



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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COMBINED SCIENCE

0653/11

Paper 1 Multiple Choice

October/November 2013

45 minutes

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

* 3 1 7 3 6 4 3 3 0 1 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

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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.

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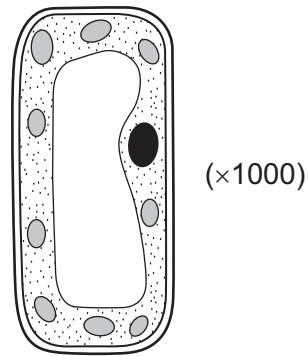
A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

This document consists of **18** printed pages and **2** blank pages.

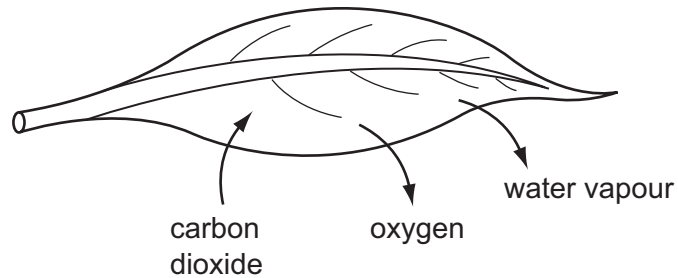


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What is the actual width of the cell?

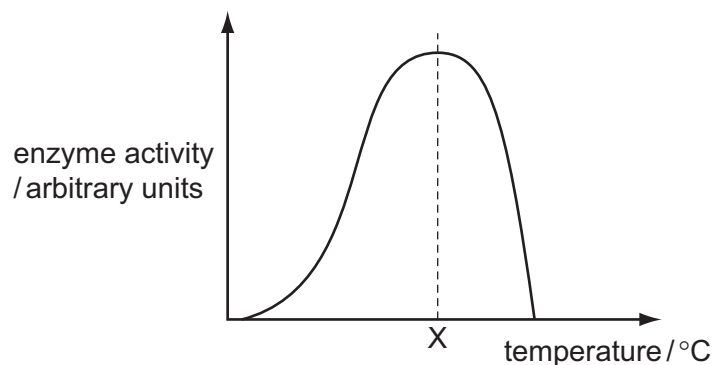
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- 2 The diagram shows a leaf in sunlight and some of the substances that diffuse into and out of it.



Which of the following has a higher concentration outside the leaf than inside the leaf?

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- 3 The diagram shows how the activity of an enzyme changes with temperature.



This enzyme works in the human body.

What is the most likely value of temperature X?

- A** 10 °C **B** 40 °C **C** 70 °C **D** 100 °C
- 4 What must be present for photosynthesis to occur?

	chlorophyll	light	oxygen	water
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B	✓	✓	x	✓
C	x	✓	✓	x
D	x	x	x	✓

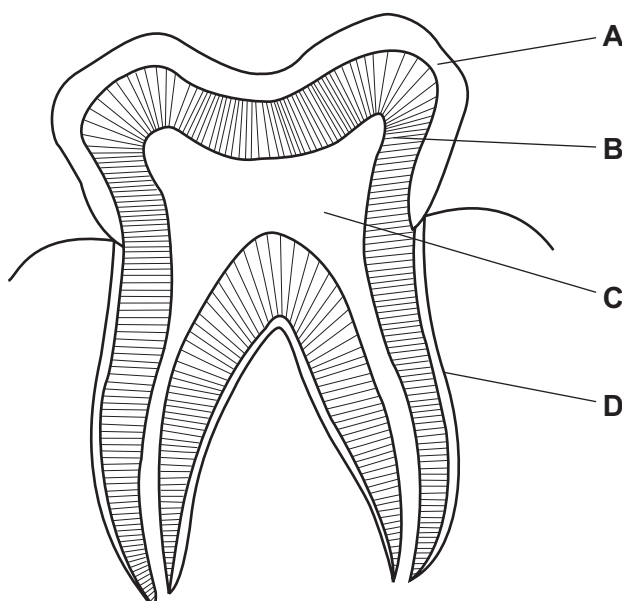
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Which part is made of the hardest material?

