



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice

0653/11

May/June 2014

45 minutes

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, 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?

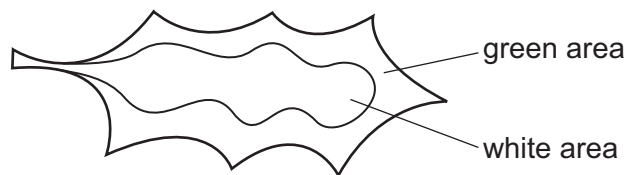
- A The oxygen concentration in the alveolus is higher than in the atmosphere.
- B The oxygen concentration in the alveolus is lower than in the blood.
- C The oxygen concentration in the atmosphere is higher than the carbon dioxide concentration.
- D The oxygen concentration in the blood is lower than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

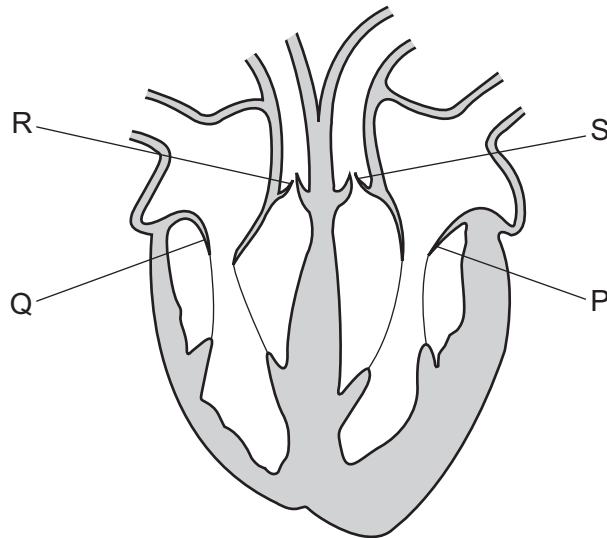
4 The diagram shows a leaf from a plant kept in the dark for 48 hours.



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

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

key

✓ = valve open

x = valve closed

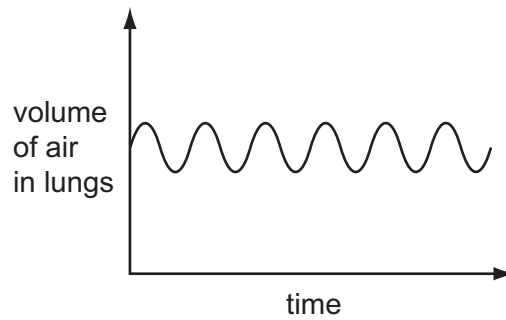
- 6 In which physical state is water when it is absorbed and when it is lost by a plant?

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

- 7 Which equation represents aerobic respiration?

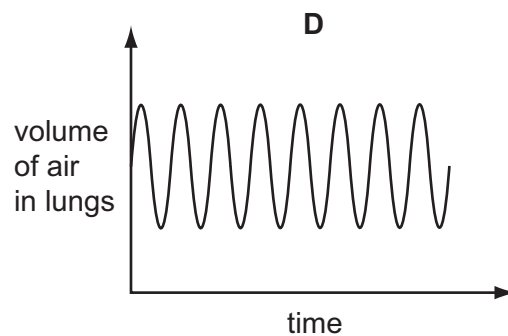
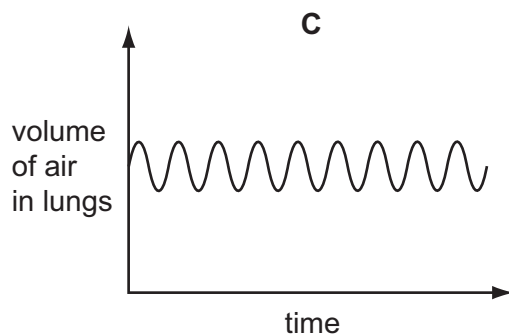
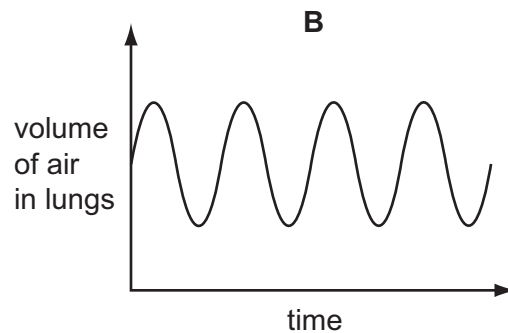
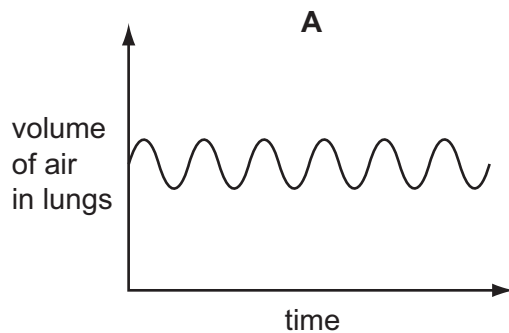
- A** carbon dioxide + glucose → oxygen + water
B carbon dioxide + water → glucose + oxygen
C glucose + oxygen → carbon dioxide + water
D glucose + water → carbon dioxide + oxygen

- 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.

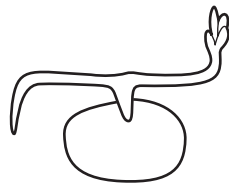


diagram 1

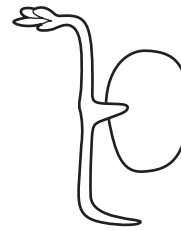


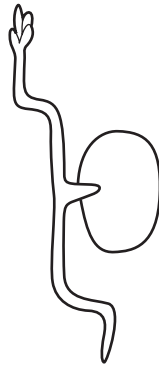
diagram 2

What is the shape of the seedling three days later?

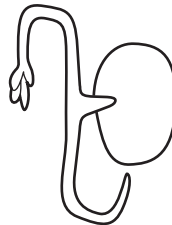
A



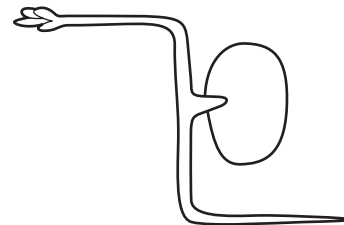
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C



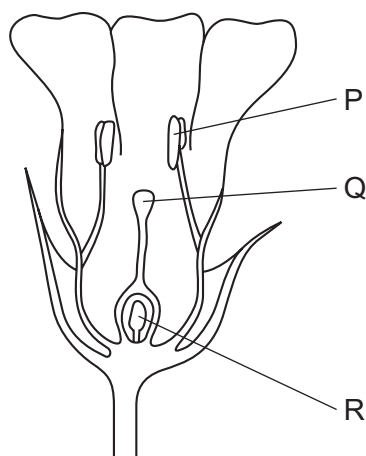
D



- 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
A	P	Q
B	P	R
C	Q	P
D	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 ₄
water	H ₂ O
oxygen	O ₂

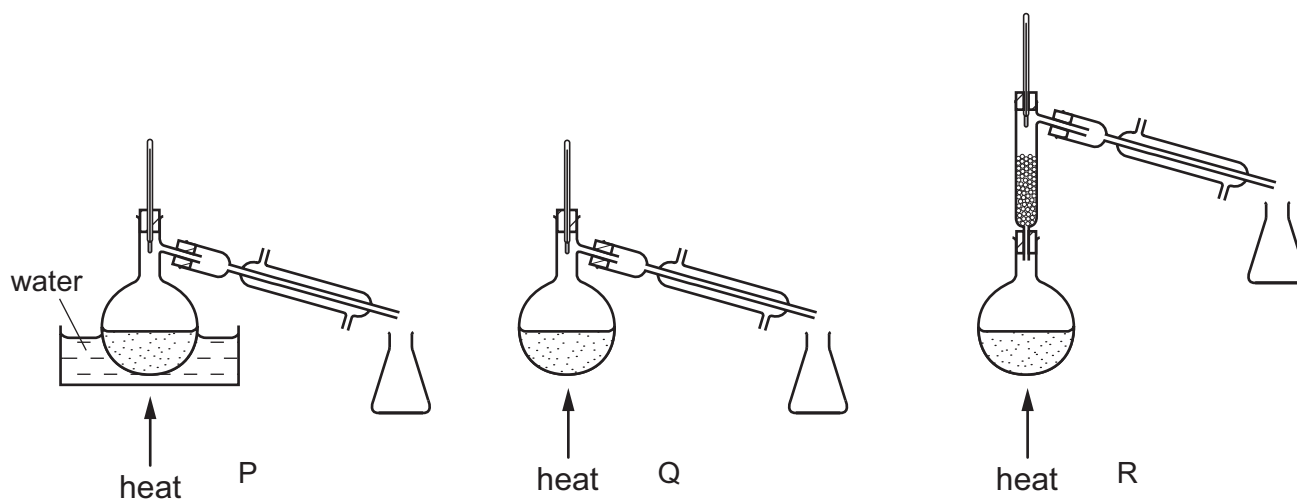
Which statement is correct?

- 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 A mixture contains two liquids.

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

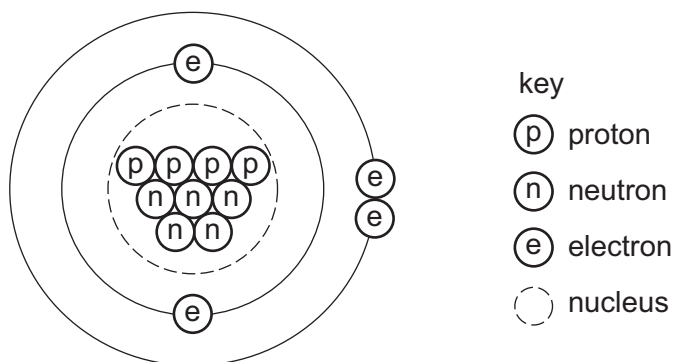
They are separated by fractional distillation.



