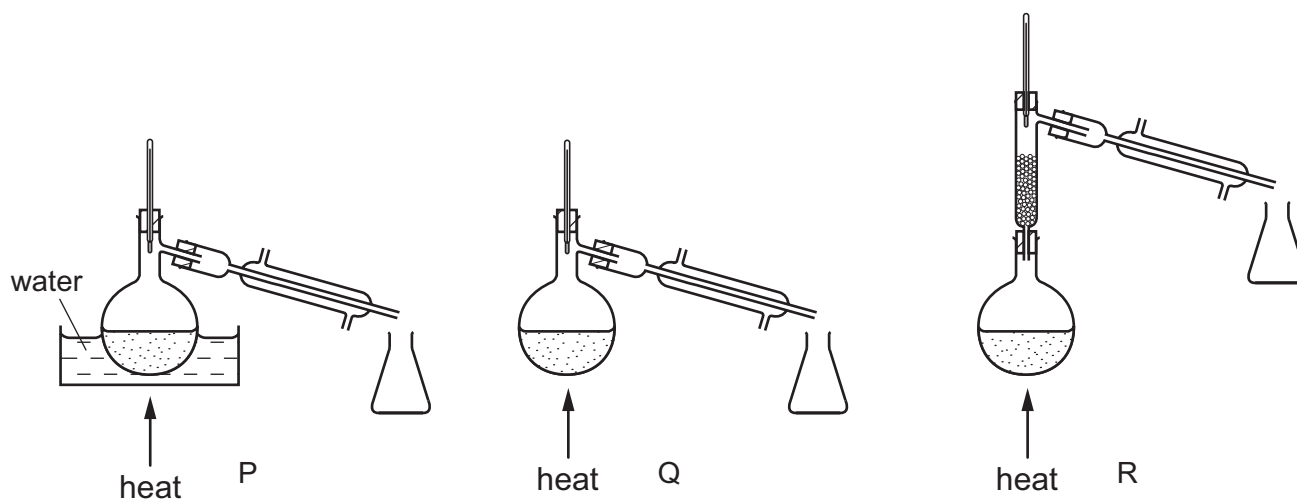
Which statement is correct?

- 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 A mixture contains two liquids.

One liquid has a boiling point of  $120^{\circ}\text{C}$  and the other boils at  $160^{\circ}\text{C}$ .

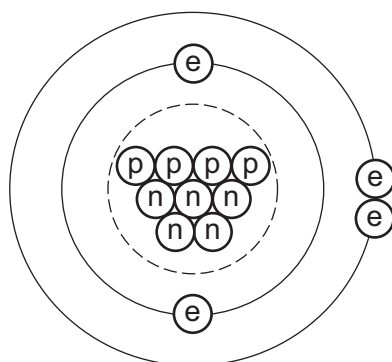
They are separated by fractional distillation.



Which apparatus is used to separate the two liquids?

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

16 The diagram represents an atom.



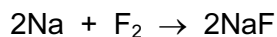
key

- (p)** proton
- (n)** neutron
- (e)** electron
- (○)** nucleus

What is the nucleon number of this atom?

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

- 17 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
<b>A</b>	gains one electron	loses two electrons
<b>B</b>	gains two electrons	loses one electron
<b>C</b>	loses one electron	gains one electron
<b>D</b>	loses two electrons	gains two electrons

- 18 The formula of the hydrocarbon octane is  $\text{C}_8\text{H}_{18}$ .

What are the products of complete combustion of octane?

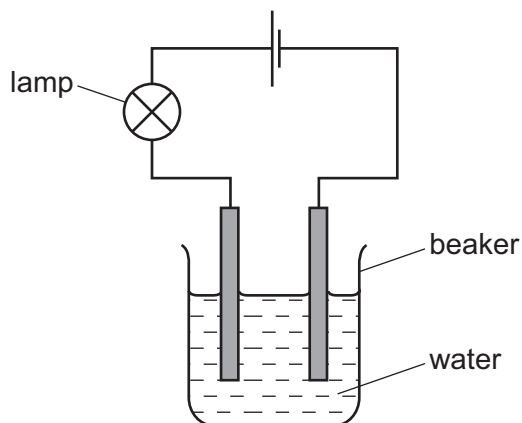
- A** carbon and hydrogen
  - B** carbon and water
  - C** carbon dioxide and water
  - D** carbon monoxide and water
- 19 A molecule of phosphoric acid contains three hydrogen atoms, one phosphorus atom and four oxygen atoms.