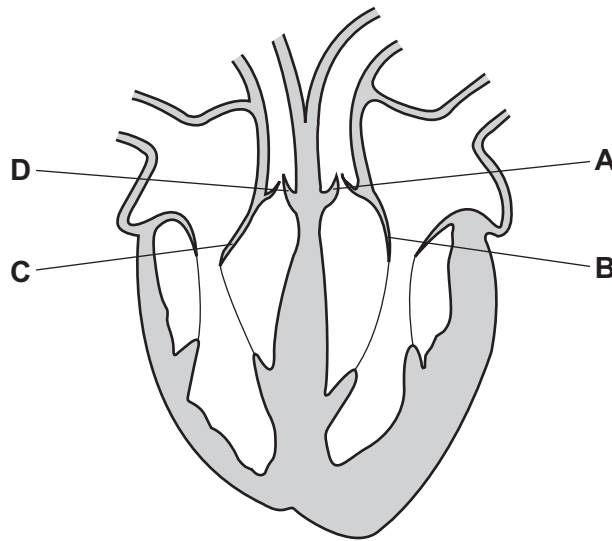


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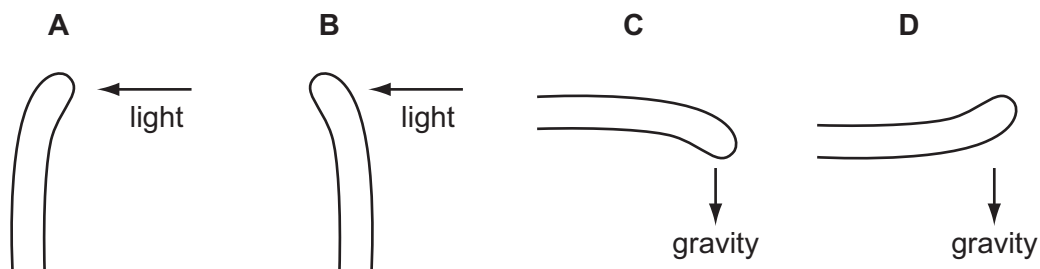
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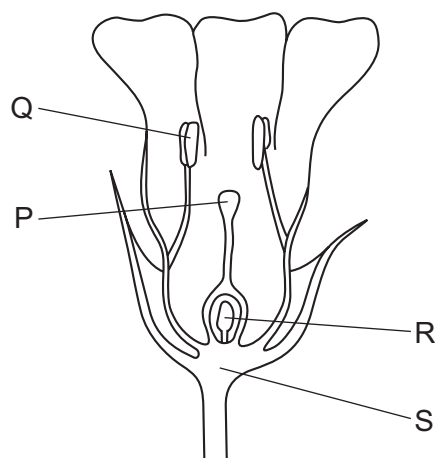
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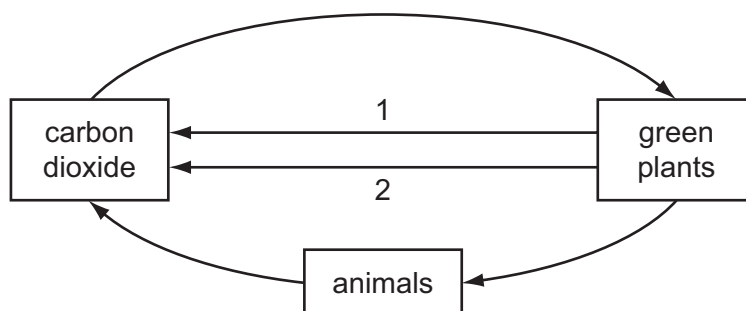
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- 11 How often is an egg usually released from the ovaries of a woman?

