



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice

0653/11

October/November 2016

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 **18** printed pages and **2** blank pages.



- 1 A boy is playing a game with a dog.

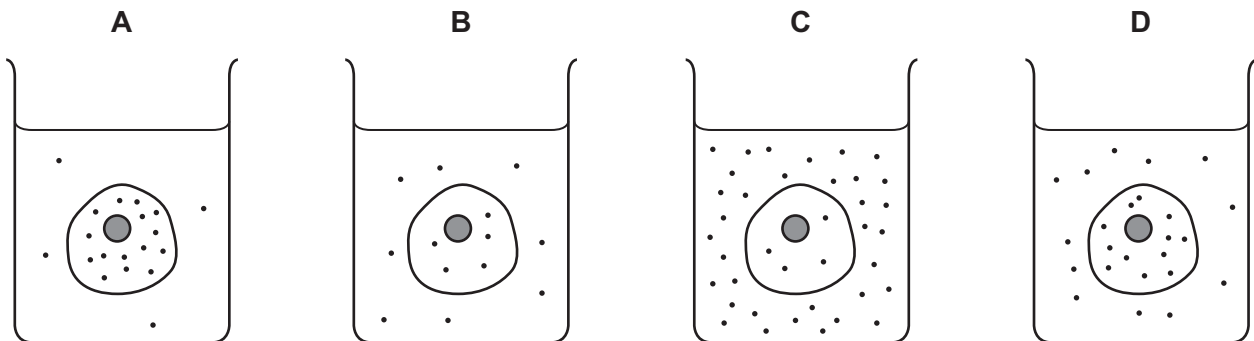
Which characteristic shown by the boy and the dog is a characteristic of all living organisms?

- A Each can hear sounds made by the other.
- B Meat is an important part of what they eat.
- C There is hair on their bodies.
- D They are able to move.

- 2 The diagrams represent four similar animal cells immersed in blood plasma.

The black dots represent molecules of dissolved oxygen.

Which cell will have oxygen molecules diffusing into it most rapidly?



- 3 A student observes a cell under a microscope.

Which structure identifies this cell as being from a plant and not from an animal?

- A cell membrane
- B cell wall
- C cytoplasm
- D nucleus

- 4 What is the purpose of chemical digestion?

- A to absorb minerals such as calcium and iron
- B to pass food out as faeces
- C to break down large molecules of nutrients into smaller molecules
- D to secrete enzymes

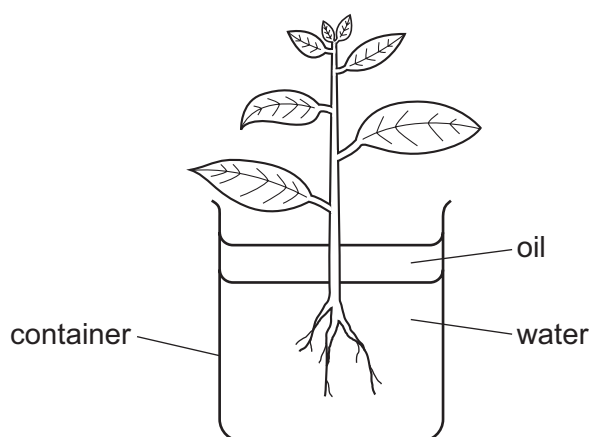
- 5 The table shows the results of tests carried out on a food.

name of test	colour obtained
iodine	brown
Benedict's	orange
biuret	blue

Which nutrients does the food contain?

	reducing sugar	starch	protein
A	✓	✓	x
B	✓	x	x
C	x	✓	✓
D	x	x	✓

- 6 The diagram shows a plant in a container of water. The layer of oil stops the water in the container evaporating.



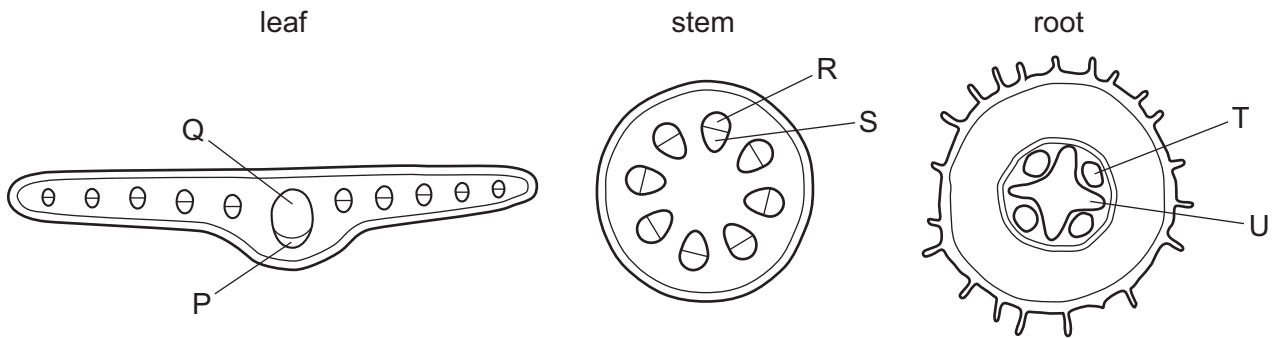
The initial mass of the container and contents is 296 g.

After two hours the mass of the container and contents is 292 g.

What is the rate of transpiration in this time?

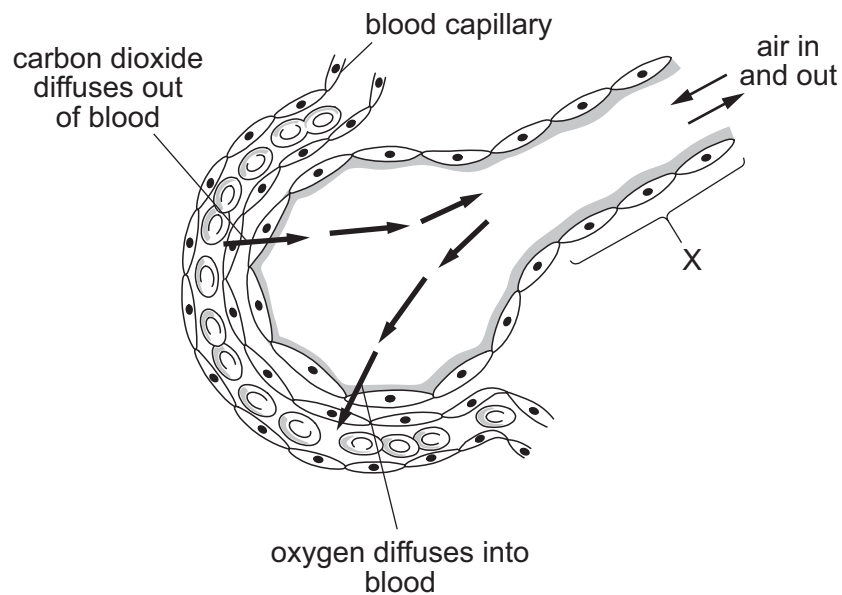
- A** 150 g water/hour
- B** 148 g water/hour
- C** 4 g water/hour
- D** 2 g water/hour

- 7 The diagrams show transverse sections through different parts of a plant.



Which tissues transport water through the plant?

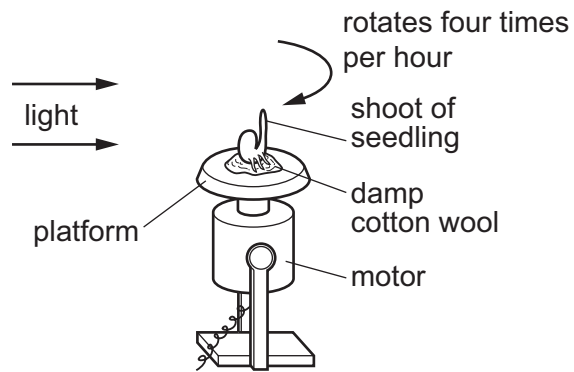
- A** P, R and T **B** P, S and U **C** Q, R and T **D** Q, S and U
- 8 The diagram shows a section through part of a lung.



What is structure X?

- A** alveolus
B bronchiole
C larynx
D trachea

- 9 The diagram shows apparatus containing a seedling fixed to a platform.

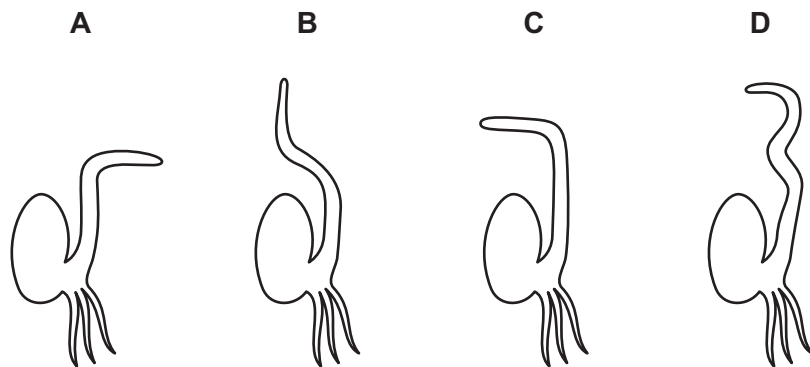


The platform is rotated four times every hour, for two days.

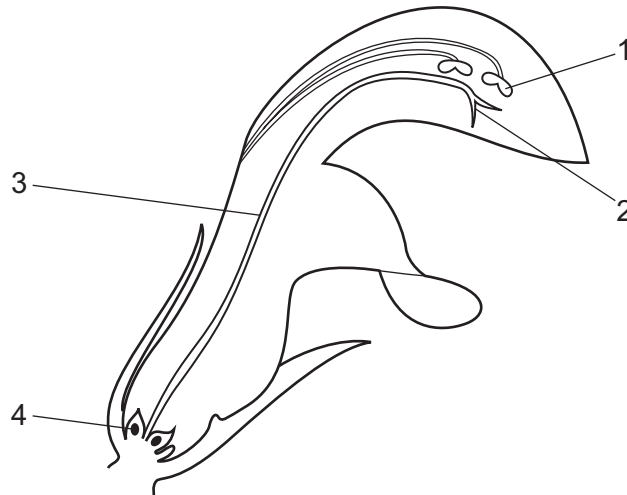
The motor is then switched off and the platform is stationary for the next two days.

During all four days the light source remains stationary.

What is the appearance of the seedling after the four days?



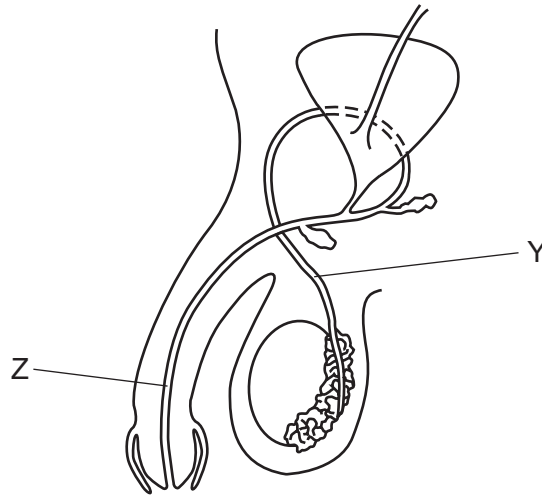
10 The diagram shows a section through a flower.