Which apparatus is used to separate the two liquids?

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

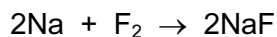
16 The diagram represents an atom.



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
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

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

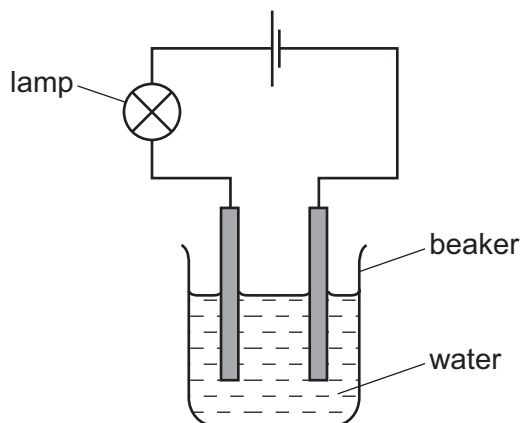
What are the products of complete combustion of octane?

- A** carbon and hydrogen
 - B** carbon and water
 - C** carbon dioxide and water
 - D** carbon monoxide and water
- 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** H_3PO_4 **B** $\text{H}_3(\text{PO})_4$ **C** 3HPO_4 **D** $3\text{HP}_4\text{O}$

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



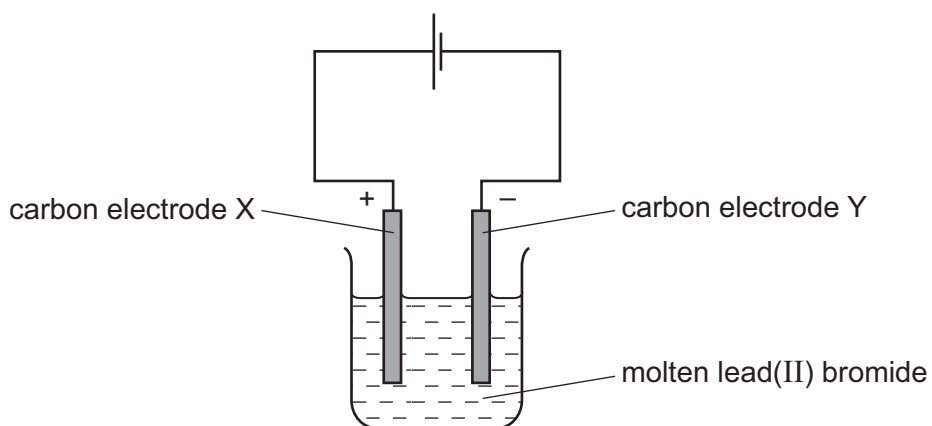
The lamp does not light when the beaker contains pure water.

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

Which statements about R are correct?

	type of bonding	elements of compound R
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

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.

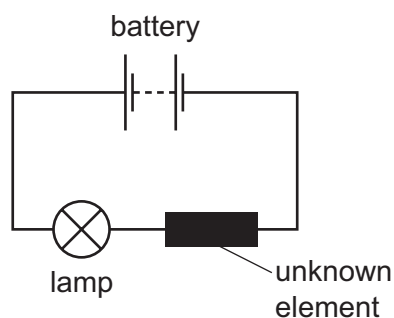
Which change decreases the speed of the reaction?

- 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.



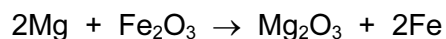
The lamp did not light.

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.

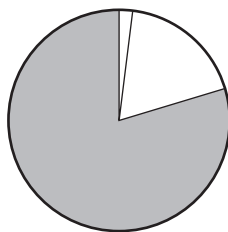
- 25** Magnesium can be used to extract iron from iron(III) oxide, Fe_2O_3 to give magnesium oxide and iron.

The equation for the reaction is shown.



Why is magnesium used in this reaction?

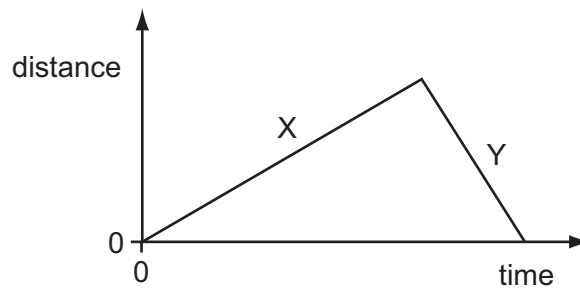
- A** It is less reactive than iron and oxidises iron(III) oxide.
 - B** It is less reactive than iron and reduces iron(III) oxide.
 - C** It is more reactive than iron and oxidises iron(III) oxide.
 - D** It is more reactive than iron and reduces iron(III) oxide.
- 26** The diagram shows the composition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

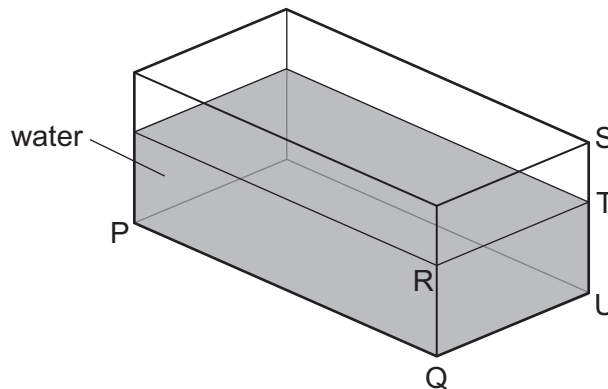
28 The distance/time graph shows the motion of a car.



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
A	constant	constant
B	constant	decreasing
C	increasing	constant
D	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?

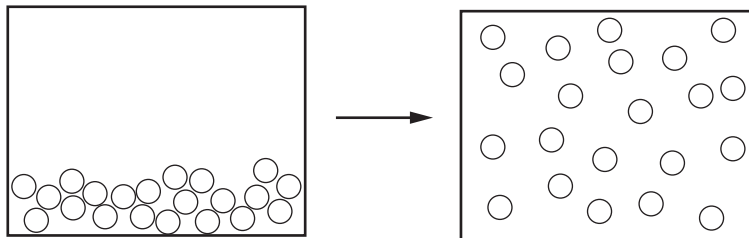
- A** RT **B** ST **C** SU **D** TU

- 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
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

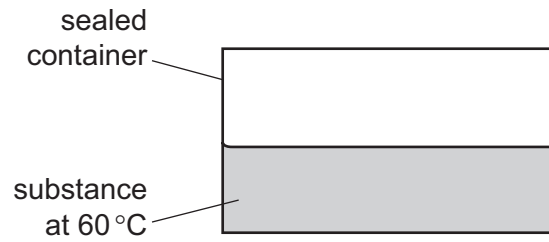
- 31** The diagram shows how the arrangement of the atoms in a substance changes during a change of state.



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°C and a boiling point of 79°C . Some of the substance is placed in a container that is then sealed.



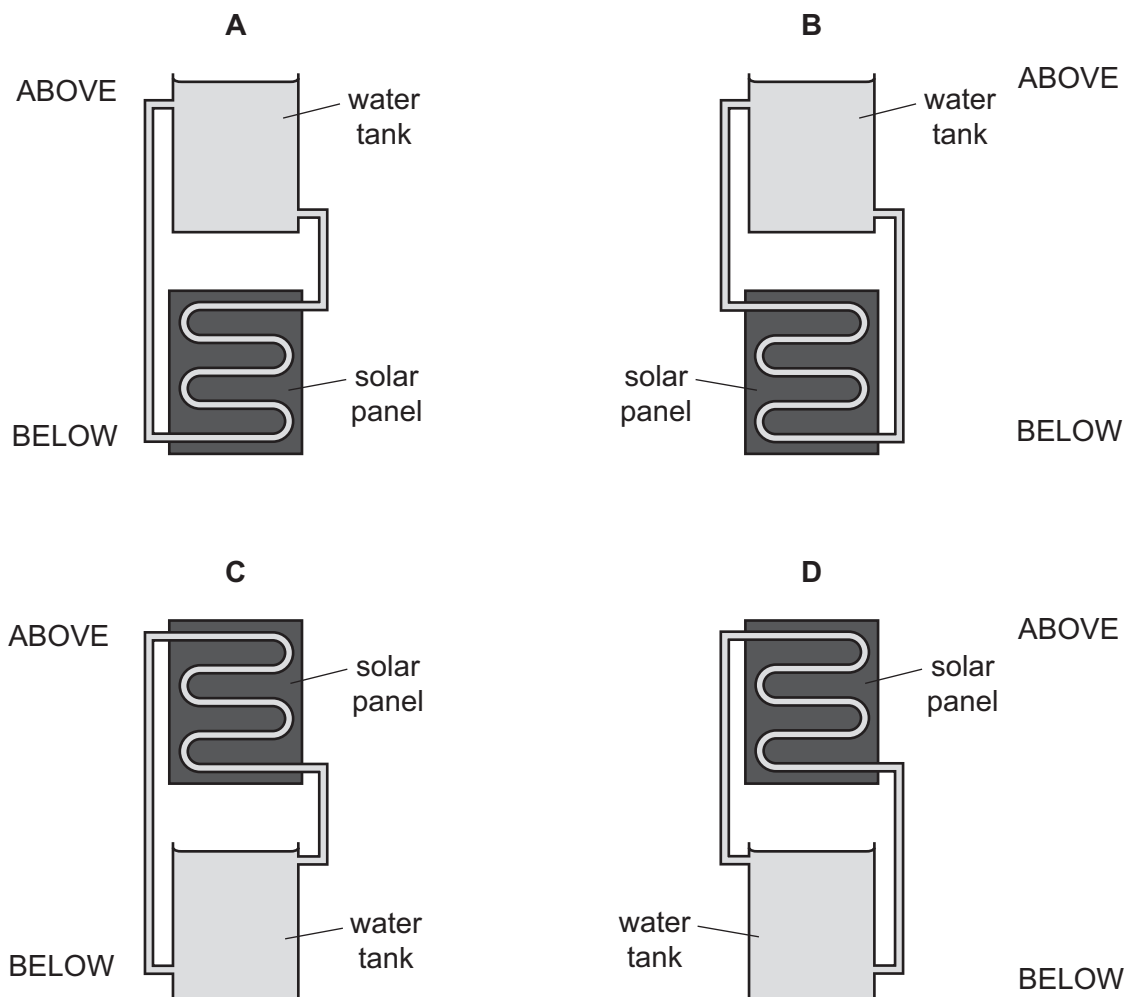
The substance and the sealed container are kept at a temperature of 60°C for several hours.