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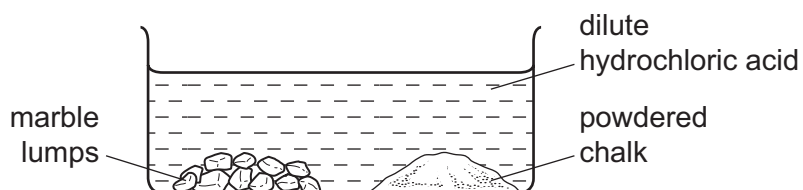


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 - C It increases the amount of methane in the air.
 - D It prevents the extinction of animal species.
- 14 Which method of separation can be used to obtain pure water from aqueous potassium chloride?
- A chromatography
 - B crystallisation
 - C distillation
 - D filtration
- 15 Which reaction involves combustion?
- A calcium carbonate $\rightarrow$ calcium oxide + carbon dioxide
 - B methane + oxygen $\rightarrow$ carbon dioxide + water
 - C sodium carbonate + hydrochloric acid $\rightarrow$ sodium chloride + water + carbon dioxide
 - D sodium hydroxide + hydrochloric acid $\rightarrow$ sodium chloride + water

16 Marble and chalk are two forms of calcium carbonate.

The diagram shows equal masses of lumps of marble and powdered chalk placed in dilute hydrochloric acid.

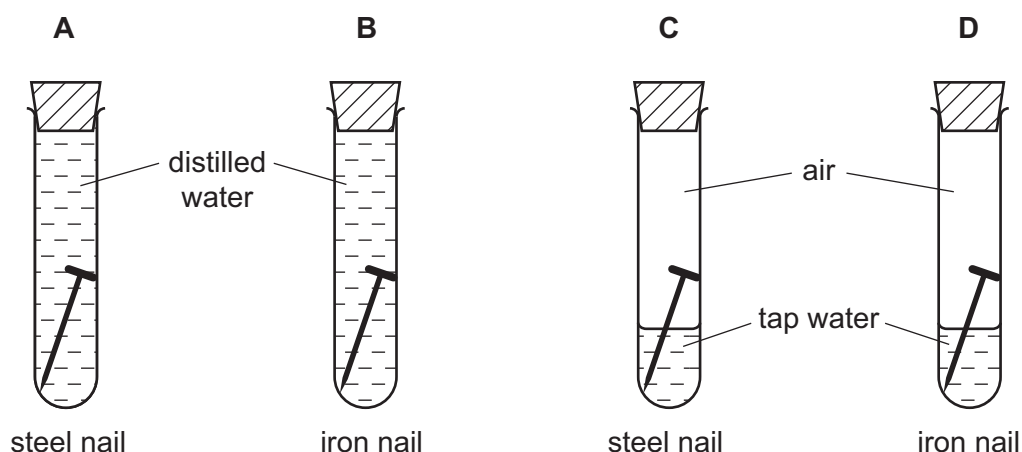


The marble takes longer than the chalk to dissolve in the acid.

Why is this?

- A** Marble is more reactive than chalk.
- B** Marble is more soluble than chalk.
- C** The marble has the smaller surface area.
- D** The marble is more basic.

17 In which test-tube does rusting occur most quickly?



18 The table shows the properties of four substances.

Which substance is an alkali?

	solubility in water	reaction with an acid
A	insoluble	reacts
B	insoluble	does not react
C	soluble	reacts
D	soluble	does not react

- 19 The positions of elements P, Q, R, S and T in the Periodic Table are shown.

The letters are not the symbols for the elements.

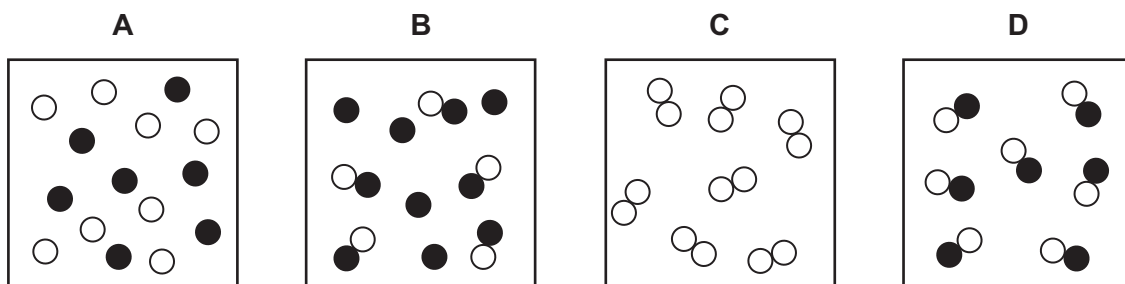
I II																		III IV V VI VII 0					
P	Q																					R	S
T																							

Which element forms an ionic compound with element P?