Which row in the table identifies male and female parts?

	male part	female part
A	1	2
B	2	4
C	3	1
D	4	3

11 The diagram shows the male reproductive system.



What are the parts Y and Z?

	Y	Z
A	prostate gland	urethra
B	urethra	prostate gland
C	sperm duct	prostate gland
D	sperm duct	urethra

12 Which factor is used to decide which organisms are linked in a food chain or web?

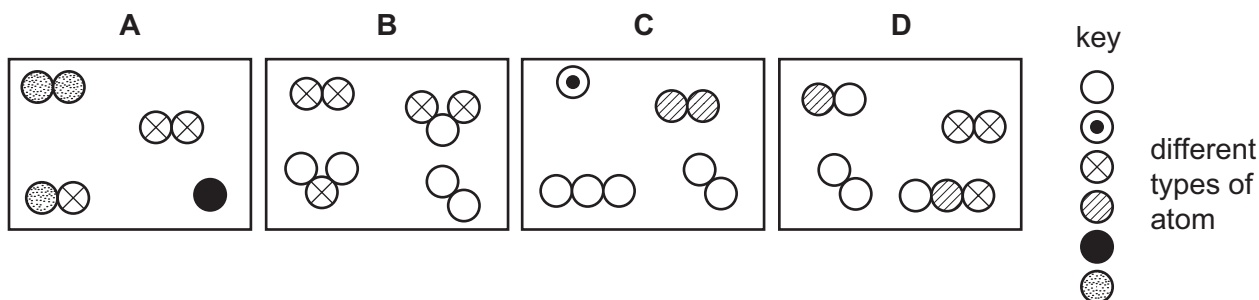
- A** Energy passes from one to another as they feed.
- B** They all depend ultimately on plants for food.
- C** They all feed on one species of plant.
- D** They are the organisms found living on an individual tree.

13 Why is it important to conserve fossil fuels?

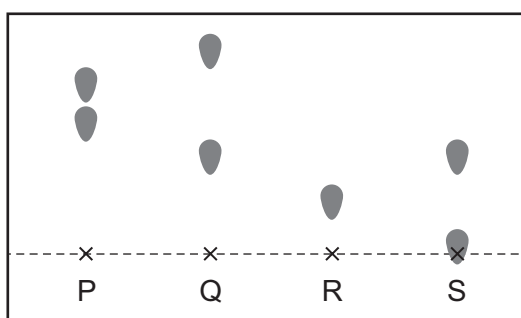
- A** Producing them causes pollution.
- B** They are difficult to dig out of the ground.
- C** They are expensive to manufacture.
- D** They are non-renewable.

14 The diagrams show four different mixtures of gases.

Which diagram represents a mixture containing **only** elements?



15 The chromatogram of four inks P, Q, R and S is shown.



Which statement is correct?

- A** P is a single substance.
- B** Q contains two substances.
- C** R contains two substances.
- D** S is a single substance.

16 Which particle has the smallest mass?

- A** atom
- B** electron
- C** neutron
- D** proton

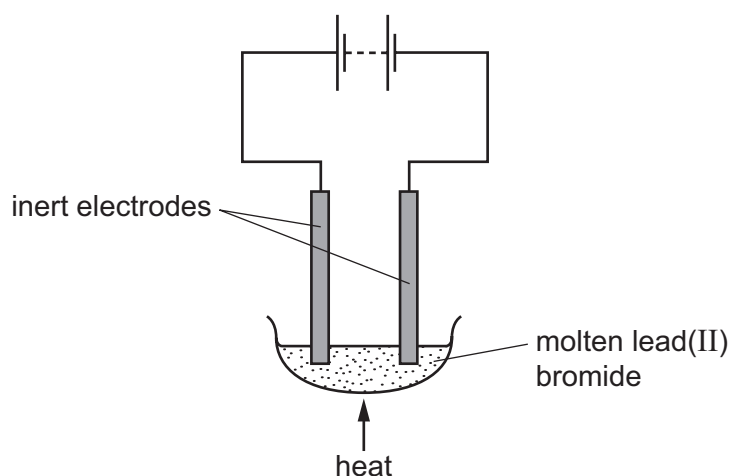
17 Which statement about compounds is correct?

- A** An ionic compound contains two metallic elements bonded together.
- B** In an ionic compound, metal ions are negatively charged.
- C** When metals combine with non-metals, electrons are shared between the atoms.
- D** When two non-metals combine, molecules are formed.

18 What does a word equation show?

	the changes that occur in a reaction	the speed of a reaction
A	✓	✓
B	✓	x
C	x	✓
D	x	x

19 The apparatus for the electrolysis of lead(II) bromide is shown.



What is seen at each electrode?

	anode	cathode
A	brown gas	silvery solid
B	green gas	silvery solid
C	silvery solid	brown gas
D	silvery solid	green gas

20 Solid calcium oxide reacts with cold water forming calcium hydroxide.

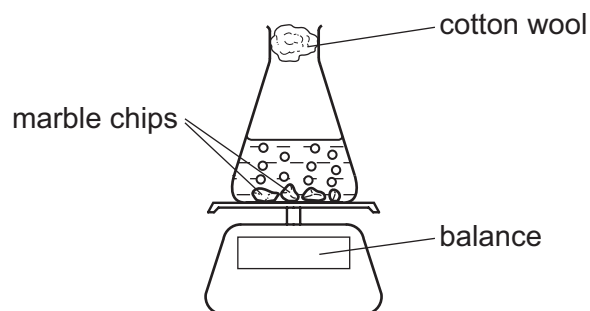
As the cold water is added, steam is seen coming from the solid.

Which statement describes the reaction?

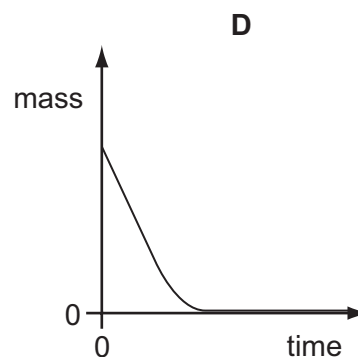
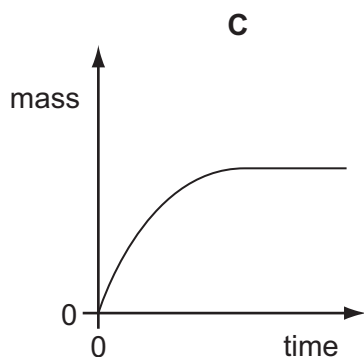
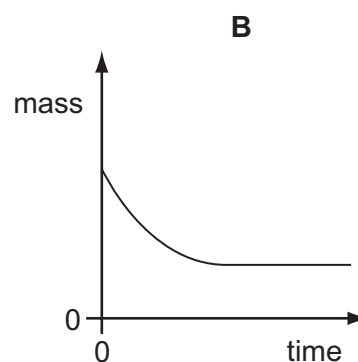
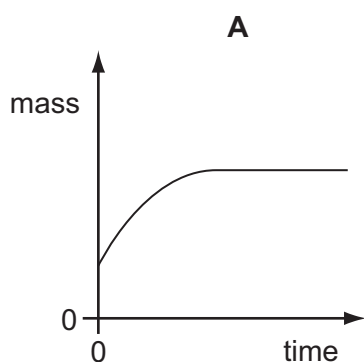
- A** It is endothermic and the temperature decreases.
- B** It is endothermic and the temperature increases.
- C** It is exothermic and the temperature decreases.
- D** It is exothermic and the temperature increases.

21 Marble chips react with dilute hydrochloric acid producing carbon dioxide.

The progress of this reaction is followed using the apparatus shown.



Which graph shows the results of this experiment?



22 Hydrochloric acid reacts with aqueous sodium hydroxide to form a neutral solution of sodium chloride.

Which process **must** be used to obtain dry crystals of sodium chloride from this solution?

- A** distillation
- B** evaporation
- C** filtration
- D** neutralisation

23 Solution X is mixed with nitric acid and aqueous barium nitrate.

A white precipitate is formed.

Which ion is present in solution X?

- A** carbonate
- B** chloride
- C** nitrate
- D** sulfate

24 Which statement describes a trend in the elements going down Group VII?

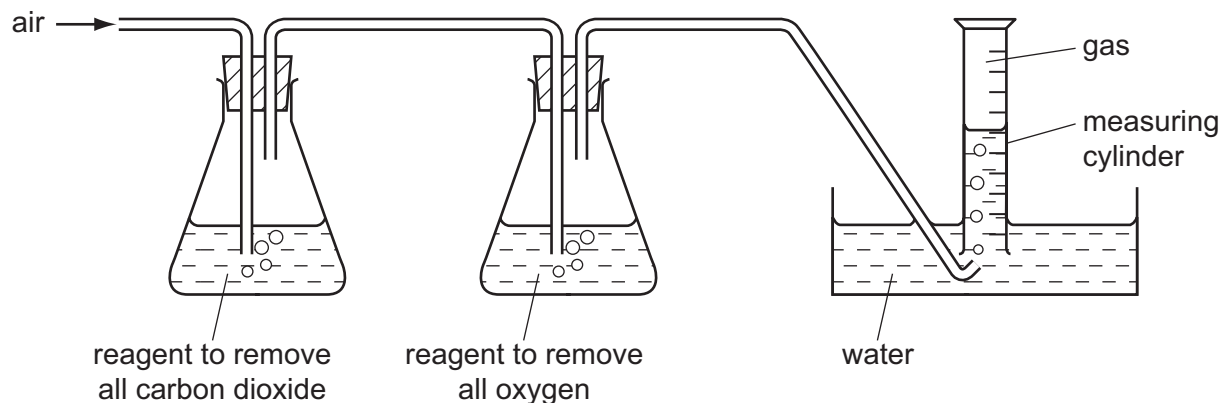
- A** They are darker in colour.
- B** They are displaced from their salts by elements lower down the group.
- C** They are more reactive.
- D** They have lower boiling points.

25 Many coins are made of an alloy.

Which property of an alloy makes it suitable for coins?

- A** conducts electricity
- B** expensive to buy
- C** resistant to corrosion
- D** soft and malleable

26 A 100 cm³ sample of air is passed into the apparatus as shown.



What is the volume and the composition of the gas collected in the measuring cylinder?