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

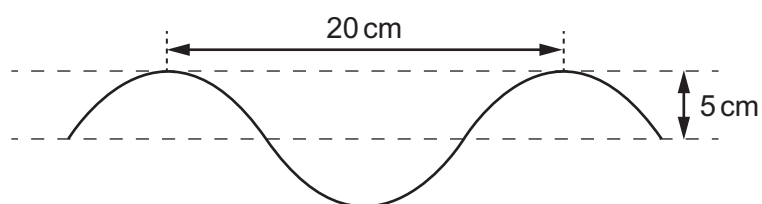
- A** solid only
- B** solid and liquid
- C** liquid only
- D** liquid and gas

- 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?



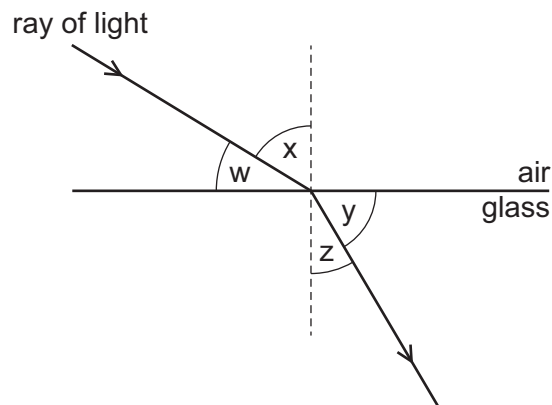
- 34** The diagram shows a section of a rope.
- Four waves pass along the rope every second.
- Each wave travels 80 cm in one second.



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
A	w	y
B	w	z
C	x	y
D	x	z

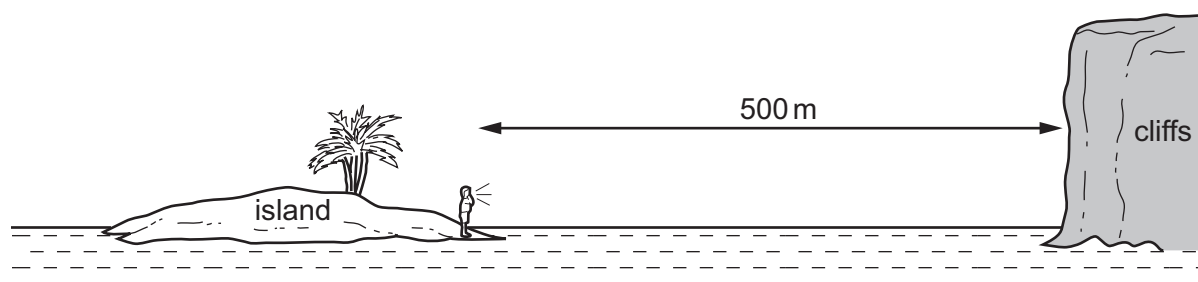
36 The diagram shows the electromagnetic spectrum.

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.

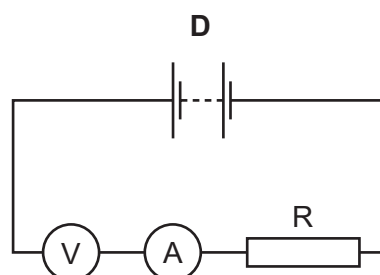
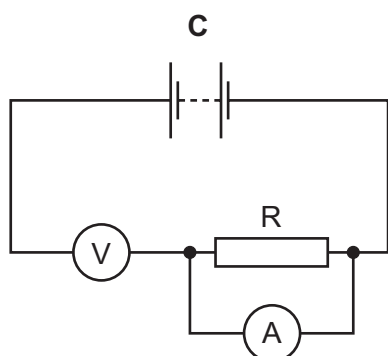
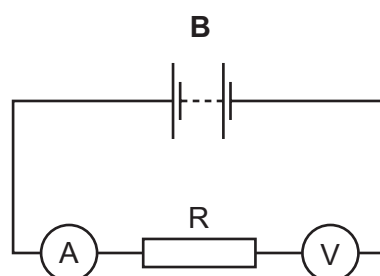
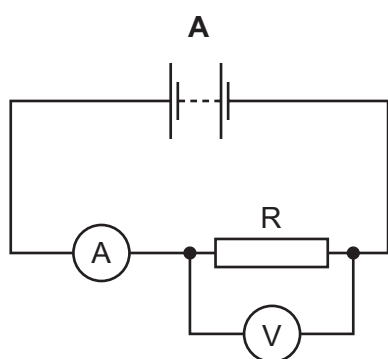


He shouts and he hears an echo from the cliffs.

Sound travels at 340 m/s through the air.

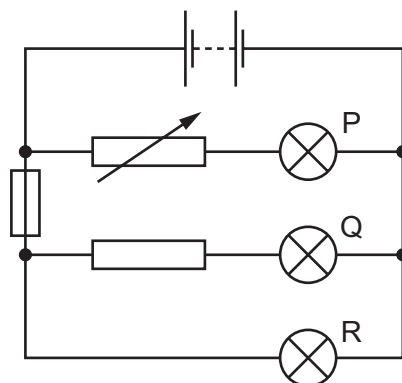
What is the time interval between when the boy shouts and when he hears the echo?

- 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	O													
1 H Hydrogen 1																														
7 Li Lithium 3	9 Be Beryllium 4																													
23 Na Sodium 11	24 Mg Magnesium 12																													
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	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36													
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	101 Rh Rhodium 45	103 Pd Palladium 46	106 Ag Silver 47	108 Cd Cadmium 48	112 In Indium 49	115 Sn Tin 50	119 Sb Antimony 51	122 Te Tellurium 52	127 I Iodine 53	128 Xe Xenon 54	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	190 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	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86													
87 Fr Francium	88 Ra Radium	227 Ac Actinium																												
*58-71 Lanthanoid series																														
90-103 Actinoid series																														
140 Ce Cerium 58																		141 Pr Praseodymium 59	144 Nd Neodymium 60	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																		238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

a

X

b

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

Key

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



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COMBINED SCIENCE

Paper 1 Multiple Choice

0653/12

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45 minutes

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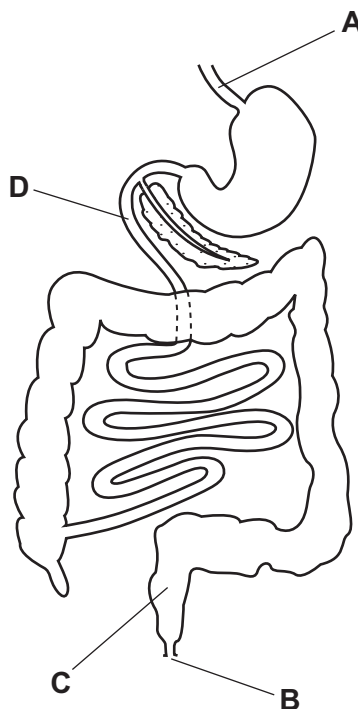
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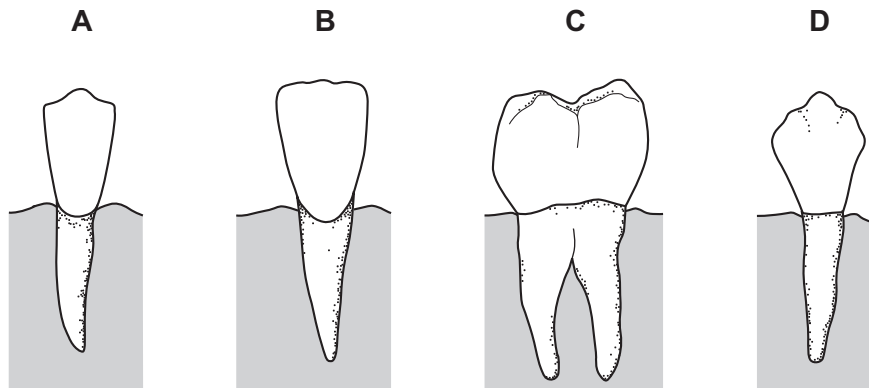


- 1 Which feature of a bird is the only one that helps to define it as a living organism?
- A It can fly.
 - B It has a hard, horny beak or bill.
 - C It is able to reproduce.
 - D The female lays eggs.
- 2 What causes oxygen to diffuse into the blood from an alveolus in the lungs?
- A The oxygen concentration 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 What are enzymes made of?
- A carbohydrate
 - B fat
 - C fibre
 - D protein
- 4 The diagram shows part of the digestive system.
- Where does egestion occur?