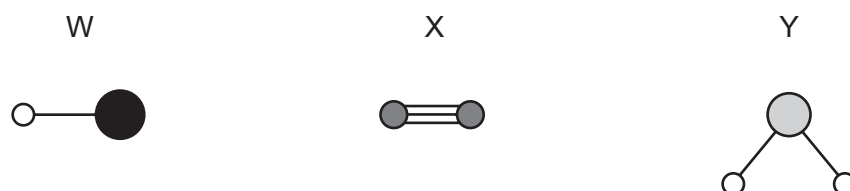
- A Q B R C S D T

- 20 In the diagrams below, ● and ○ represent different atoms.

Which diagram represents molecules of a single compound?



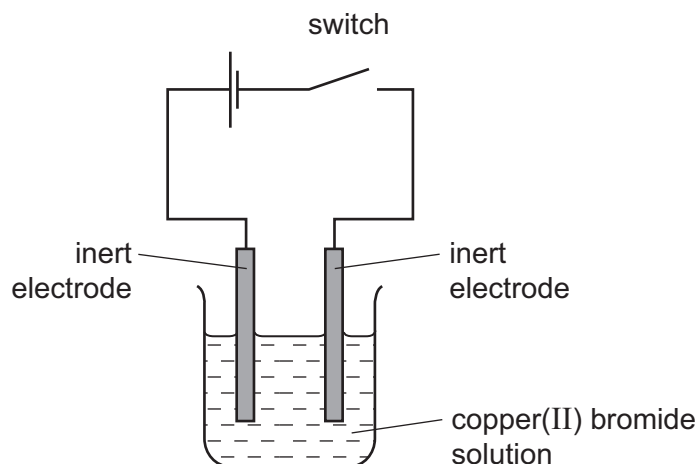
- 21 Molecules of W, X and Y are shown.



What are W, X and Y?

	W	X	Y
A	hydrogen chloride	nitrogen	water
B	hydrogen chloride	water	nitrogen
C	nitrogen	hydrogen chloride	water
D	water	nitrogen	hydrogen chloride

22 Copper(II) bromide can be electrolysed in the same way as copper(II) chloride.



Which row in the table correctly describes the products at the electrodes?

	product at anode	product at cathode
A	brown liquid	brown-red solid
B	brown-red solid	brown liquid
C	colourless gas	brown-red solid
D	silvery solid	colourless gas

23 Metal X reacts rapidly with cold water.

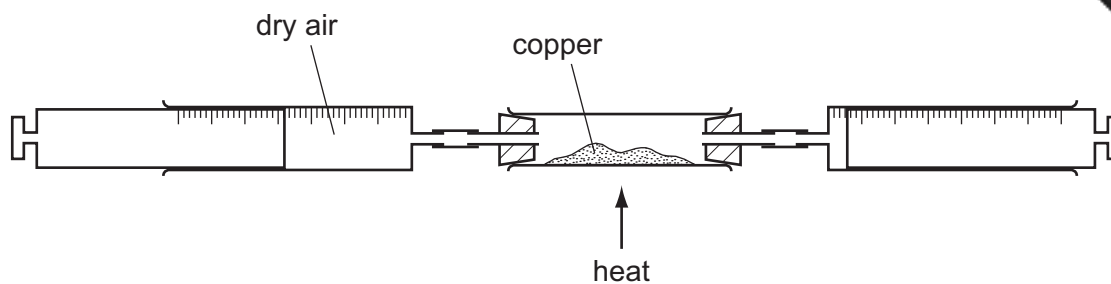
Metal Y does not react with dilute hydrochloric acid.

Metal Y is obtained from its oxide by heating with carbon.