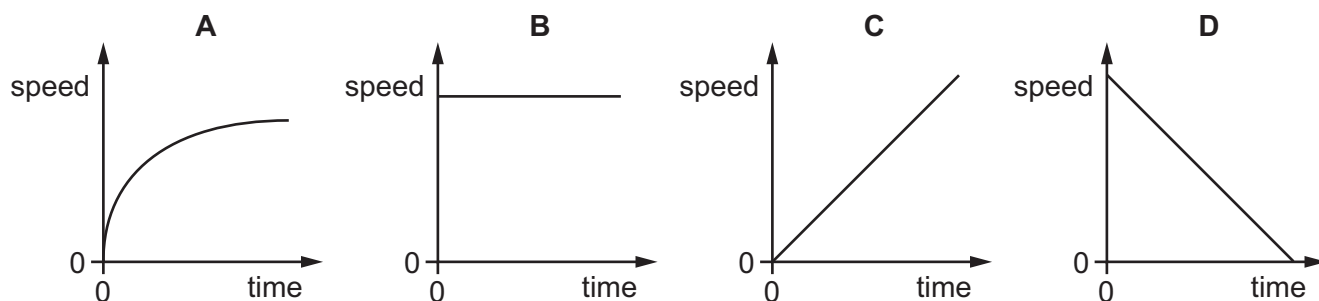
	volume / cm ³	composition
A	21	pure nitrogen
B	21	nitrogen and other gases
C	79	pure nitrogen
D	79	nitrogen and other gases

27 What is formed during the complete combustion of a hydrocarbon?

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

28 A speed/time graph is plotted for the journey of a car.

Which graph shows that the car is travelling at a constant speed?



- 29** There is water in a beaker on a laboratory bench.

On a hot day some water evaporates.

What happens to the volume and what happens to the mass of the water in the beaker?

	volume	mass
A	decreases	decreases
B	decreases	stays the same
C	stays the same	decreases
D	stays the same	stays the same

- 30** A wind-powered generator is used to charge a car battery.

In which form is energy stored in the moving air and in which form is energy stored in the charged battery?

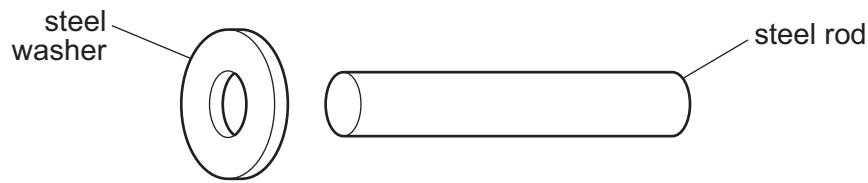
	energy in moving air	energy in charged battery
A	kinetic	chemical
B	kinetic	electrical
C	thermal	chemical
D	thermal	electrical

- 31** A bowl contains some warm water. The water evaporates from the bowl.

Which row describes where the evaporation occurs and the effect of the evaporation on the temperature of the water left in the bowl?

	where evaporation occurs	effect on temperature of water in bowl
A	only on the surface	decreases
B	only on the surface	no change
C	throughout the water	decreases
D	throughout the water	no change

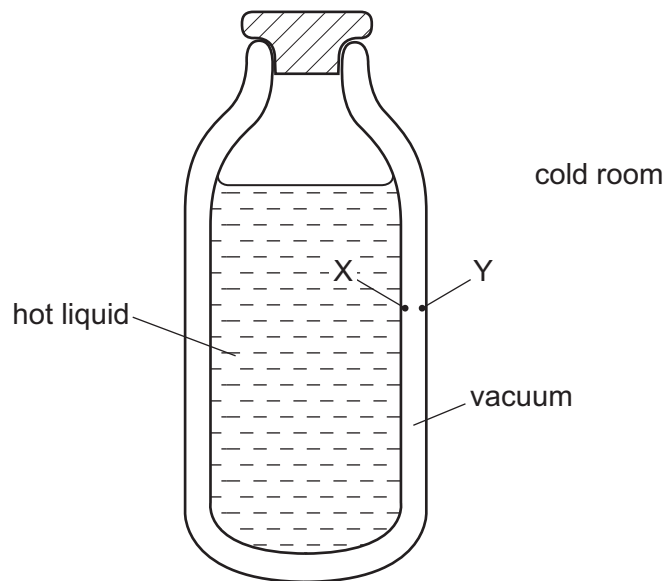
- 32** An engineer wants to fix a steel washer on to a steel rod. The rod is slightly too big to fit into the hole in the washer.



How can the engineer fit the washer on to the rod?

- A** Cool the washer and push it over the rod.
 - B** Cool the washer and the rod to the same temperature and then push them together.
 - C** Heat the rod and then push it in the hole.
 - D** Heat the washer and then place it over the rod.
- 33** The diagram shows a vacuum flask containing a hot liquid in a cold room.

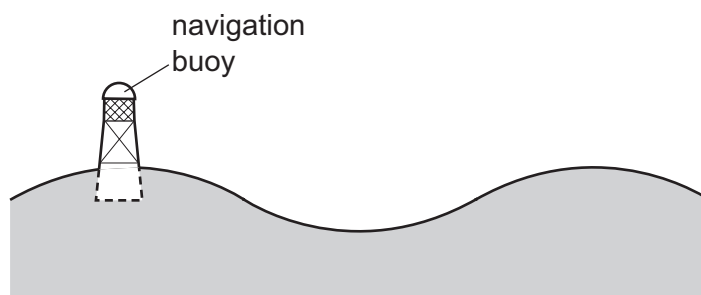
X and Y are points on the inside surfaces of the walls of the flask.



How is energy transferred through the vacuum between X and Y?

- A** by conduction and convection
- B** by conduction only
- C** by radiation and convection
- D** by radiation only

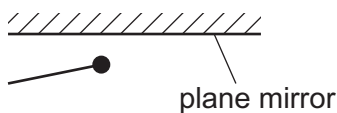
- 34 A navigation buoy floating on the sea oscillates up and down as a wave passes.



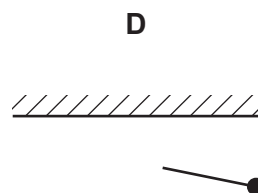
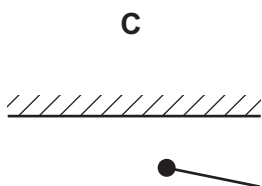
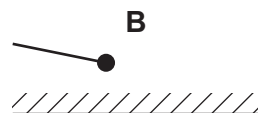
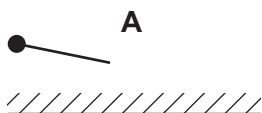
In exactly two minutes, six complete wavelengths pass the buoy.

What is the frequency of the waves?

- A 0.050 Hz B 0.33 Hz C 3.0 Hz D 20 Hz
- 35 The diagram shows an object in front of a plane mirror.



Which diagram below shows the image of the object formed by the mirror?



- 36 Which statement about the electromagnetic spectrum is correct?

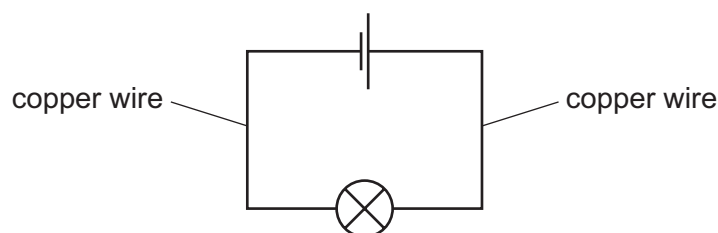
- A Gamma rays have the highest frequency.
- B Microwaves have the smallest wavelength.
- C Ultraviolet waves have the largest wavelength.
- D Visible light has the lowest frequency.

- 37** A sound wave has a frequency of 250 Hz in air. A second sound wave has a frequency of 500 Hz in air. Both sound waves have the same amplitude.

How does the second sound wave compare with the first?

- A** It is louder.
- B** It has a greater speed.
- C** It has a higher pitch.
- D** It has a larger wavelength.

- 38** A lamp is connected to a cell by copper wires. Particles flow from one terminal of the cell around the circuit to the other terminal of the cell.



Which particles flow round the circuit and from which terminal of the cell do they flow?

	particles	from which terminal
A	electrons	negative
B	electrons	positive
C	protons	negative
D	protons	positive

- 39** When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A while the computer is in use.

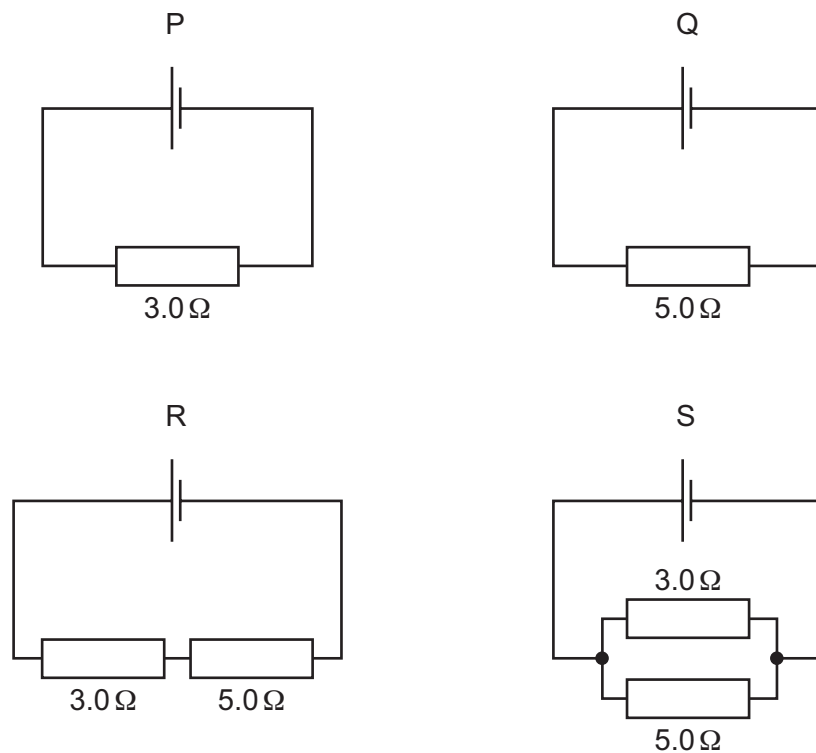
The wire connecting the computer to the power supply can safely carry a current of up to 10.0 A.

The circuit contains a fuse.

Which value of fuse is suitable to use to provide the greatest protection?

- A** 1.0 A
- B** 3.0 A
- C** 5.0 A
- D** 13.0 A

40 The diagram shows four different circuits containing either one or two resistors.



What is the order of increasing resistance of these circuits?

	lowest resistance $\longrightarrow$ highest resistance			
A	P	Q	R	S
B	R	S	P	Q
C	S	P	Q	R
D	P	R	Q	S

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The Periodic Table of Elements

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	19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64							30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —	116 Lv livermorium —	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—</

lanthanoids

actinoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

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



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/12

Paper 1 Multiple Choice

October/November 2016

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 **17** printed pages and **3** blank pages.

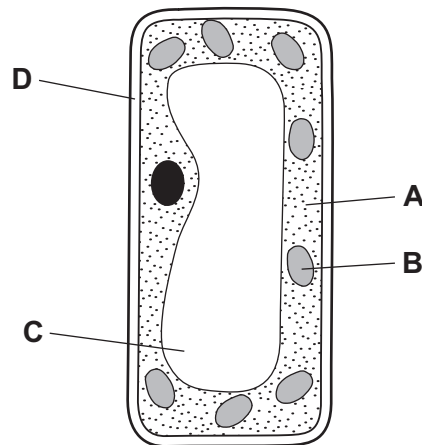


- 1 A plant bends towards the light.