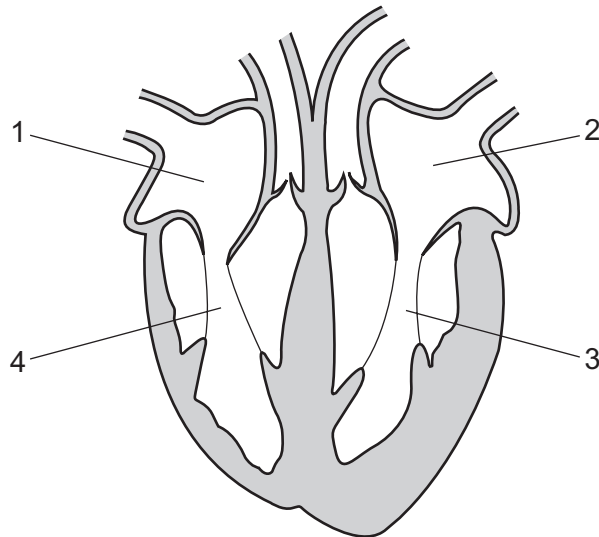


- 5 The diagram shows four human teeth.

Which tooth is a molar?



- 6 The diagram shows a section through the heart. The atria and ventricles are numbered.



What is the sequence in which the atria and ventricles contract during one heart beat?

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

- 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 row gives the correct information about aerobic respiration?

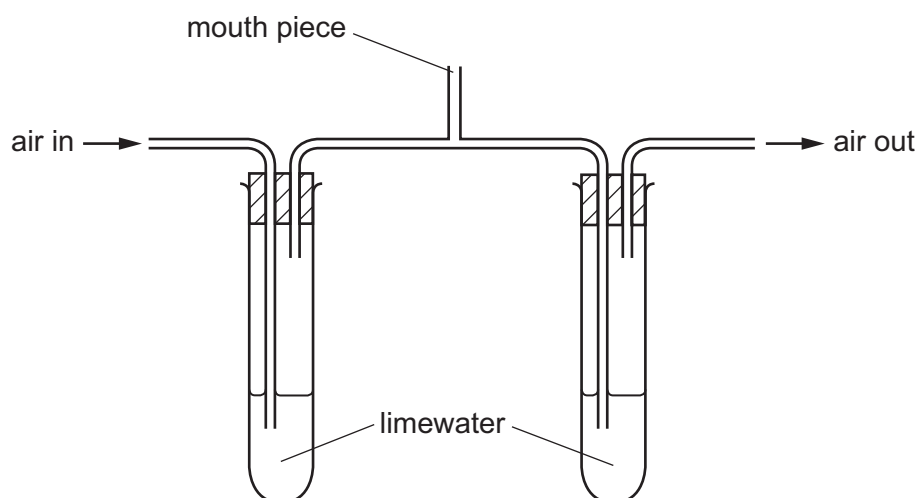
	nutrient molecules broken down	produces water	releases energy
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = information correct

✗ = information incorrect

- 9 Which statement is proved correct by breathing through the apparatus shown in the diagram?



- A** Expired air contains less carbon dioxide than inspired air.
- B** Expired air contains more carbon dioxide than inspired air.
- C** Inspired air contains less oxygen than expired air.
- D** Inspired air contains more oxygen than expired air.

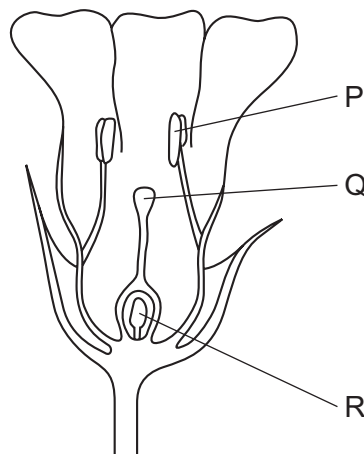
10 What happens after a hormone has had an effect on a target organ?

- A It is destroyed by the liver.
- B It is reabsorbed by the gland that made it.
- C It is stored for future use.
- D It is used to increase the rate of heartbeat.

11 What would be effective in preventing the spread of HIV?

- A chlorinating all drinking water
- B screening of blood before transfusions
- C sterilisation of showers, baths and toilets
- D thorough cooking of all food

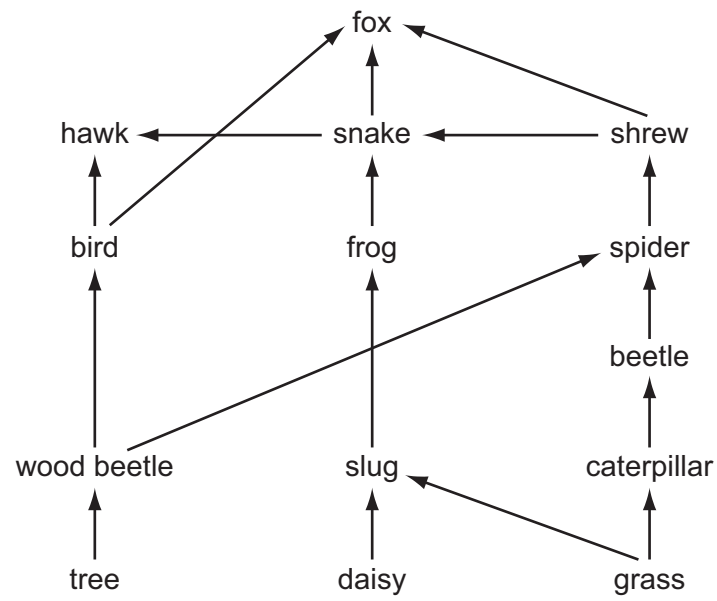
12 The diagram shows a section through a flower.



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

13 The diagram shows a food web.



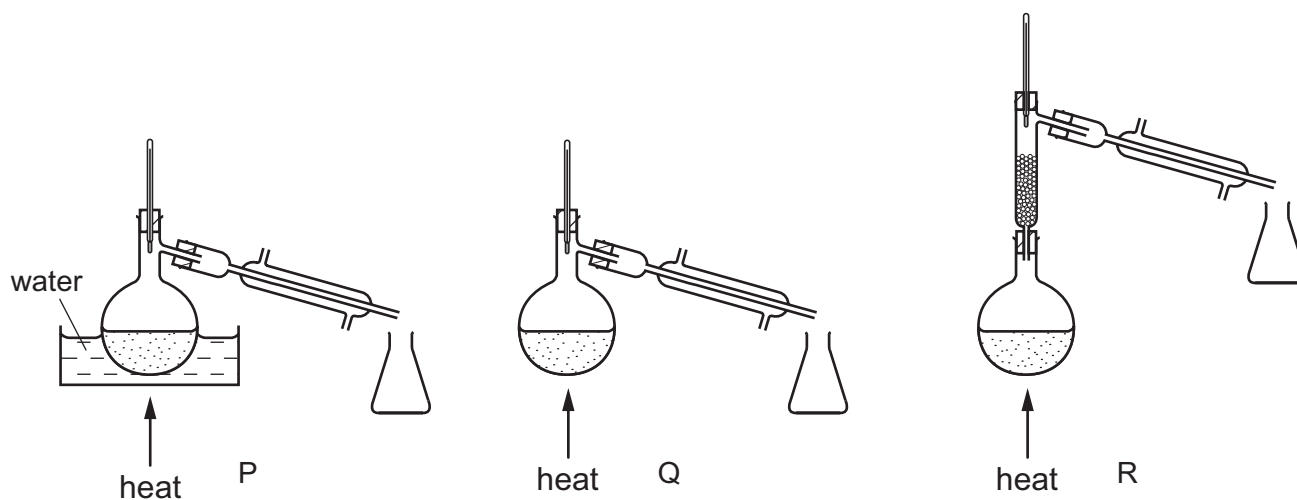
How many types of consumer and how many types of producer are shown in this food web?

	types of consumer	types of producer
A	3	3
B	3	14
C	11	3
D	11	14

14 A mixture contains two liquids.

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

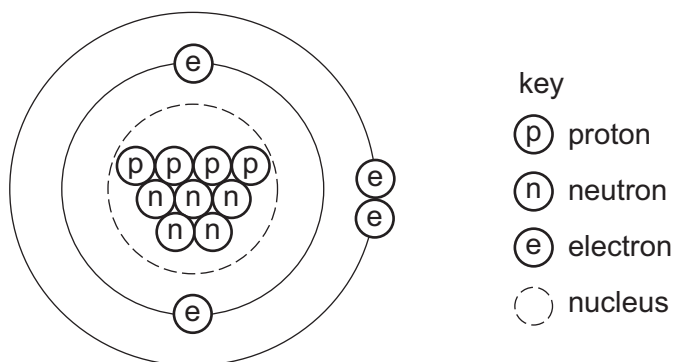
They are separated by fractional distillation.



Which apparatus is used to separate the two liquids?

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

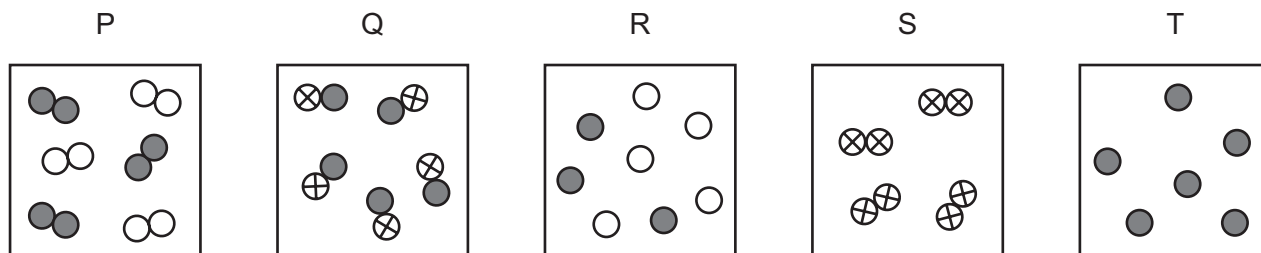
15 The diagram represents an atom.



What is the nucleon number of this atom?