Which row shows the more reactive metal and the type of reaction which metal Y oxide undergoes when it is heated with carbon?

	more reactive metal	type of reaction
A	X	oxidation
B	X	reduction
C	Y	oxidation
D	Y	reduction

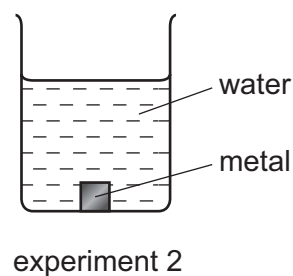
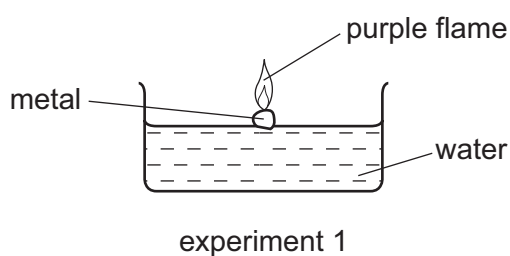
- 24 80 cm^3 of dry air is passed over hot copper until there is no further change in volume.



The volume of air decreases by 16 cm^3 .

Which gas reacts with the copper?

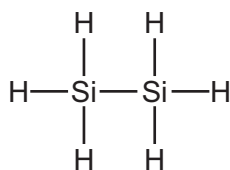
- A carbon dioxide
 - B nitrogen
 - C oxygen
 - D water vapour
- 25 The diagram shows what happens when two metals are added to water.



What are the metals?

	experiment 1	experiment 2
A	calcium	zinc
B	magnesium	copper
C	potassium	calcium
D	potassium	copper

- 26 The diagram shows a molecule of a compound of silicon and hydrogen.



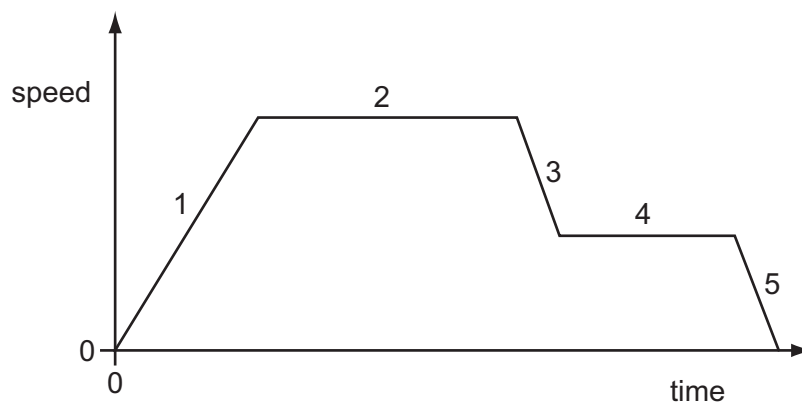
What is the molecular formula of this compound?

- A** SiH_3 **B** SiH_4 **C** Si_2H_6 **D** Si_6H_2
- 27 A catalyst is a substance that 1..... a reaction and is 2..... at the end of the reaction.

Which words correctly complete gaps 1 and 2?

	1	2
A	slows down	changed
B	slows down	unchanged
C	speeds up	changed
D	speeds up	unchanged

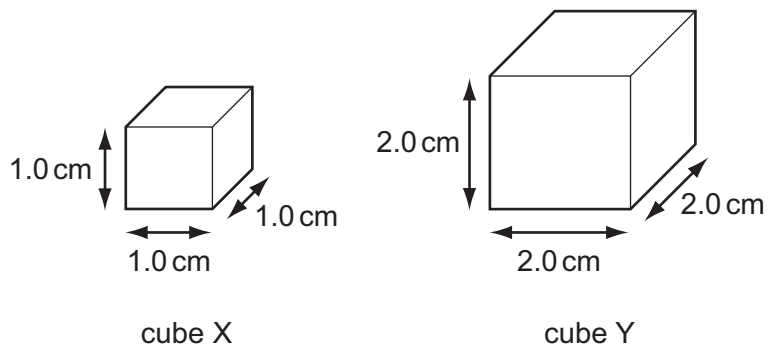
- 28 The speed/time graph for a car journey is shown.



During which two parts of the journey is the car moving at constant speed?

- A** 1 and 3 **B** 1 and 5 **C** 2 and 4 **D** 3 and 5

29 The diagram shows two cubes of different sizes made from the same substance.



Cube X has a density of 1.2 g/cm^3 .

What is the density of cube Y?