Which characteristics of living organisms does this show?

- A movement and nutrition
 - B movement and respiration
 - C movement and sensitivity
 - D sensitivity and respiration
- 2 How do molecules move when they are involved in the process of diffusion?
- A They all move from a high to a low concentration.
 - B They all move from a low to a high concentration.
 - C They all move randomly.
 - D They show net movement against a concentration gradient.
- 3 The diagram shows a typical plant cell as seen under a light microscope.

Which part would also be present in a liver cell?

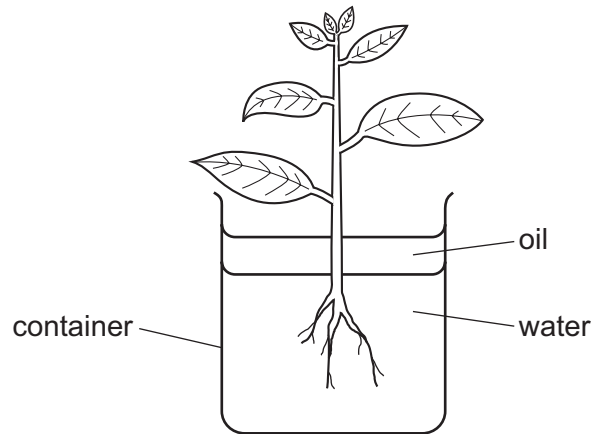


- 4 A student wants to find out if a solution contains an enzyme.

Which chemical should the student use?

- A Benedict's solution
- B biuret solution
- C ethanol
- D iodine solution

- 5 The diagram shows a plant in a container of water. The layer of oil stops the water in the container evaporating.



The initial mass of the container and contents is 296 g.

After two hours the mass of the container and contents is 292 g.

What is the rate of transpiration in this time?

- A 150 g water/hour
 - B 148 g water/hour
 - C 4 g water/hour
 - D 2 g water/hour
- 6 A student is given a clear liquid.

She tests the liquid with Benedict's solution and iodine solution.

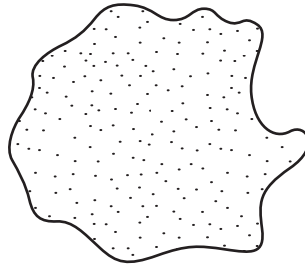
The results are shown in the table.

test	result
Benedict's solution	orange-red colour
iodine solution	orange-brown colour

Which nutrients are present in the liquid?

	reducing sugar	starch
A	✓	✓
B	✓	x
C	x	✓
D	x	x

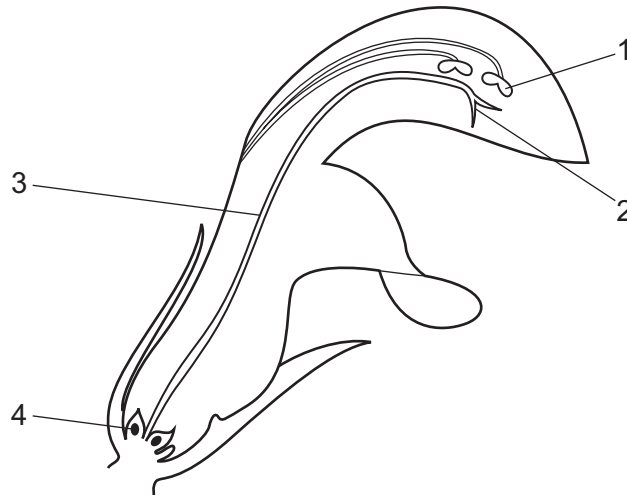
- 7 The diagram shows a type of white blood cell with a structural feature missing.



Which feature is missing?

- A cell membrane
 - B cell wall
 - C large vacuole
 - D nucleus
- 8 What makes up a higher percentage of inspired air compared with expired air?
- A carbon dioxide
 - B nitrogen
 - C noble gases
 - D oxygen
- 9 Which process in a germinating seed is a tropic response?
- A the breaking of the outer skin
 - B the root tip growing downwards
 - C the start of photosynthesis
 - D the uptake of water

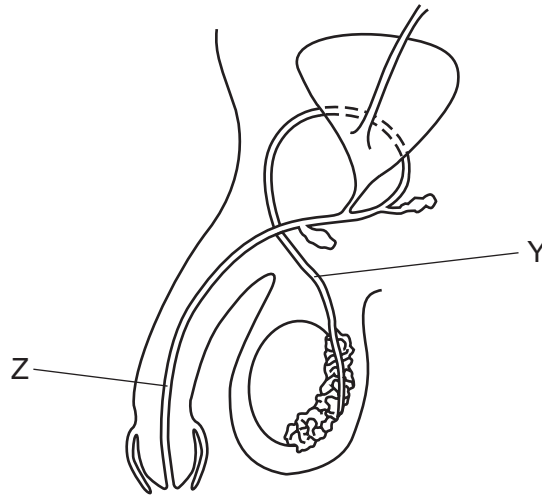
10 The diagram shows a section through a flower.



Which row in the table identifies male and female parts?

	male part	female part
A	1	2
B	2	4
C	3	1
D	4	3

11 The diagram shows the male reproductive system.



What are the parts Y and Z?

	Y	Z
A	prostate gland	urethra
B	urethra	prostate gland
C	sperm duct	prostate gland
D	sperm duct	urethra

12 A farmer chops down a tree to provide firewood. He gets warm when chopping down the tree. The farmer then burns the wood to keep warm.

What is the original source of the energy that warms the farmer in both cases?

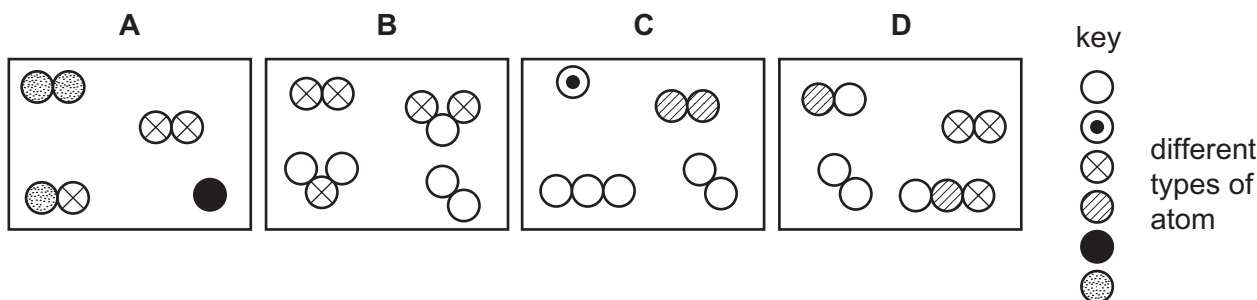
- A** photosynthesis by the tree growing the wood
- B** respiration
- C** the match used to light the fire
- D** the Sun

13 Deforestation could have which effect?

- A** a decrease in carbon dioxide in the atmosphere
- B** an increase in oxygen in the atmosphere
- C** less likelihood of flooding
- D** the extinction of species

14 The diagrams show four different mixtures of gases.

Which diagram represents a mixture containing **only** elements?



15 Which method is used to separate an insoluble salt from a mixture of the salt and water?

- A crystallisation
- B distillation
- C filtration
- D fractional distillation

16 Which process is a physical change?

- A the combustion of methane
- B the electrolysis of aqueous copper chloride
- C the melting of ice
- D the reaction of sodium with water

17 Which statement about compounds is correct?

- A An ionic compound contains two metallic elements bonded together.
- B In an ionic compound, metal ions are negatively charged.
- C When metals combine with non-metals, electrons are shared between the atoms.
- D When two non-metals combine, molecules are formed.

18 What does a word equation show?

	the changes that occur in a reaction	the speed of a reaction
A	✓	✓
B	✓	x
C	x	✓
D	x	x

19 What are the products of electrolysis of aqueous copper chloride using inert electrodes?

- A** copper and chlorine
- B** copper and oxygen
- C** hydrogen and chlorine
- D** hydrogen and oxygen

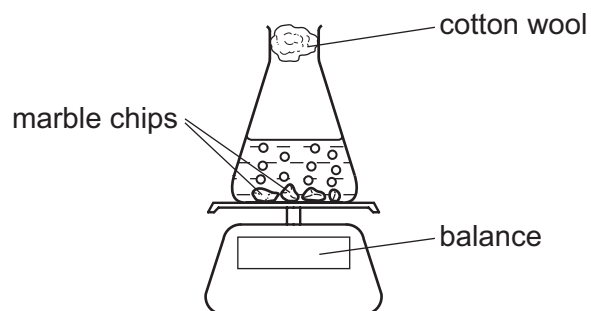
20 The reaction between calcium oxide and water is used to heat food in special food cans.

Which type of reaction occurs?

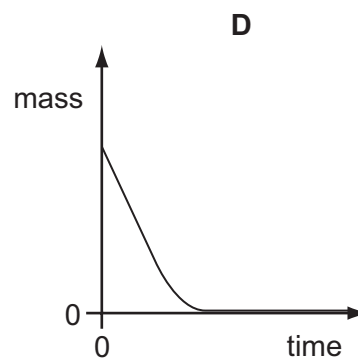
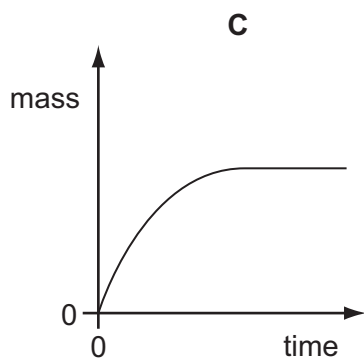
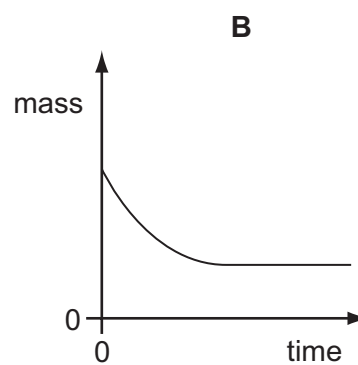
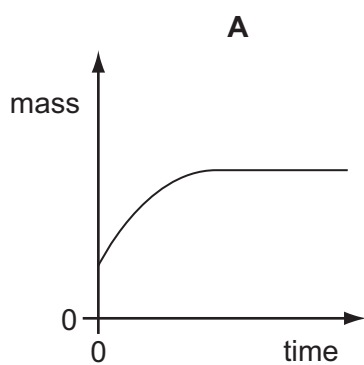
- A** endothermic
- B** exothermic
- C** neutralisation
- D** precipitation

21 Marble chips react with dilute hydrochloric acid producing carbon dioxide.

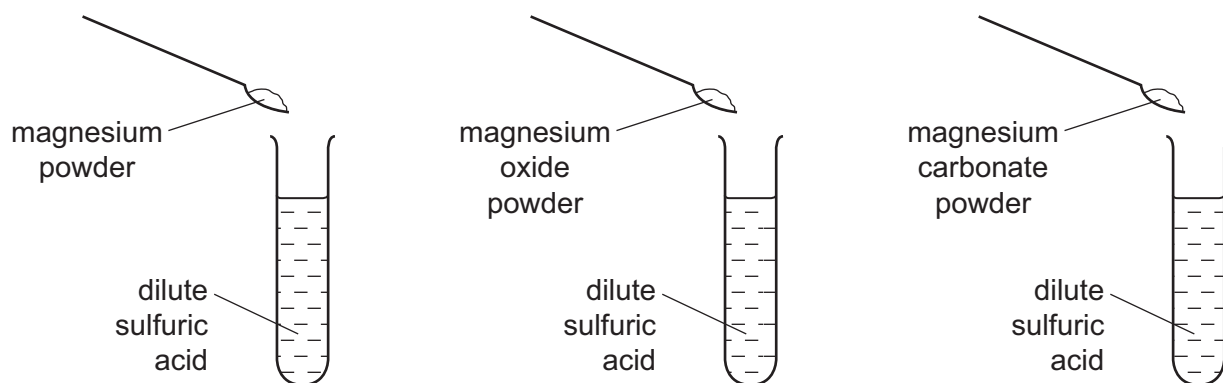
The progress of this reaction is followed using the apparatus shown.