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

16 The diagrams represent different substances.



Which row correctly identifies the type of substance?

	an element	a compound	a mixture
A	P	R	Q
B	Q	S	P
C	S	Q	R
D	T	P	S

17 Sodium is in Group I of the Periodic Table.

What happens to an atom of sodium when it reacts?

- A** It gains one electron, forming Na^- .
- B** It gains one electron, forming Na^+ .
- C** It loses one electron, forming Na^- .
- D** It loses one electron, forming Na^+ .

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 for iron(III) sulfate is $\text{Fe}_2(\text{SO}_4)_3$.

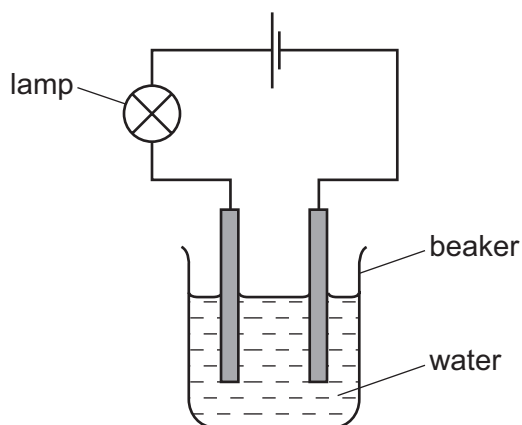
What is the total number of atoms in this formula?

- A** 3 **B** 7 **C** 17 **D** 26

- 20 Which products are formed when aqueous copper(II) chloride is electrolysed using inert electrodes?

	at the anode	at the cathode
A	chlorine	copper
B	chlorine	hydrogen
C	copper	chlorine
D	hydrogen	chlorine

- 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

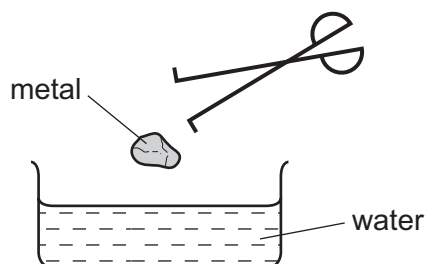
- 22 Which change decreases the speed of a chemical reaction?

- A** increasing concentration
- B** increasing particle size
- C** increasing temperature
- D** using a catalyst

23 Which two reagents form a white precipitate when they are mixed?

- A barium chloride and hydrochloric acid
- B barium chloride and nitric acid
- C silver nitrate and hydrochloric acid
- D silver nitrate and nitric acid

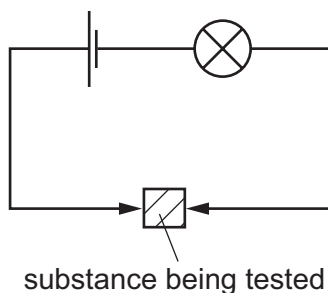
24 A piece of metal is added to water.



Which metal produces the most violent reaction?

- A copper
- B magnesium
- C potassium
- D zinc

25 Steel and sulfur are tested using the circuit shown.



In which tests does the lamp light?

	steel	sulfur
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = lamp lights

x = lamp does not light

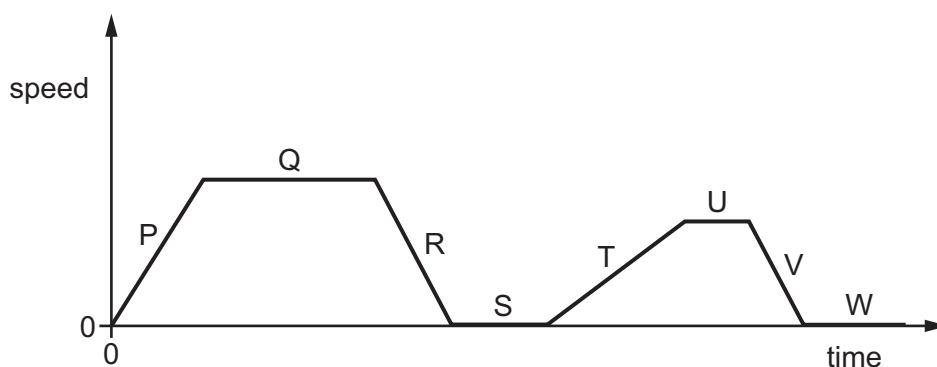
26 Which row gives the percentage by volume of the gases in the air?

	highest percentage	→	lowest percentage
A	nitrogen	oxygen	other gases
B	nitrogen	other gases	oxygen
C	oxygen	nitrogen	other gases
D	oxygen	other gases	nitrogen

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

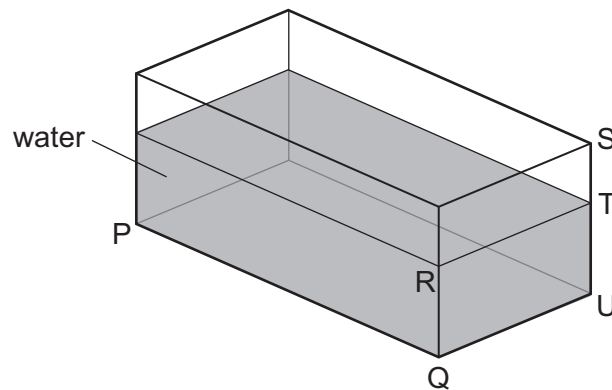
28 The speed/time graph for a bus journey is shown.



During which labelled periods was the bus stationary?

- A** P, R, T and V
- B** Q, S, U and W
- C** Q and U only
- D** S and W only

- 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?

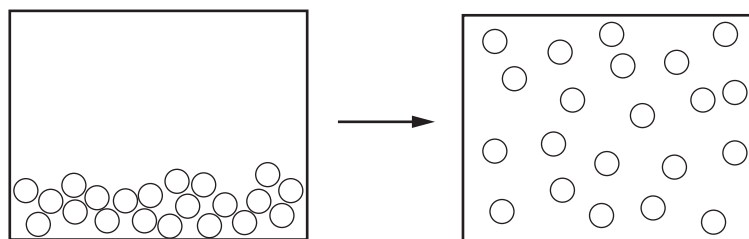
- A** RT **B** ST **C** SU **D** TU

- 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
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

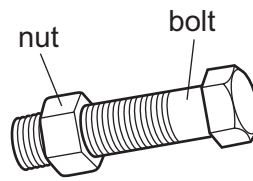
- 31 The diagram shows how the arrangement of the atoms in a substance changes during a change of state.



Which change of state is shown?

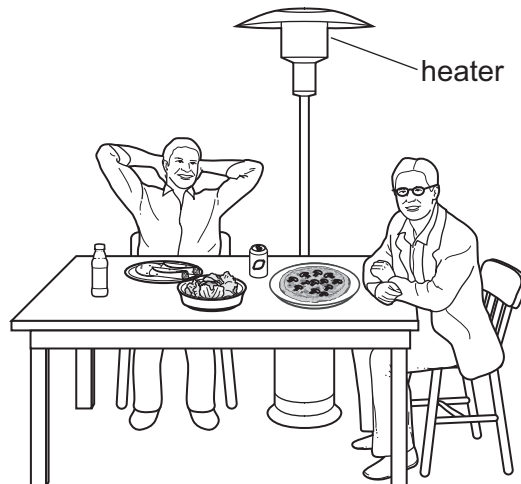
- A** gas to liquid
B liquid to gas
C liquid to solid
D solid to liquid

- 32 A mechanic cannot remove a large steel nut from a steel bolt because it is too tight.



What could the mechanic do to help her remove the nut?

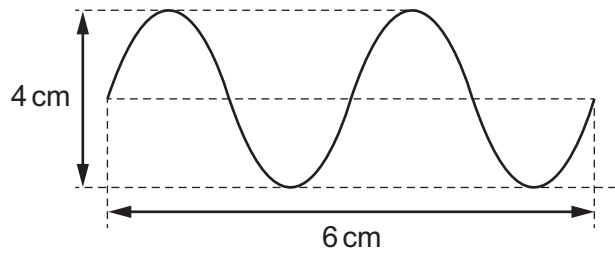
- A cool the nut and heat the bolt
 - B heat the bolt only
 - C heat the nut and the bolt through the same temperature rise
 - D heat the nut only
- 33 Diners sit at a table outside a café on a cold evening. A heater above the table warms the diners as they eat.



Which row shows how thermal (heat) energy from the heater reaches the diners?

	conduction	convection	radiation
A	no	no	yes
B	no	yes	yes
C	yes	no	yes
D	yes	yes	no

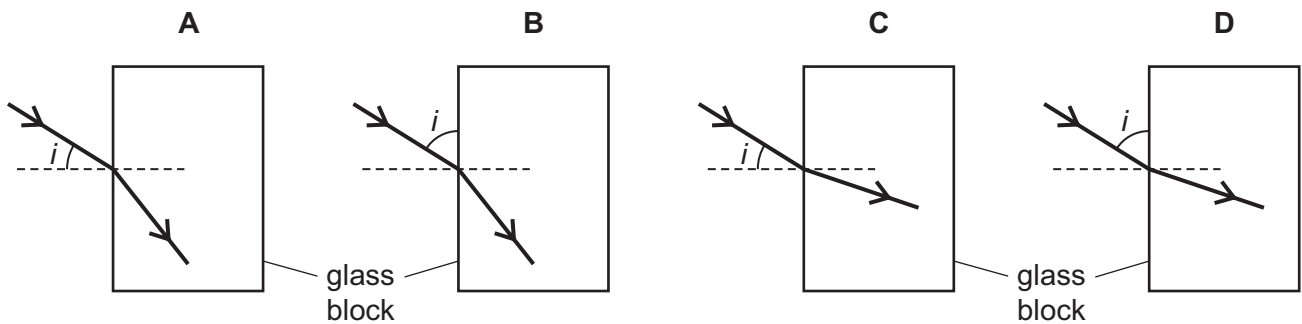
34 The diagram represents a wave.