What is the formula of this molecule?

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



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



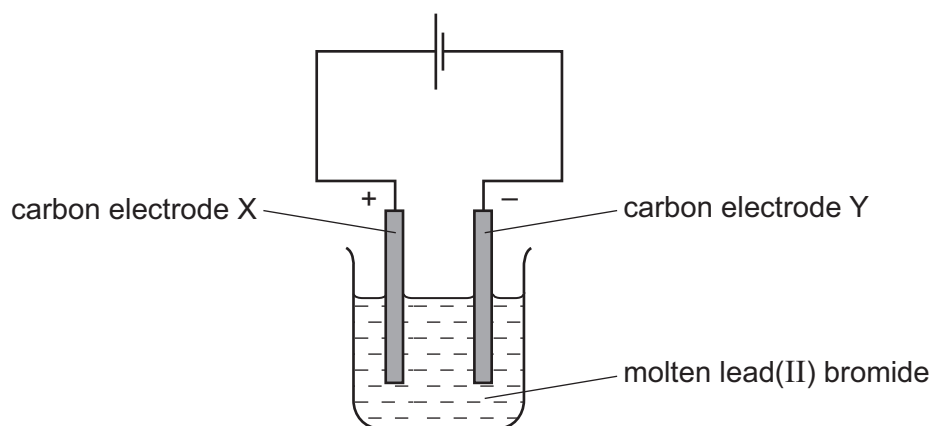
The lamp does not light when the beaker contains pure water.

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

Which statements about R are correct?

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

21 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.

22 Limestone chips react with hydrochloric acid.

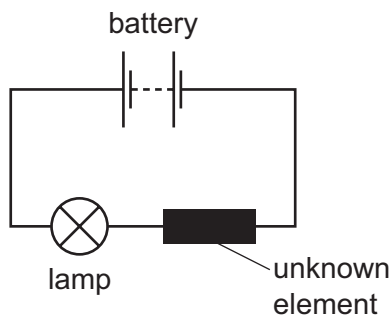
Which change decreases the speed of the reaction?

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

23 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

24 An unknown element is tested using the apparatus shown.



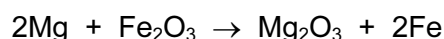
The lamp did not light.

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.

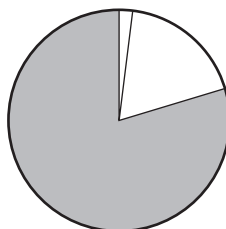
- 25 Magnesium can be used to extract iron from iron(III) oxide,  $\text{Fe}_2\text{O}_3$  to give magnesium oxide and iron.

The equation for the reaction is shown.



Why is magnesium used in this reaction?

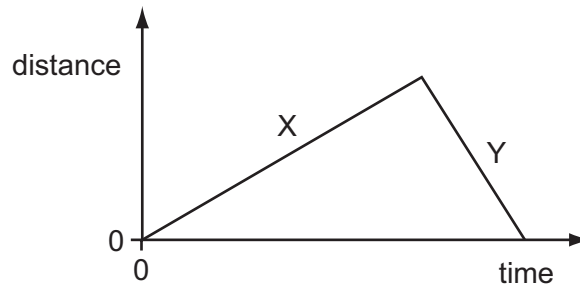
- A It is less reactive than iron and oxidises iron(III) oxide.
  - B It is less reactive than iron and reduces iron(III) oxide.
  - C It is more reactive than iron and oxidises iron(III) oxide.
  - D It is more reactive than iron and reduces iron(III) oxide.
- 26 The diagram shows the composition of air.



Which gas is shown by the shaded part?