Which graph shows the results of this experiment?



22 Three powders are added to dilute sulfuric acid, as shown.



Which of the powders react to produce water?

	magnesium	magnesium oxide	magnesium carbonate
A	✓	✓	x
B	✓	x	x
C	x	✓	✓
D	x	x	✓

key

✓ = does produce water

x = does not produce water

23 A mixture of ammonium carbonate and ammonium chloride is heated with aqueous sodium hydroxide.

Which gas is produced?

- A** ammonia
- B** carbon dioxide
- C** chlorine
- D** hydrogen chloride

24 Which describes a noble gas?

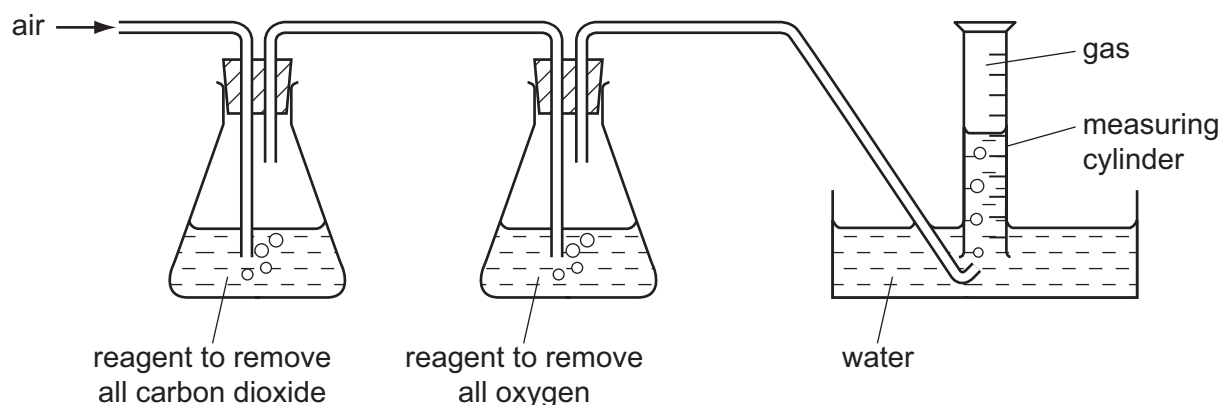
- A** compound, colourless, does not burn in air
- B** element, colourless, burns in air
- C** element, colourless, does not burn in air
- D** element, green, does not burn in air

25 Tenorite is a mineral that contains copper oxide.

How is copper obtained from tenorite?

- A** Heat a mixture of tenorite and carbon.
- B** Pass electricity through solid tenorite.
- C** React tenorite with a metal that is less reactive than copper.
- D** React tenorite with hydrochloric acid.

26 A 100 cm³ sample of air is passed into the apparatus as shown.



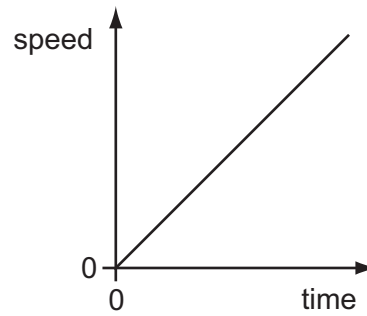
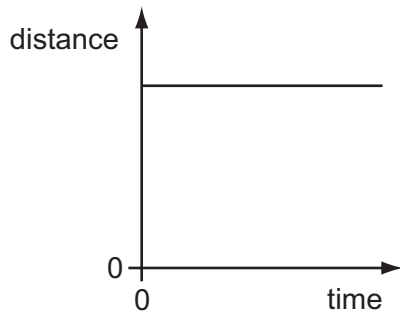
What is the volume and the composition of the gas collected in the measuring cylinder?

	volume / cm ³	composition
A	21	pure nitrogen
B	21	nitrogen and other gases
C	79	pure nitrogen
D	79	nitrogen and other gases

27 What is the main constituent of natural gas?

- A** ethane
- B** methane
- C** nitrogen
- D** oxygen

28 Graph 1 is a distance/time graph. Graph 2 is a speed/time graph.



Which, if any, of these graphs represents the motion of a car that is accelerating?

- A graph 1 only
- B graph 2 only
- C both graphs
- D neither graph

29 A 1.0 kg sample of aluminium is kept in a laboratory. A 1.0 kg sample of iron is kept in a different laboratory in the same building.

Which quantity must be identical for these two samples?

- A density
- B temperature
- C volume
- D weight

30 A parachutist falls at a constant speed. Her kinetic energy does not change.

Which form of energy is increasing as she falls?

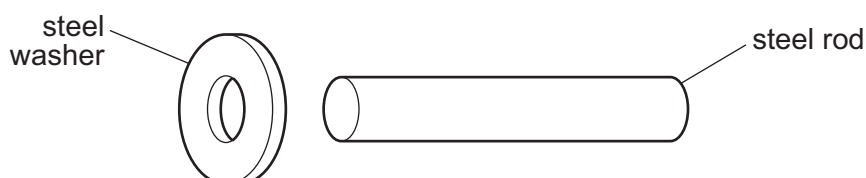
- A chemical energy
- B gravitational (potential) energy
- C nuclear energy
- D thermal energy

- 31** A bowl contains some warm water. The water evaporates from the bowl.

Which row describes where the evaporation occurs and the effect of the evaporation on the temperature of the water left in the bowl?

	where evaporation occurs	effect on temperature of water in bowl
A	only on the surface	decreases
B	only on the surface	no change
C	throughout the water	decreases
D	throughout the water	no change

- 32** An engineer wants to fix a steel washer on to a steel rod. The rod is slightly too big to fit into the hole in the washer.

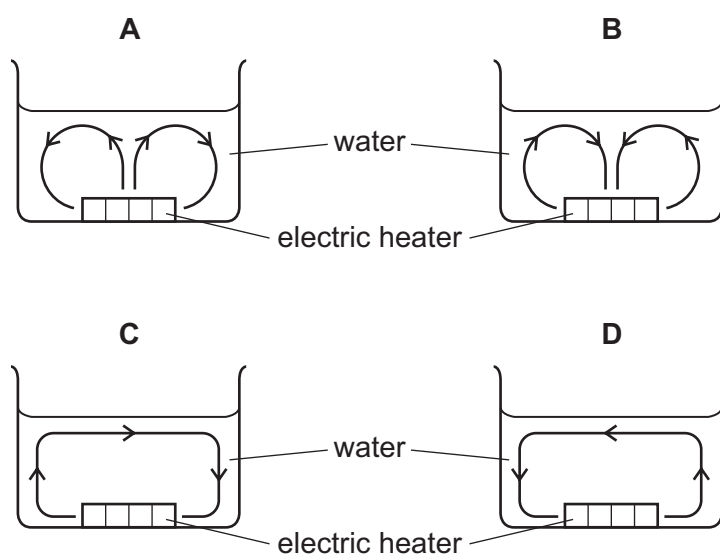


How can the engineer fit the washer on to the rod?

- A** Cool the washer and push it over the rod.
B Cool the washer and the rod to the same temperature and then push them together.
C Heat the rod and then push it in the hole.
D Heat the washer and then place it over the rod.

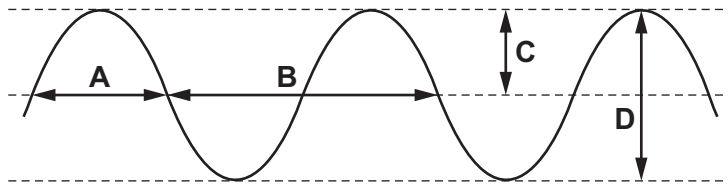
- 33** Water in a beaker is heated by an electric heater in the position shown.

Which diagram shows the convection current formed?

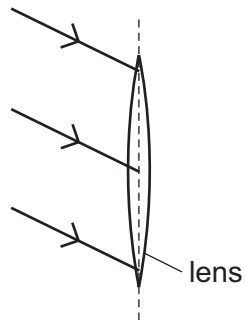


34 The diagram represents a water wave.

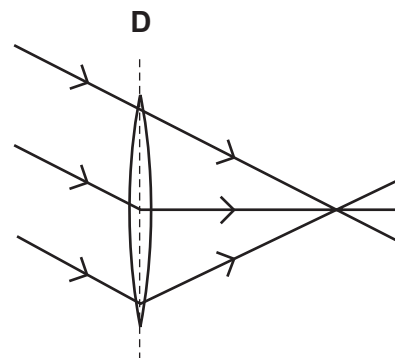
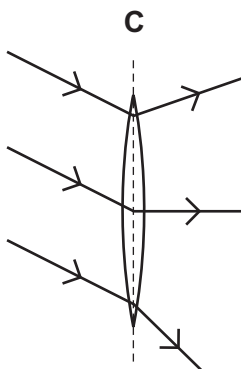
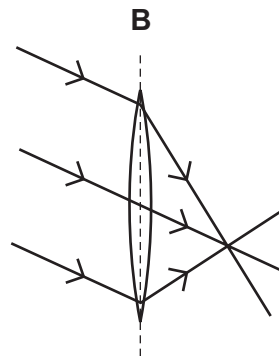
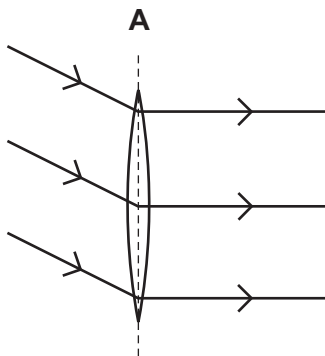
Which labelled distance shows the amplitude of the wave?



35 Three rays of light are incident on a converging lens as shown.



Which diagram shows the rays after passing through the lens?