What is the amplitude of the wave?

- A** 2 cm **B** 3 cm **C** 4 cm **D** 6 cm

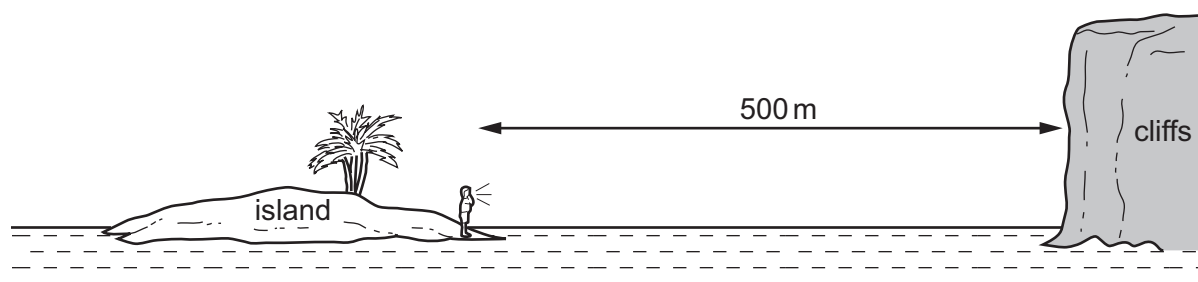
35 Which diagram shows how a ray of light passes from air into a glass block, and shows the angle of incidence labelled i ?



36 Which row shows the type of wave that is used for a mobile (cell) telephone and the type that is used to send television signals from a satellite to Earth?

	mobile telephone	satellite television
A	microwaves	microwaves
B	microwaves	radio waves
C	radio waves	microwaves
D	radio waves	radio waves

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



He shouts and he hears an echo from the cliffs.

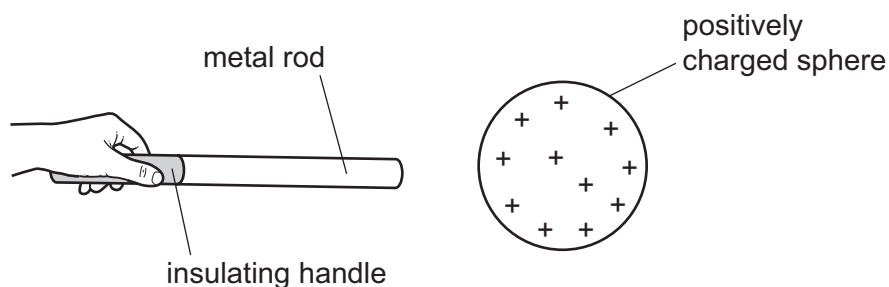
Sound travels at 340 m/s through the air.

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 An uncharged metal rod is held by an insulating handle.

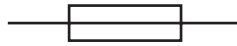
The rod is brought near to a positively charged sphere. This causes some particles in the rod to move.



Which particles in the rod move and in which direction do the particles move?

	particles that move	direction of movement
A	electrons	away from the sphere
B	electrons	towards the sphere
C	neutrons	away from the sphere
D	protons	towards the sphere

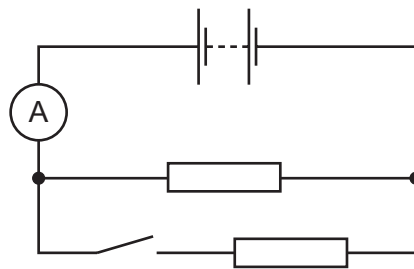
39 A circuit diagram contains the following symbol.



What does this symbol represent?

- A** a fixed resistor
- B** a fuse
- C** a lamp
- D** a variable resistor

40 In the circuit shown the switch is open.



A student closes the switch.

What happens to the ammeter reading, and what happens to the total resistance of the circuit?

	ammeter reading	total resistance
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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DATA SHEET
The Periodic Table of the Elements

Group																																							
I	II	III										IV	V	VI	VII	0																							
		1 H Hydrogen 1																																					
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10																						
23 Na Sodium 11	24 Mg Magnesium 12											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																						
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	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36																						
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	96 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	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	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86																						
Fr 87	Ra 88	Ac 89																																					
58-71 Lanthanoid series																																							
90-103 Actinoid series																																							
Key	a	X	a = relative atomic mass	X = atomic symbol	b = proton (atomic) number								175 Lu Lutetium 71	173 Yb Ytterbium 70	169 Tm Thulium 69	167 Er Erbium 68	165 Ho Holmium 67	162 Dy Dysprosium 66	159 Tb Terbium 65	157 Gd Gadolinium 64	152 Eu Europlum 63	150 Sm Samarium 62	144 Nd Neodymium 60	141 Pr Praseodymium 59	140 Ce Cerium 58	232 Th Thorium 90	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

a

X

b

Key

a = relative atomic mass

X = atomic symbol

b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice

0653/13

May/June 2014

45 minutes

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, 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?

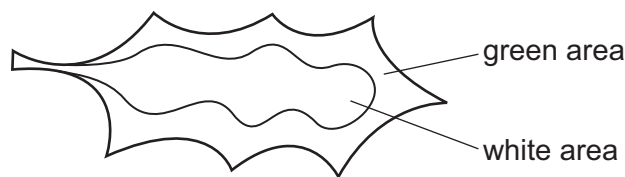
- A reproduction, nutrition, growth and sensitivity
- B respiration, nutrition, digestion and photosynthesis
- C respiration, nutrition, digestion and transpiration
- D sensitivity, respiration, growth and photosynthesis

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.



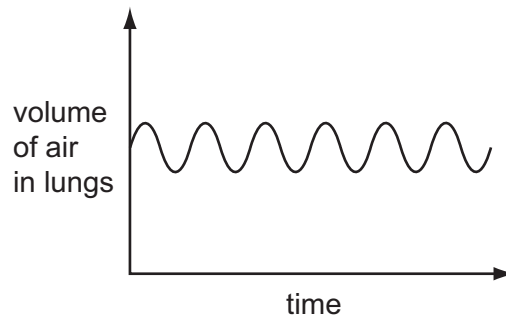
Which colours will be obtained if the leaf is then tested for starch with iodine solution?

	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?

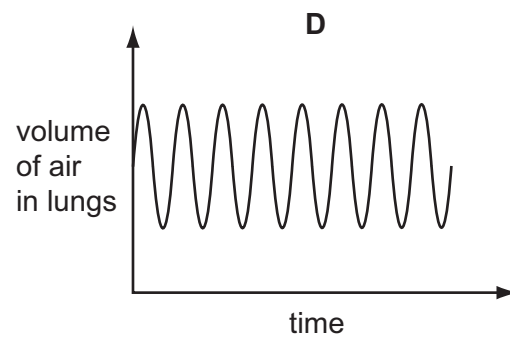
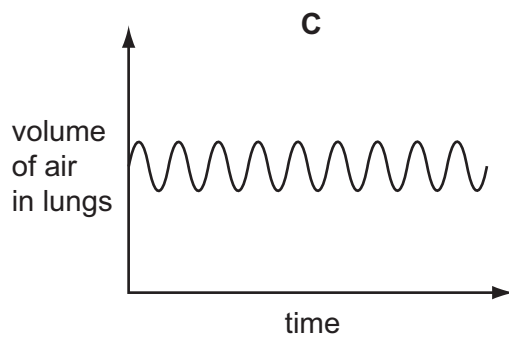
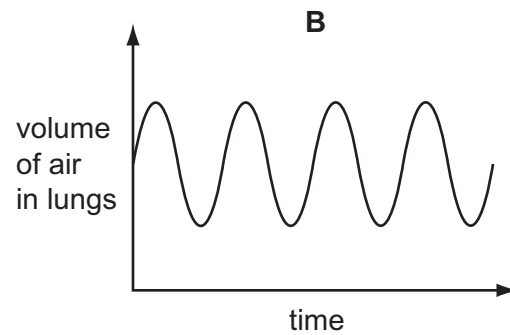
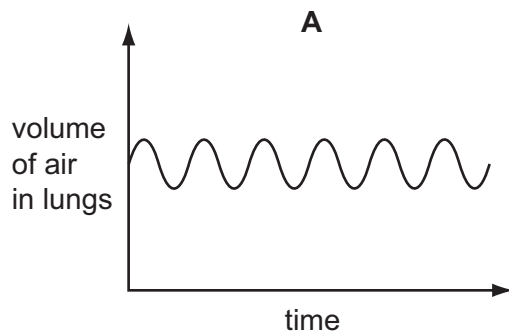
- A The oxygen concentration in the alveolus is higher than in the atmosphere.
- B The oxygen concentration in the alveolus is lower than in the blood.
- C The oxygen concentration in the atmosphere is higher than the carbon dioxide concentration.
- D The oxygen concentration in the blood is lower than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

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

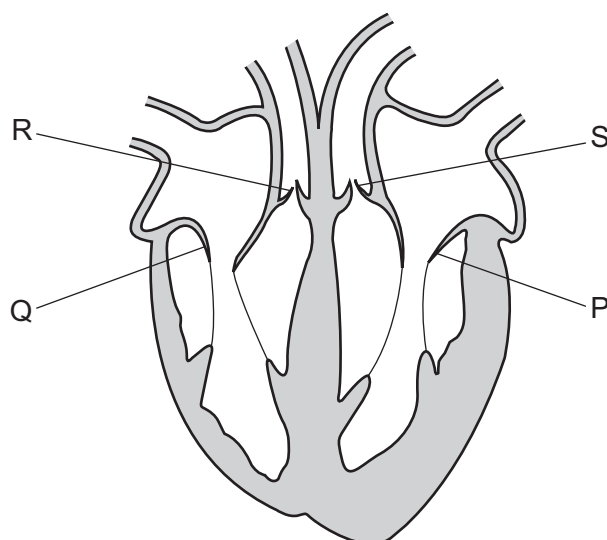


The person runs a race.