- A** 1.2 g/cm^3 **B** 2.4 g/cm^3 **C** 4.8 g/cm^3 **D** 9.6 g/cm^3

30 Weight lifting involves a number of different stages.

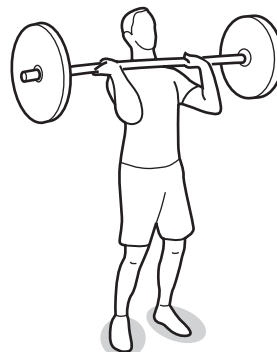
In which stage is **no** work being done on the weights?

A



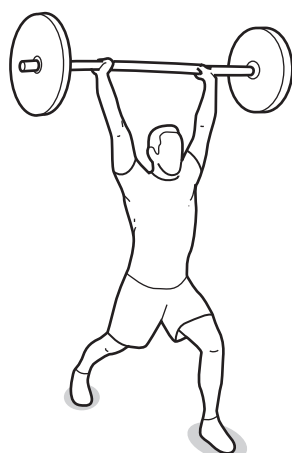
The weights are lifted from the floor to the chest.

B



The weights are raised as the lifter stands up.

C



The weights are lifted above the head.

D



The weights are held stationary above the head.

31 A drop of liquid falls on a student's skin and evaporates quickly.

What is the effect on the skin and the reason for this effect?

- A** The skin cools because the most energetic molecules escape from the liquid.
- B** The skin cools because the most energetic molecules remain in the liquid.
- C** The skin warms because the most energetic molecules escape from the liquid.
- D** The skin warms because the most energetic molecules remain in the liquid.

32 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

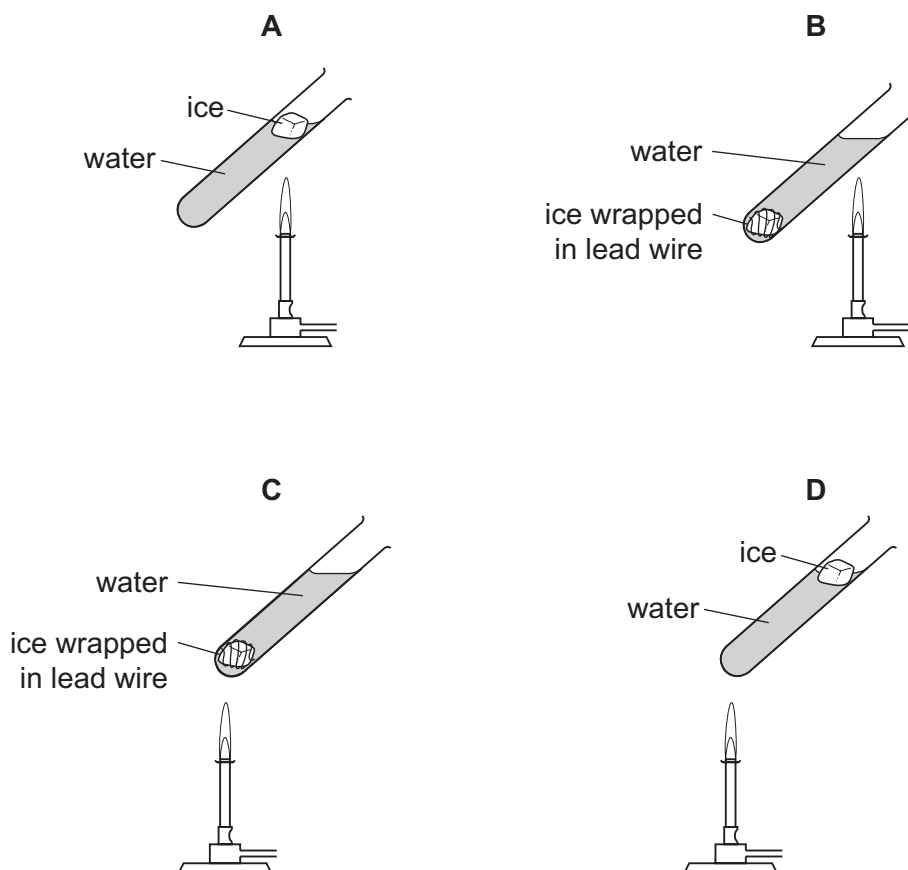
	melting point	boiling point
benzene	5.4 °C	80 °C
glycerine	18 °C	290 °C

At which temperature will both benzene and glycerine be liquid?