- A carbon dioxide
  - B nitrogen
  - C noble gases
  - D oxygen
- 27 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

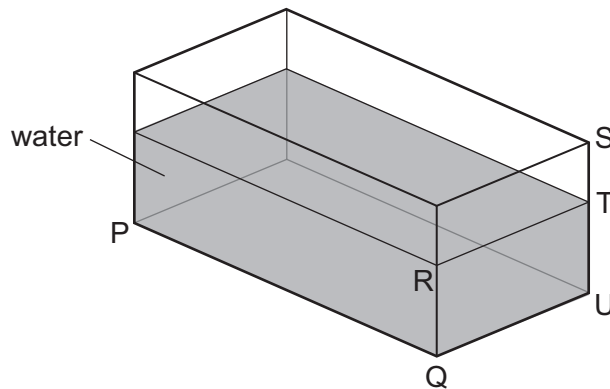
28 The distance/time graph shows the motion of a car.



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
<b>A</b>	constant	constant
<b>B</b>	constant	decreasing
<b>C</b>	increasing	constant
<b>D</b>	increasing	decreasing

29 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?

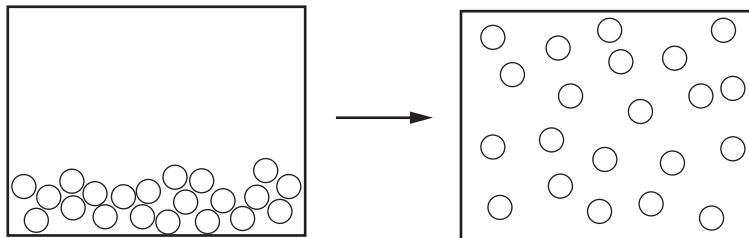
- A** RT                      **B** ST                      **C** SU                      **D** TU

- 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
<b>A</b>	less for the lighter block	less for the lighter block
<b>B</b>	less for the lighter block	the same for both blocks
<b>C</b>	more for the lighter block	more for the lighter block
<b>D</b>	the same for both blocks	more for the lighter block

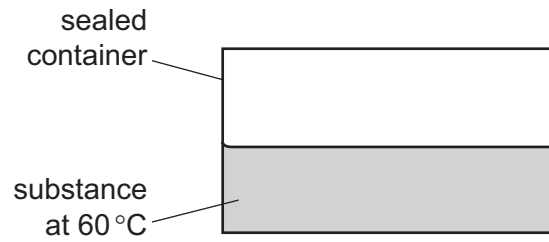
- 31 The diagram shows how the arrangement of the atoms in a substance changes during a change of state.



Which change of state is shown?

- A** gas to liquid
- B** liquid to gas
- C** liquid to solid
- D** solid to liquid

- 32 A substance has a melting point of  $-114^{\circ}\text{C}$  and a boiling point of  $79^{\circ}\text{C}$ . Some of the substance is placed in a container that is then sealed.