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.

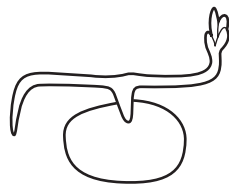


diagram 1

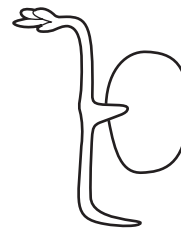


diagram 2

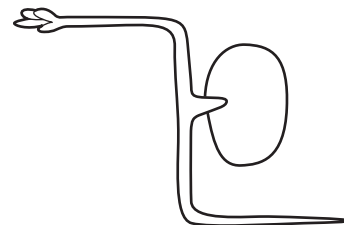
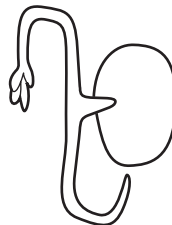
What is the shape of the seedling three days later?

A

B

C

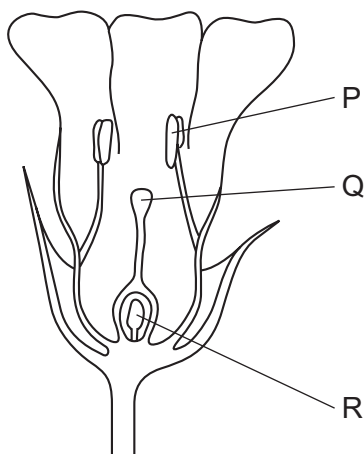
D



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

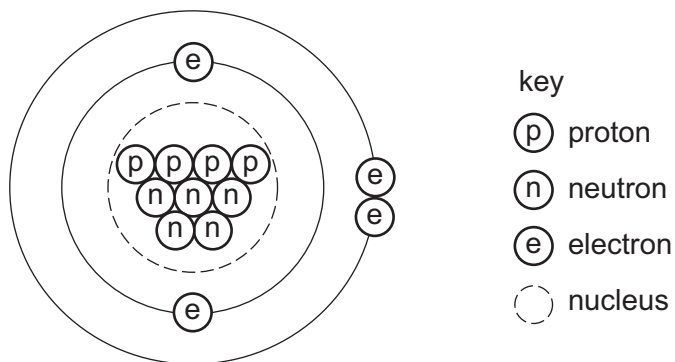
14 The table shows the formulae of three substances.

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.

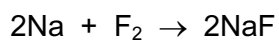
15 The diagram represents an atom.



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.



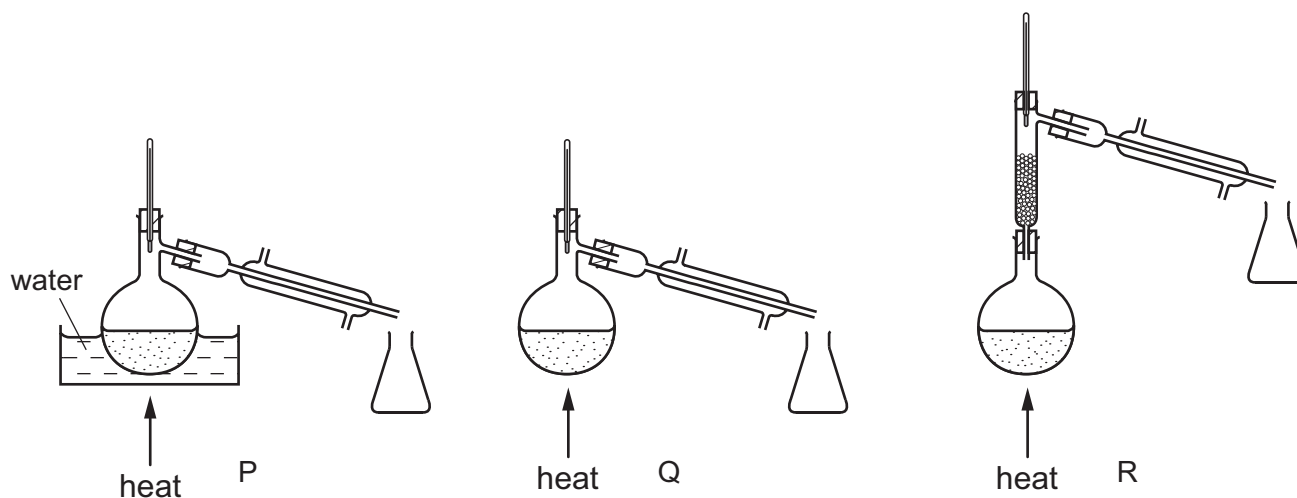
Which changes occur to each atom when sodium and fluorine react together?

	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.



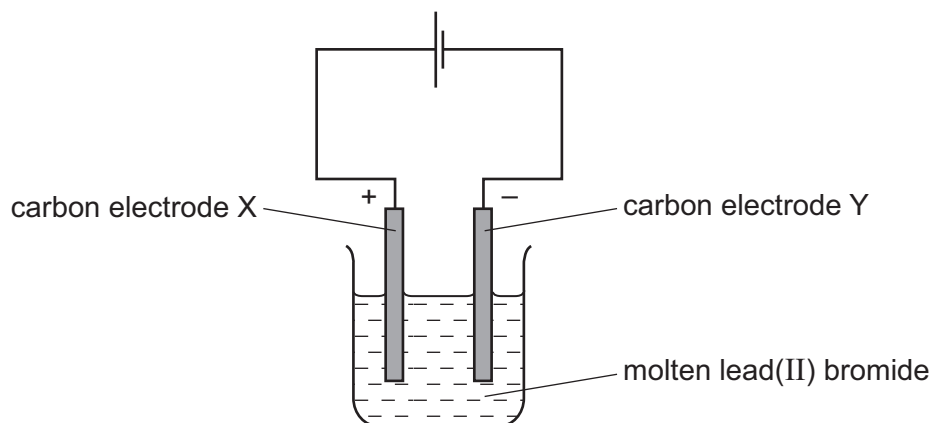
Which apparatus is used to separate the two liquids?

- 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

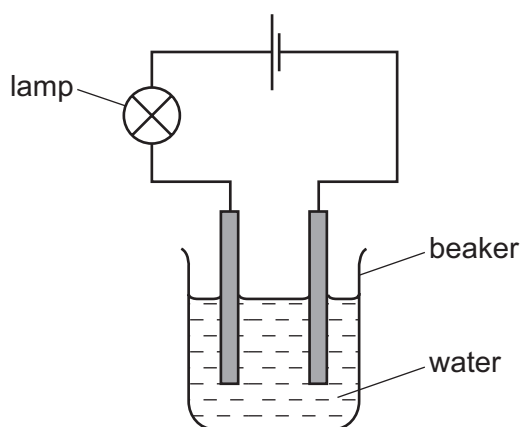
20 The diagram shows the electrolysis of molten lead(II) bromide.



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.

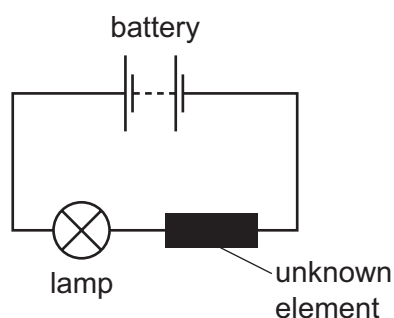
Which statements about R are correct?

	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?

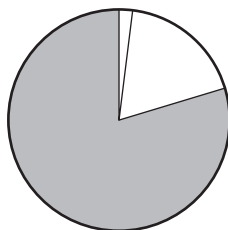
- A It is a Group I metal.
- B It is an alloy.
- C It is a non-metal.
- D It is a transition element.

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

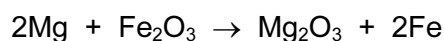
25 The diagram shows the composition of air.



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.

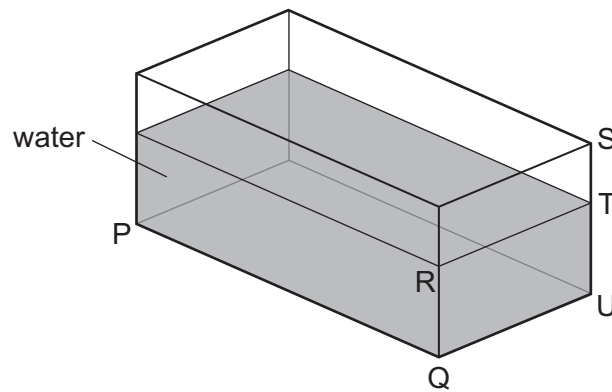
The equation for the reaction is shown.



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.

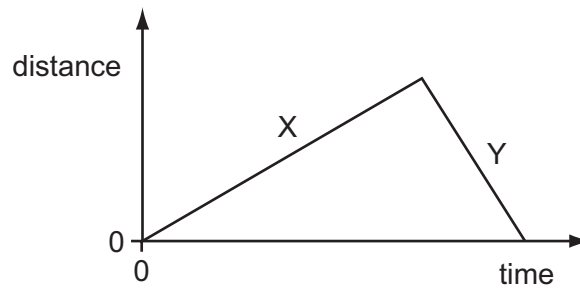


Only the length PQ and the width QU of the tank are known.

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?

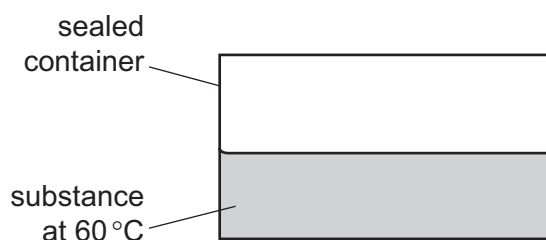
	speed in section X	speed in section Y
A	constant	constant
B	constant	decreasing
C	increasing	constant
D	increasing	decreasing

- 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.