- A** 0 °C **B** 50 °C **C** 100 °C **D** 150 °C

33 The diagrams show four identical pieces of ice that are heated in test-tubes of water. All four burners provide heat at the same rate.

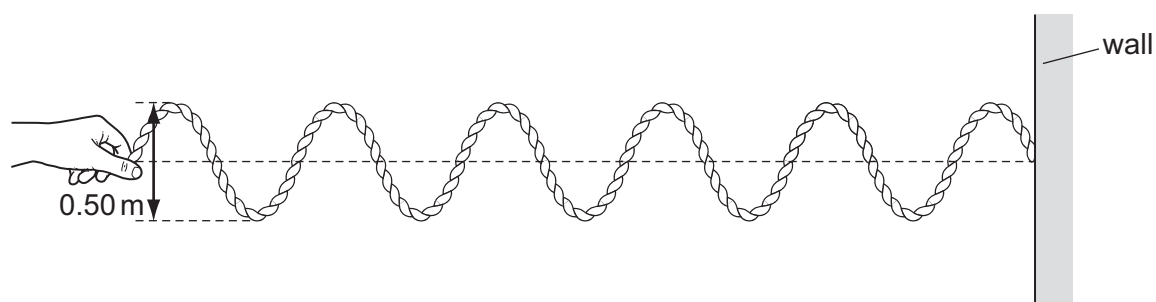
In which test-tube does the ice take the longest time to melt?



- 34 The diagram shows a rope with one end fixed to a wall.

The end of the rope is moved up and down through a distance of 0.50 m twice every second.

This makes a wave move along the rope.



Which line in the table shows the amplitude and the frequency of the wave?

	amplitude / m	frequency / Hz
A	0.25	0.50
B	0.25	2.0
C	0.50	0.50
D	0.50	2.0

- 35 A ray of light travels from glass into air. The angle of refraction is equal to the angle of incidence.

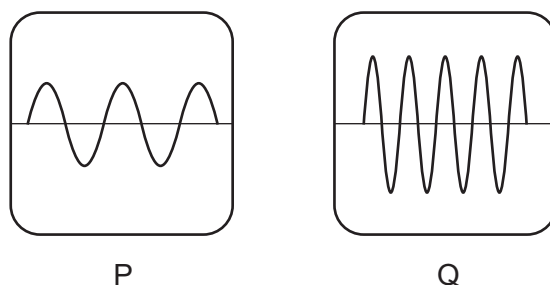
What is the angle of incidence?

- A** 0° **B** 45° **C** 60° **D** 90°

- 36 Which electromagnetic waves are found immediately either side of the visible region of the electromagnetic spectrum?

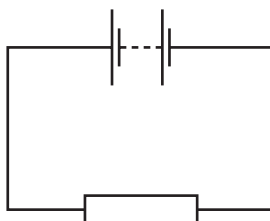
- A** infrared and ultra-violet
B microwaves and infrared
C microwaves and X-rays
D ultra-violet and X-rays

- 37 Two sound waves P and Q are displayed on an oscilloscope. The settings on the are the same for P and Q.



Which statement correctly compares the pitch and the loudness of the two sounds?

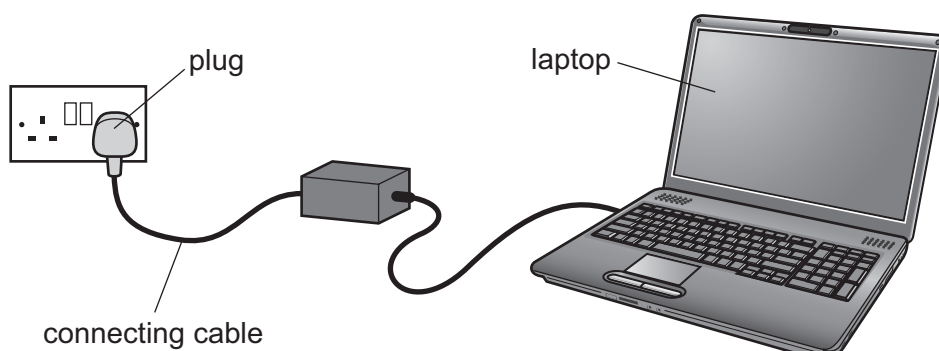
- A** P has a higher pitch and is louder than Q.
B P has a higher pitch and is quieter than Q.
C P has a lower pitch and is louder than Q.
D P has a lower pitch and is quieter than Q.
- 38 There is an electric current in the circuit shown.