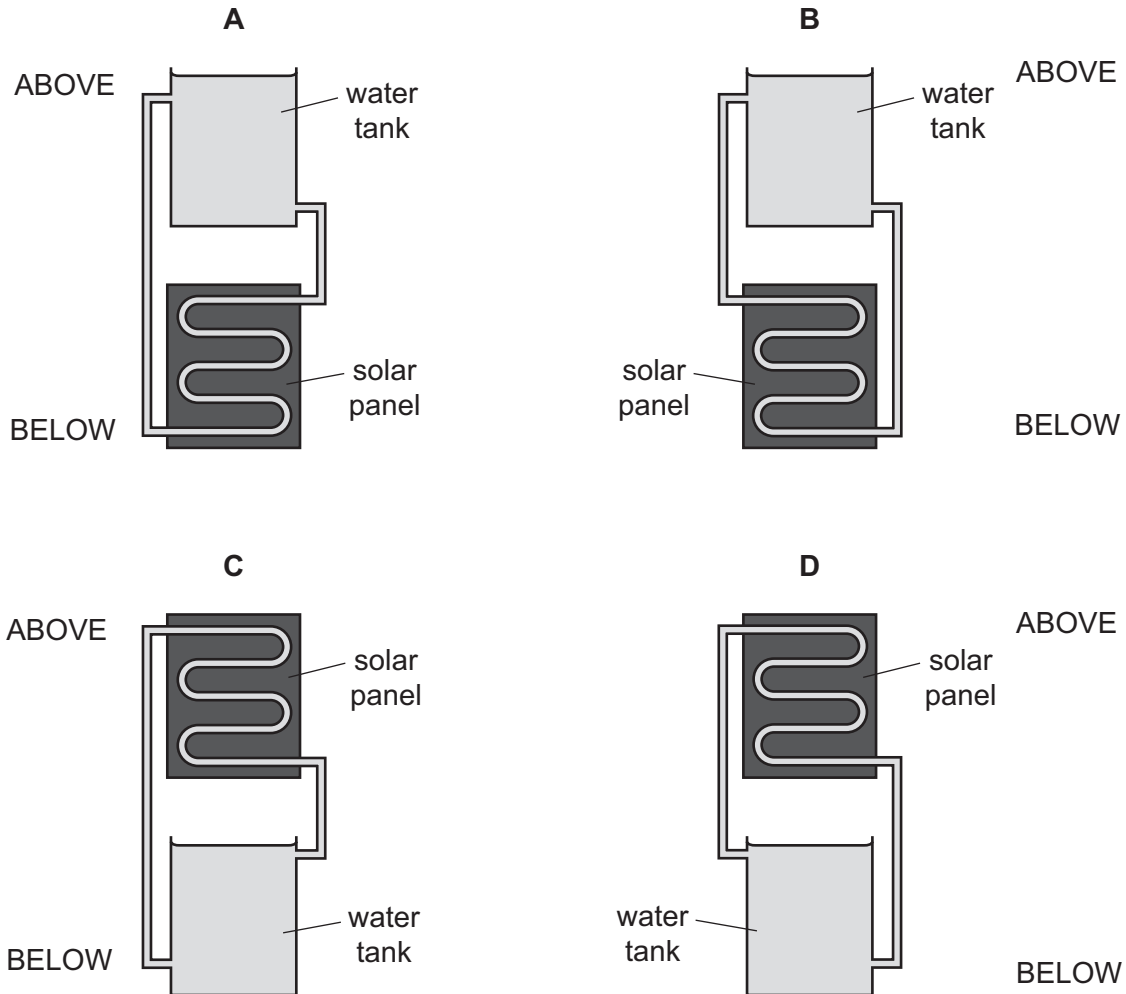
The substance and the sealed container are kept at a temperature of  $60^{\circ}\text{C}$  for several hours.

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

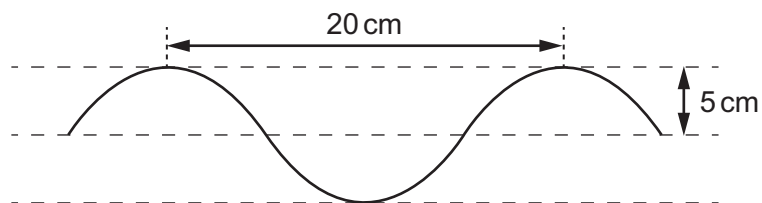
- A solid only
- B solid and liquid
- C liquid only
- D liquid and gas

33 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?



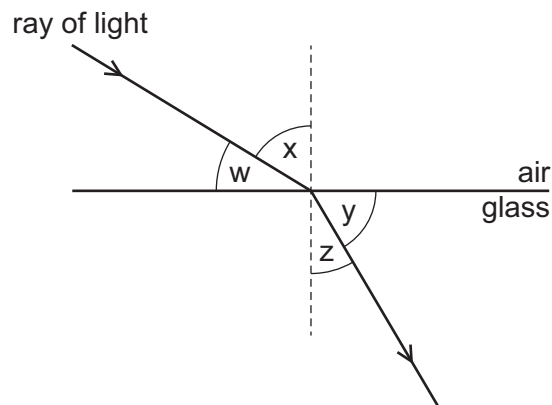
34 The diagram shows a section of a rope.  
 Four waves pass along the rope every second.  
 Each wave travels 80 cm in one second.