36 Which statement about the electromagnetic spectrum is correct?

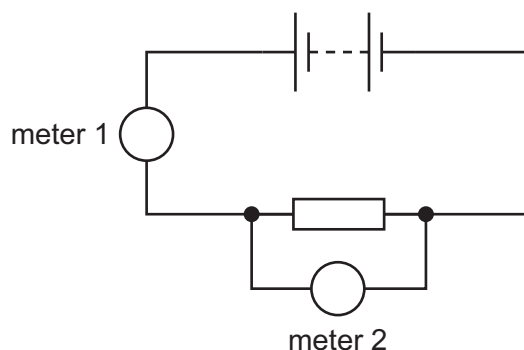
- A Gamma rays have the highest frequency.
- B Microwaves have the smallest wavelength.
- C Ultraviolet waves have the largest wavelength.
- D Visible light has the lowest frequency.

37 A fire alarm is not loud enough. An engineer adjusts it so that it produces a note of the same pitch which is louder.

What effect does this have on the amplitude and on the frequency of the sound waves from the alarm?

	amplitude	frequency
A	larger	larger
B	larger	unchanged
C	unchanged	larger
D	unchanged	unchanged

38 An ammeter and a voltmeter are correctly connected in a circuit so that the resistance of the resistor can be calculated. The ammeter reads 2.0 A and the voltmeter reads 4.0 V.



Which row correctly identifies the voltmeter and gives the resistance of the resistor?

	voltmeter	resistance of resistor / Ω
A	meter 1	0.50
B	meter 1	2.0
C	meter 2	0.50
D	meter 2	2.0

- 39 When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A while the computer is in use.

The wire connecting the computer to the power supply can safely carry a current of up to 10.0 A.

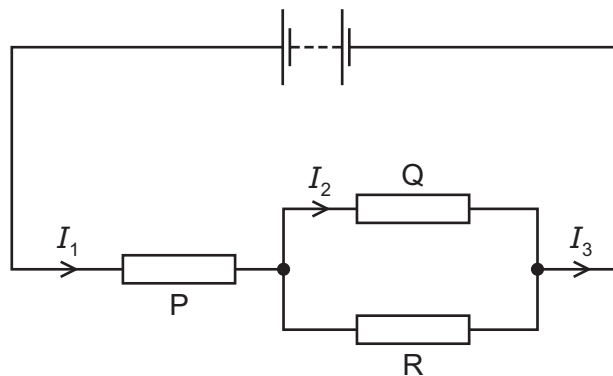
The circuit contains a fuse.

Which value of fuse is suitable to use to provide the greatest protection?

- A** 1.0 A **B** 3.0 A **C** 5.0 A **D** 13.0 A

- 40 The diagram shows a circuit with a battery connected to three resistors P, Q and R.

In different parts of the circuit the currents are I_1 , I_2 and I_3 , as shown.



Which is correct?

- A** I_1 is equal to I_2 **and** I_2 is equal to I_3 .
B I_1 is larger than I_2 **and** I_2 is larger than I_3 .
C I_1 is larger than I_2 **and** I_2 is smaller than I_3 .
D I_1 is smaller than I_2 **and** I_2 is larger than I_3 .

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The Periodic Table of Elements

Group																		
I	II	Key										III	IV	V	VI	VII	VIII	
		atomic number atomic symbol name relative atomic mass										1 H hydrogen 1						
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	2 He helium 4	
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40	
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84	
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131	
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids		72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	
87 Fr francium —	88 Ra radium —	89–103 actinoids		104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —		116 Lv livermorium —	—		

lanthanoids

actinoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

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



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice

October/November 2016

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.

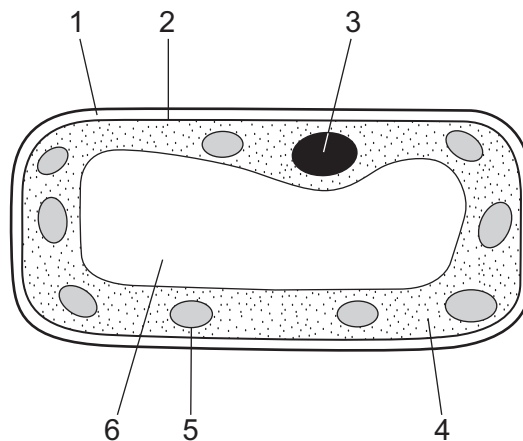
This document consists of **19** printed pages and **1** blank page.



- 1 In an experiment, two pins are pressed onto a student's hand. The student reports whether they feel one or two pins.

Which characteristic of living things is being investigated?

- A excretion
 - B growth
 - C respiration
 - D sensitivity
- 2 How does carbon dioxide move out of the cells that form the walls of the alveoli into the surrounding air?
- A absorption
 - B breathing
 - C diffusion
 - D respiration
- 3 The diagram shows a palisade cell from a leaf.



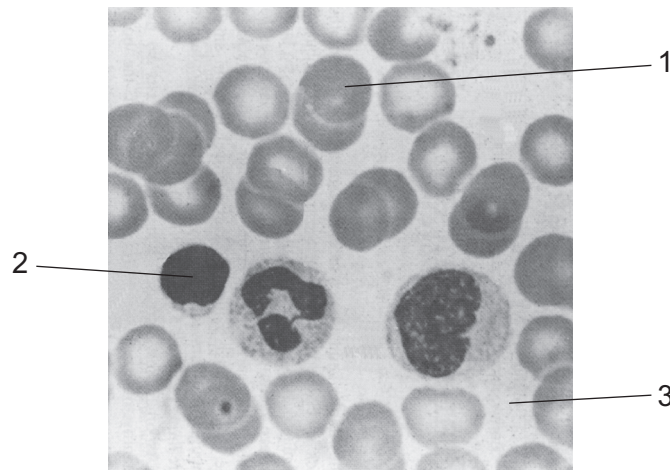
Which labelled structures are found only in plant cells?

- A 1, 2 and 6
 - B 1, 5 and 6
 - C 2, 3 and 5
 - D 2, 3 and 6
- 4 Which statements about enzymes are correct?
- 1 act as catalysts
 - 2 can be denatured by heat
 - 3 composed of complex carbohydrates
 - 4 produced by cells
- A 1, 2 and 4
 - B 1 and 4 only
 - C 2, 3 and 4
 - D 3 and 4 only

- 5 When food reaches the stomach the digestion of starch stops.

Why is this?

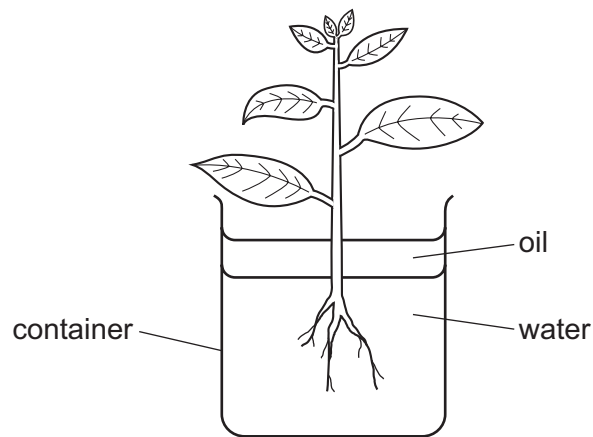
- A** All the starch has been digested.
B The enzyme in saliva has been used up.
C The pH in the stomach is very low.
D The stomach does not produce a starch-digesting enzyme.
- 6 The photograph shows a sample of blood seen under a microscope.



What is the name and function of one of the numbered parts in the blood?

	blood part		
	number	name	function
A	1	platelet	blood clotting
B	1	red blood cell	formation of antibodies
C	2	white blood cell	transport of oxygen
D	3	plasma	transport of hormones

- 7 The diagram shows a plant in a container of water. The layer of oil stops the water in the container evaporating.



The initial mass of the container and contents is 296 g.

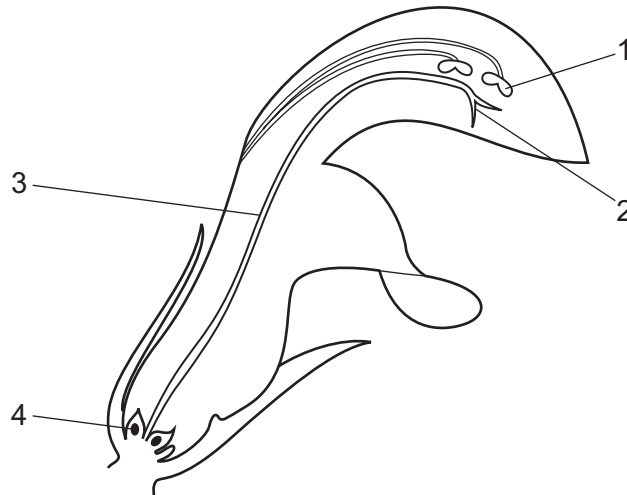
After two hours the mass of the container and contents is 292 g.

What is the rate of transpiration in this time?

- A** 150 g water/hour
B 148 g water/hour
C 4 g water/hour
D 2 g water/hour
- 8 What is the word equation for aerobic respiration?
- A** carbon dioxide + chlorophyll → glucose + oxygen
B carbon dioxide + glucose → oxygen + water
C glucose + oxygen → carbon dioxide + water
D oxygen + light energy → carbon dioxide + water
- 9 How does adrenaline affect blood glucose concentration and pulse rate?

	blood glucose concentration	pulse rate
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

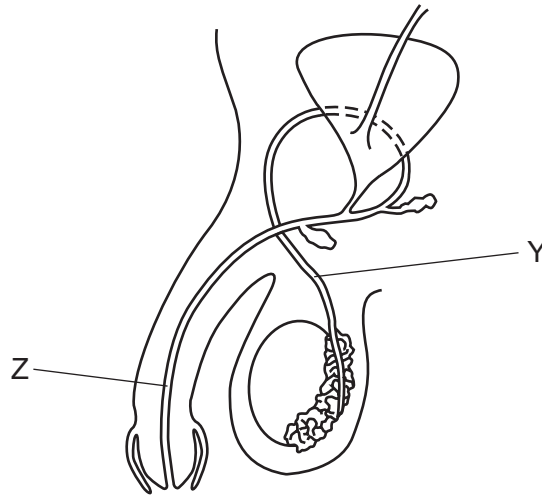
10 The diagram shows a section through a flower.