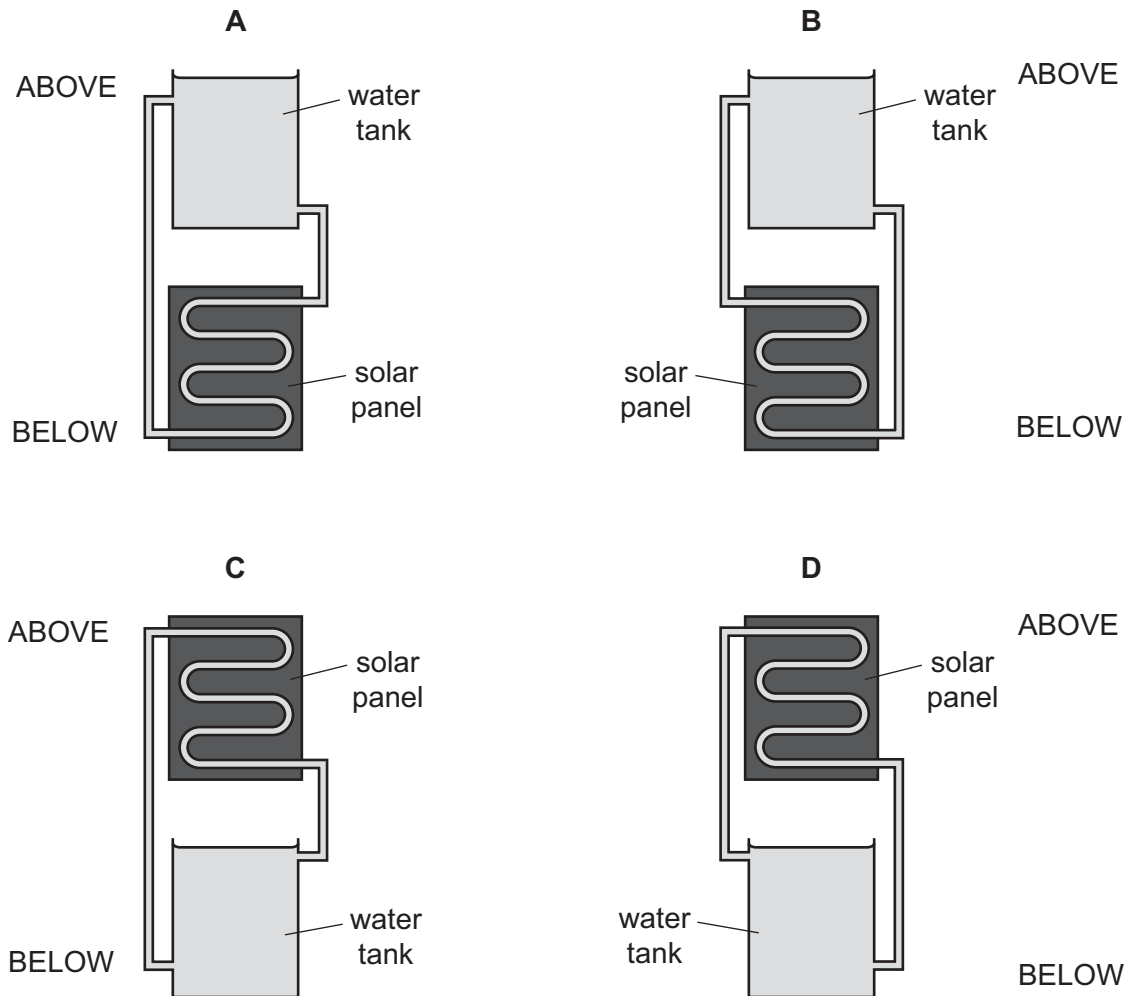
The substance and the sealed container are kept at a temperature of 60°C for several hours.

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

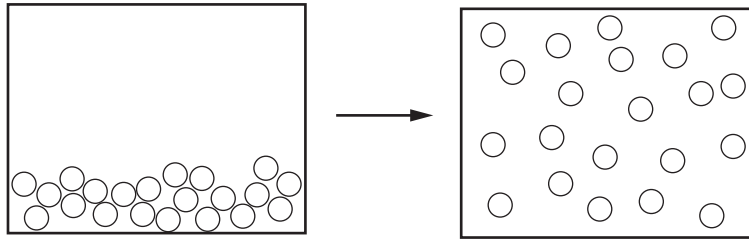
- A** solid only
- B** solid and liquid
- C** liquid only
- D** liquid and gas

- 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?

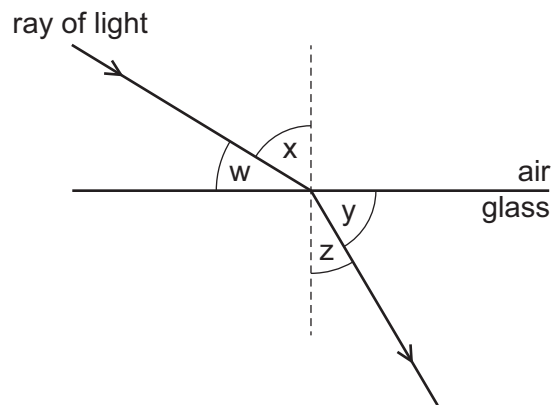


- 33 The diagram shows how the arrangement of the atoms in a substance changes during a change of state.



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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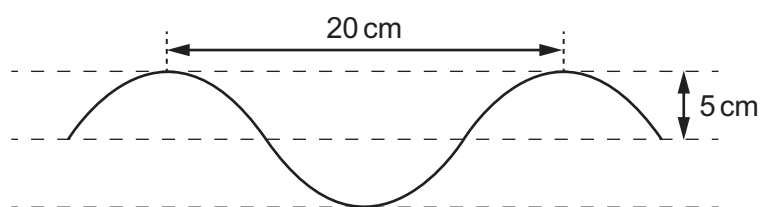
Which statement about electromagnetic waves is correct?

- 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.

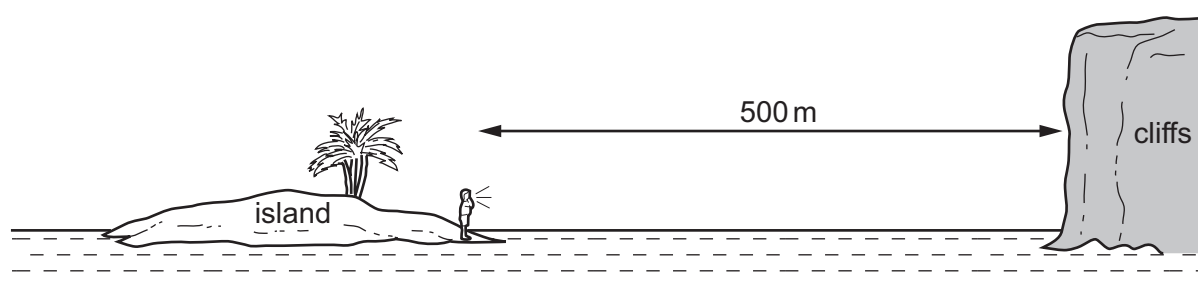
Each wave travels 80 cm in one second.



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?

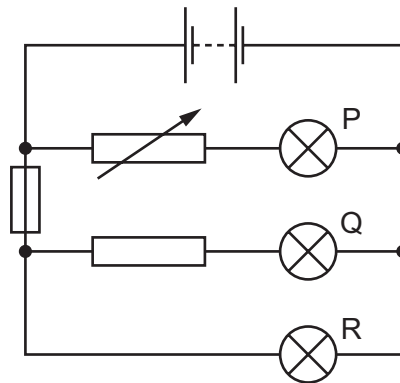
- A $\frac{500}{340}$ s
- B $\frac{2 \times 500}{340}$ s
- C $\frac{340}{500}$ s
- D $\frac{2 \times 340}{500}$ s

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.

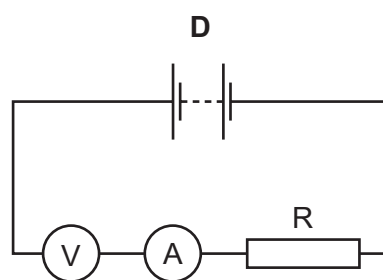
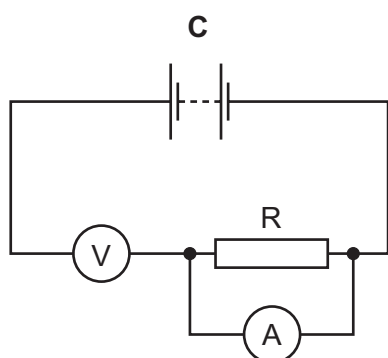
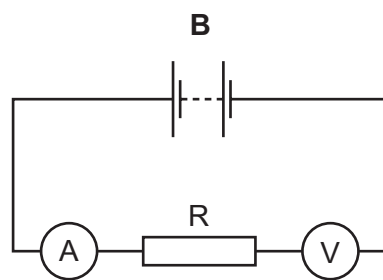
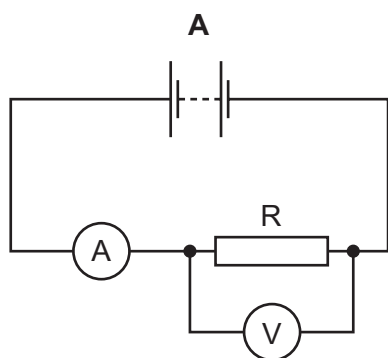


The fuse melts (blows).

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?



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

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