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

35 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
<b>A</b>	w	y
<b>B</b>	w	z
<b>C</b>	x	y
<b>D</b>	x	z

36 The diagram shows the electromagnetic spectrum.

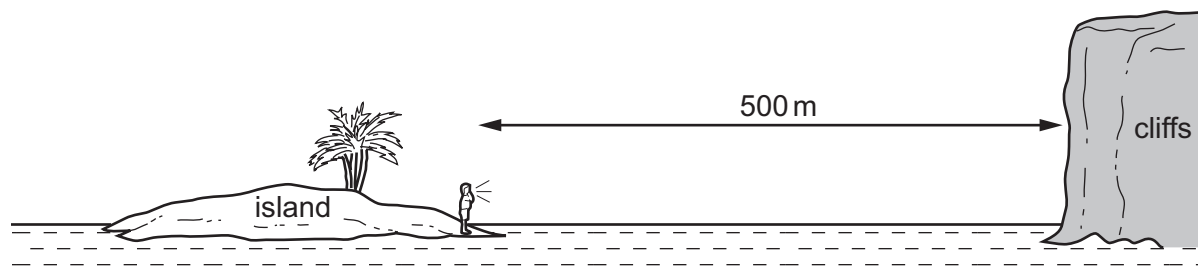
radio waves	microwaves	infra-red waves	visible light	ultraviolet waves	X-rays	gamma rays
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Which statement about electromagnetic waves is correct?

- 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.



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

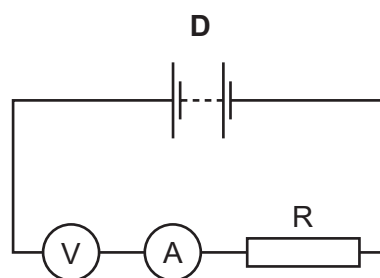
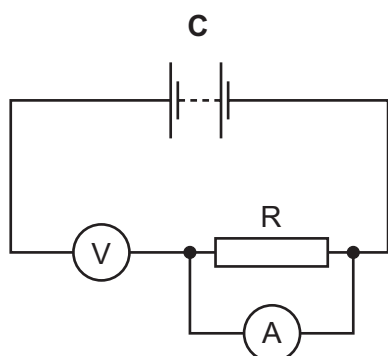
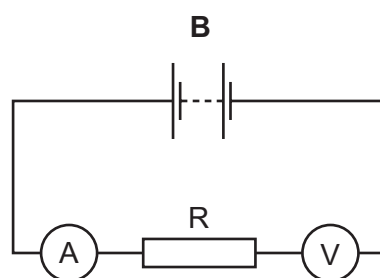
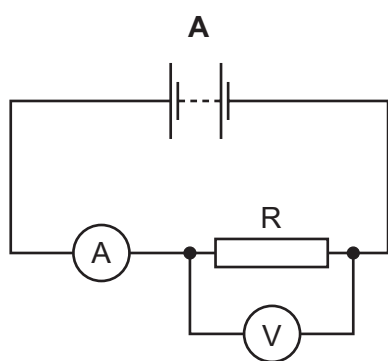


He shouts and he hears an echo from the cliffs.

Sound travels at 340 m/s through the air.

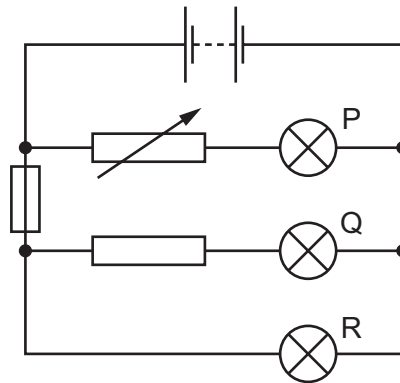
What is the time interval between when the boy shouts and when he hears the echo?

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



40 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

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**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																																																																		
I	II	III	IV	V	VI	VII	0																																																													
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10	23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18	39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36	85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	106 <b>Pd</b> Palladium 46	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54	133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86	226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89
												140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>Md</b> Mendelevium 101	238 <b>No</b> Nobelium 102	238 <b>Lr</b> Lawrencium 103																															

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

Key

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

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

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