Which row in the table identifies male and female parts?

	male part	female part
A	1	2
B	2	4
C	3	1
D	4	3

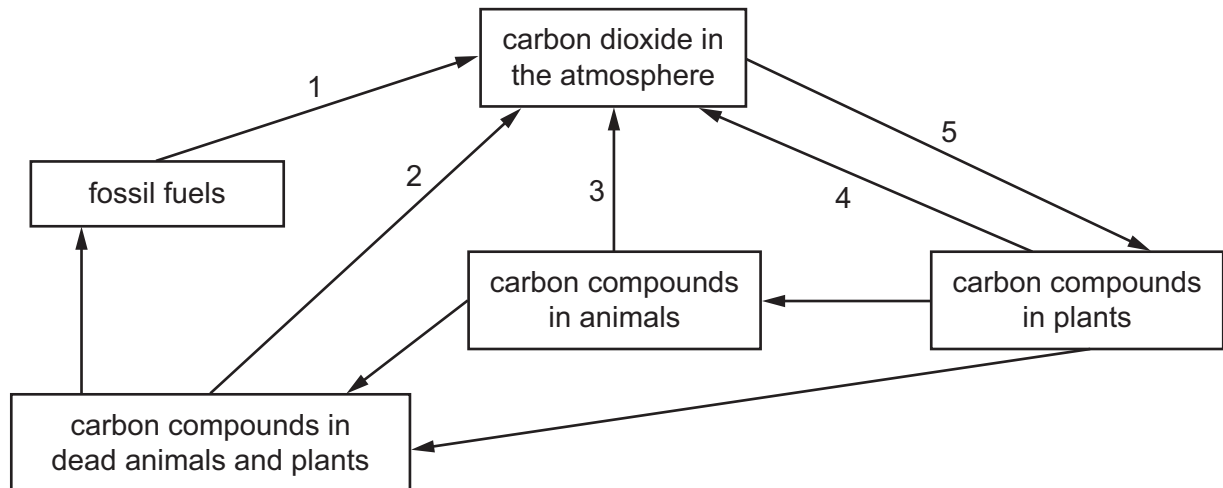
11 The diagram shows the male reproductive system.



What are the parts Y and Z?

	Y	Z
A	prostate gland	urethra
B	urethra	prostate gland
C	sperm duct	prostate gland
D	sperm duct	urethra

12 The diagram shows part of the carbon cycle.



Which are stages that use oxygen and produce oxygen?

	uses oxygen	produces oxygen
A	1	2
B	2	3
C	3	4
D	4	5

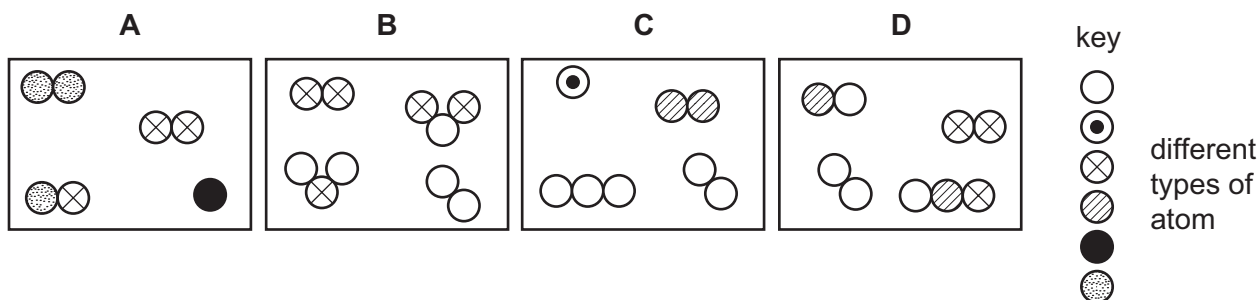
13 Which are undesirable effects of deforestation?

- 1 build up of carbon dioxide in the air
- 2 extinction of species
- 3 loss of soil

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

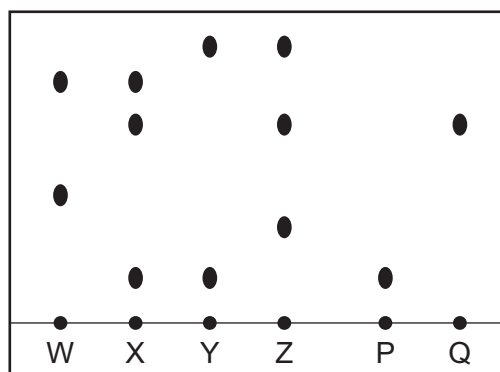
14 The diagrams show four different mixtures of gases.

Which diagram represents a mixture containing **only** elements?



15 Four food samples W, X, Y and Z, are tested for additives P and Q using chromatography.

The chromatogram obtained is shown.



Which food sample does **not** contain artificial additives P or Q?

- A** W **B** X **C** Y **D** Z

16 Which number determines the order of elements in the Periodic Table?

- A** neutron number
B nucleon number
C proton number
D relative atomic mass

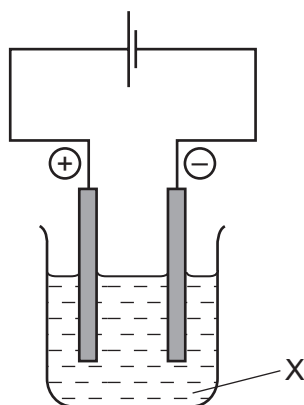
17 Which statement about compounds is correct?

- A** An ionic compound contains two metallic elements bonded together.
B In an ionic compound, metal ions are negatively charged.
C When metals combine with non-metals, electrons are shared between the atoms.
D When two non-metals combine, molecules are formed.

18 What does a word equation show?

	the changes that occur in a reaction	the speed of a reaction
A	✓	✓
B	✓	x
C	x	✓
D	x	x

19 Aqueous sodium chloride is electrolysed using the apparatus shown.



What is X?

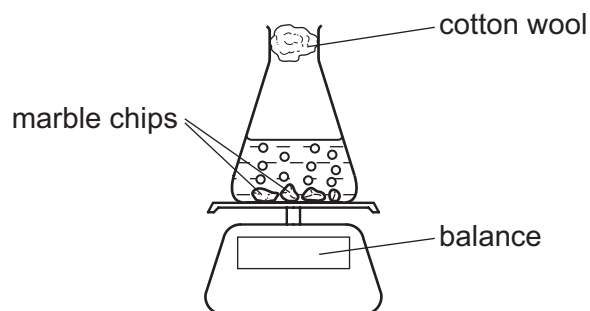
- A** the anode
- B** the cathode
- C** the electrode
- D** the electrolyte

20 Which reaction is **most** endothermic?

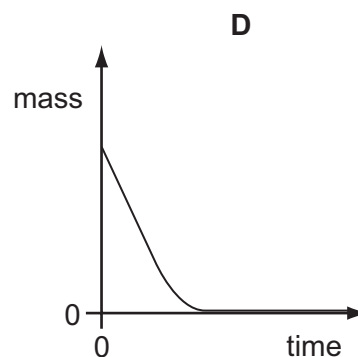
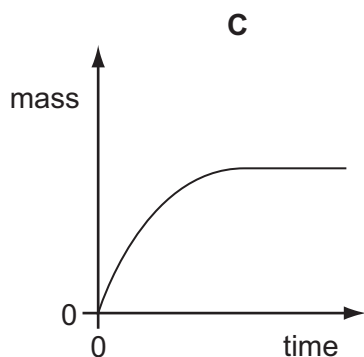
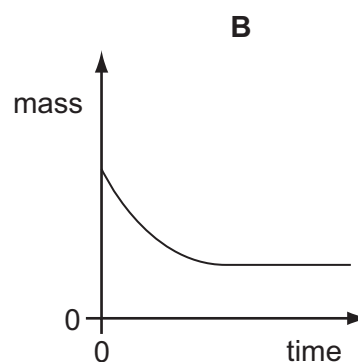
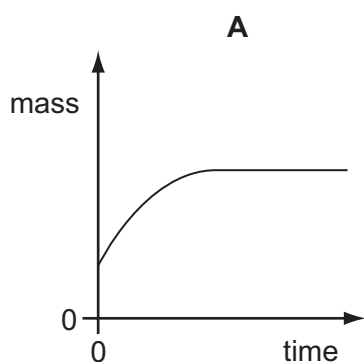
	initial temperature / °C	final temperature / °C
A	18	23
B	19	18
C	20	22
D	21	19

21 Marble chips react with dilute hydrochloric acid producing carbon dioxide.

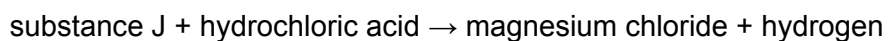
The progress of this reaction is followed using the apparatus shown.



Which graph shows the results of this experiment?



22 The word equation shows the reaction between substance J and hydrochloric acid.



What is substance J?

- A** magnesium
- B** magnesium carbonate
- C** magnesium hydroxide
- D** magnesium oxide

- 23** A piece of damp blue litmus paper is placed in a gas.

The litmus paper turns red and then turns white.

What is the gas?

- A** carbon dioxide
- B** chlorine
- C** hydrogen
- D** oxygen

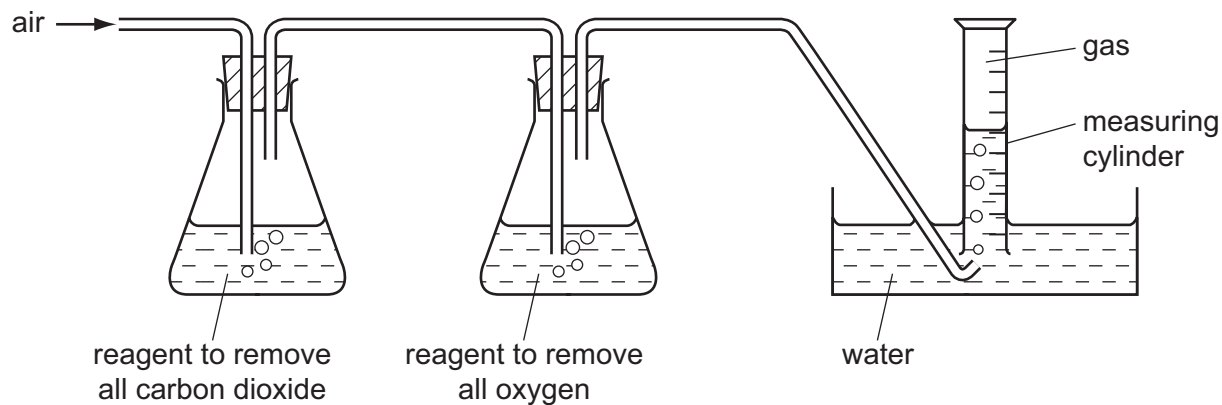
- 24** Period 3 of the Periodic Table is shown.

Na	Mg	Al	Si	P	S	Cl	Ar
----	----	----	----	---	---	----	----

Which statement about these elements is correct?

- A** All the elements are metals.
 - B** All the elements are non-metals.
 - C** Metallic character decreases from Na to Ar.
 - D** Proton number decreases from Na to Ar.
- 25** What is the order of reactivity of calcium, copper, potassium and zinc, from most to least reactive?
- A** calcium, potassium, zinc, copper
 - B** copper, zinc, calcium, potassium
 - C** potassium, calcium, zinc, copper
 - D** potassium, zinc, calcium, copper

26 A 100 cm^3 sample of air is passed into the apparatus as shown.



What is the volume and the composition of the gas collected in the measuring cylinder?

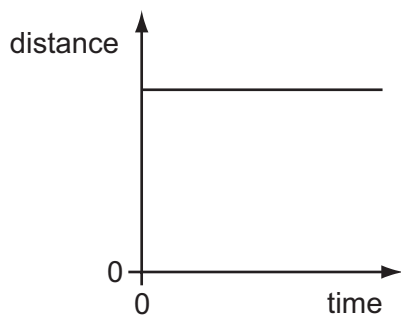
	volume / cm^3	composition
A	21	pure nitrogen
B	21	nitrogen and other gases
C	79	pure nitrogen
D	79	nitrogen and other gases

27 Substance X burns in air to form carbon dioxide and water.

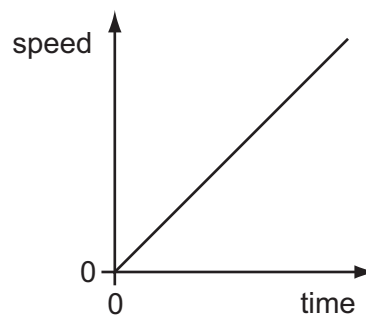
What is substance X?

- A** a noble gas
- B** an alkane
- C** carbon
- D** hydrogen

28 Graph 1 is a distance/time graph. Graph 2 is a speed/time graph.



graph 1



graph 2

Which, if any, of these graphs represents a car that is moving at constant speed?

- A graph 1 only
- B graph 2 only
- C both graphs
- D neither graph

29 Which statement is **always** correct?

- A Smaller objects have less mass than larger objects.
- B The mass of an object can change from one place to another.
- C Weight and mass are both examples of a force.
- D Weight on Earth is caused by the Earth's gravitational field.

30 A stone is dropped onto a soft surface. The stone does not bounce.

Which type of energy increases as the stone hits the surface?

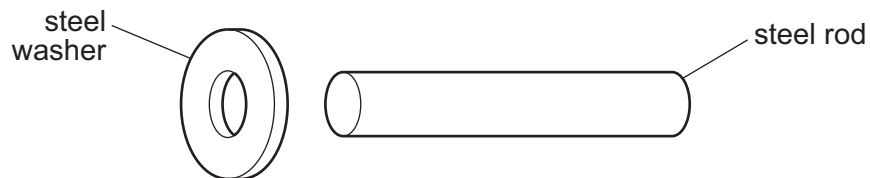
- A chemical
- B gravitational (potential)
- C kinetic
- D thermal

- 31** A bowl contains some warm water. The water evaporates from the bowl.

Which row describes where the evaporation occurs and the effect of the evaporation on the temperature of the water left in the bowl?

	where evaporation occurs	effect on temperature of water in bowl
A	only on the surface	decreases
B	only on the surface	no change
C	throughout the water	decreases
D	throughout the water	no change

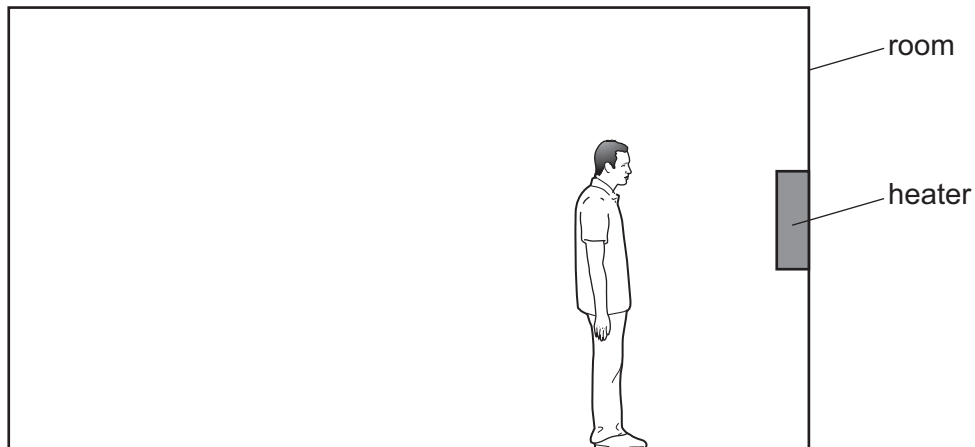
- 32** An engineer wants to fix a steel washer on to a steel rod. The rod is slightly too big to fit into the hole in the washer.



How can the engineer fit the washer on to the rod?

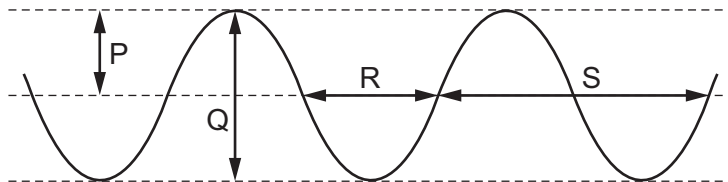
- A** Cool the washer and push it over the rod.
- B** Cool the washer and the rod to the same temperature and then push them together.
- C** Heat the rod and then push it in the hole.
- D** Heat the washer and then place it over the rod.

- 33** A man is in a cold room one metre away from a heater. The heater is switched on and the man feels warmer almost immediately.



How is thermal energy transferred from the heater to the man so quickly?

- A** by conduction only
 - B** by convection only
 - C** by radiation only
 - D** by conduction, convection and radiation
- 34** The diagram represents a wave at one moment.

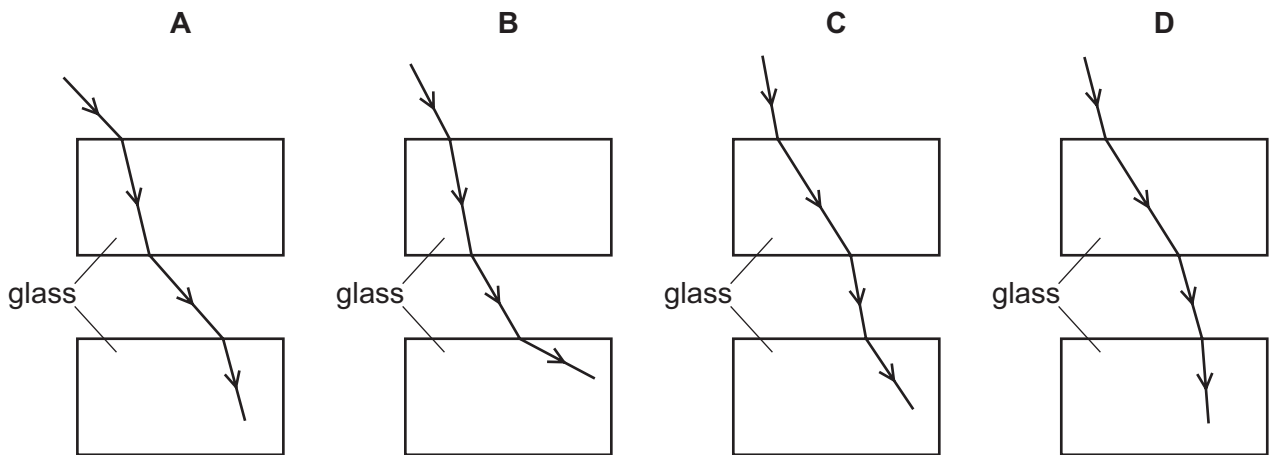


Which labelled arrows represent the amplitude and the wavelength of the wave?

	amplitude	wavelength
A	P	R
B	P	S
C	Q	R
D	Q	S

- 35** Two rectangular glass blocks are placed a short distance apart in air. A ray of light passes through the first block and enters the second block.

Which diagram shows the route taken by the light?



- 36** Which statement about the electromagnetic spectrum is correct?

- A** Gamma rays have the highest frequency.
- B** Microwaves have the smallest wavelength.
- C** Ultraviolet waves have the largest wavelength.
- D** Visible light has the lowest frequency.

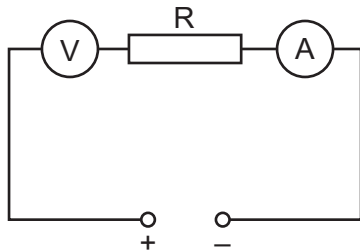
- 37** Which change makes the pitch of a sound lower?

- A** decreasing its amplitude
- B** decreasing its frequency
- C** increasing its amplitude
- D** increasing its frequency

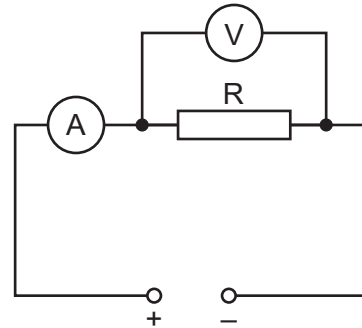
- 38 The diagrams show the circuits connected by four students to determine the resistance of a resistor R .

Which circuit is correct?

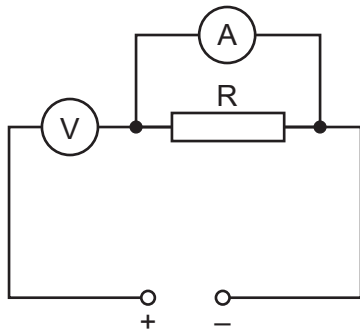
A



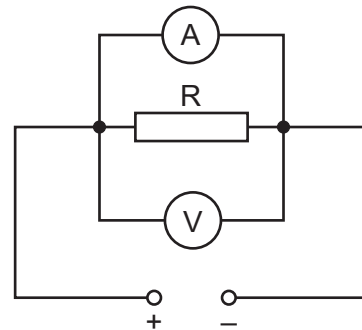
B



C



D



- 39 When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A while the computer is in use.

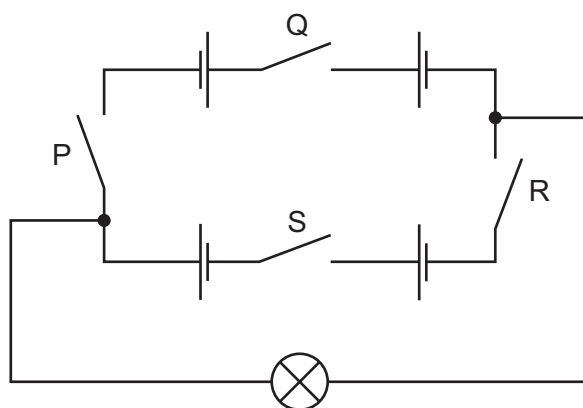
The wire connecting the computer to the power supply can safely carry a current of up to 10.0 A.

The circuit contains a fuse.

Which value of fuse is suitable to use to provide the greatest protection?

- A** 1.0 A **B** 3.0 A **C** 5.0 A **D** 13.0 A

- 40 The circuit shows a lamp, four identical cells and four switches P, Q, R and S. All the switches are open.



Two switches are now closed, and the lamp lights.

Which switches could have been closed to cause the lamp to light?

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

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The Periodic Table of Elements

Group																	
I	II	1 Hhydrogen1										III	IV	V	VI	VII	VIII
3 Li lithium 7	4 Be beryllium 9	Key atomic number atomic symbol name relative atomic mass										5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
	11 Na sodium 23												12 Mg magnesium 24	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —		114 Fl flerovium —		116 Lv livermorium —		

lanthanoids

actinoids

57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

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