Which two changes will each increase the current?

	change 1	change 2
A	decrease the voltage of the battery	decrease the resistance of the resistor
B	decrease the voltage of the battery	increase the resistance of the resistor
C	increase the voltage of the battery	decrease the resistance of the resistor
D	increase the voltage of the battery	increase the resistance of the resistor

- 39 The charger for a laptop computer is connected by a cable to the mains supply through a plug. The plug contains a 13 A fuse. The thin wires in the cable are designed to carry a current of 5 A. A fault develops and the current in the wires rises to 5 A.

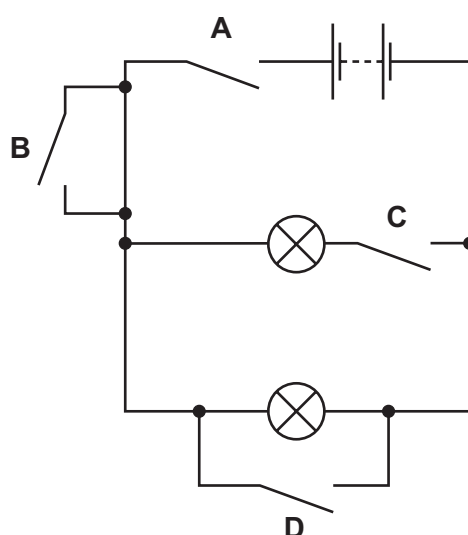


What is the danger caused by this larger current?

- A A large amount of electrical energy could be wasted.
 - B Somebody might receive an electric shock.
 - C The fuse could blow and start a fire.
 - D The wires could overheat and start a fire.
- 40 The circuit shown contains four labelled switches.

All the switches are closed.

Which switch can be opened without changing the brightness of either bulb?



DATA SHEET

The Periodic Table of the Elements

Group																						
I	II											III	IV	V	VI	VII	0					
		1 H Hydrogen																				
3 7 Li Lithium	4 9 Be Beryllium																5 11 B Boron	6 12 C Carbon	7 14 N Nitrogen	8 16 O Oxygen	9 19 F Fluorine	2 4 He Helium
11 23 Na Sodium	12 24 Mg Magnesium																13 27 Al Aluminium	14 28 Si Silicon	15 31 P Phosphorus	16 32 S Sulfur	17 35.5 Cl Chlorine	10 20 Ne Neon
19 39 K Potassium	20 40 Ca Calcium	21 45 Sc Scandium	22 48 Ti Titanium	23 51 V Vanadium	24 52 Cr Chromium	25 55 Mn Manganese	26 56 Fe Iron	27 59 Co Cobalt	28 59 Ni Nickel	29 64 Cu Copper	30 65 Zn Zinc	31 70 Ga Gallium	32 73 Ge Germanium	33 75 As Arsenic	34 79 Se Selenium	35 80 Br Bromine	36 84 Kr Krypton					
37 85 Rb Rubidium	38 88 Sr Strontium	39 89 Y Yttrium	40 91 Zr Zirconium	41 93 Nb Niobium	42 96 Mo Molybdenum	43 98 Tc Technetium	44 101 Ru Ruthenium	45 103 Rh Rhodium	46 106 Pd Palladium	47 108 Ag Silver	48 112 Cd Cadmium	49 115 In Indium	50 119 Sn Tin	51 122 Sb Antimony	52 128 Te Tellurium	53 127 I Iodine	54 131 Xe Xenon					
55 133 Cs Caesium	56 137 Ba Barium	57 139 La Lanthanum	72 178 Hf Hafnium	73 181 Ta Tantalum	74 184 W Tungsten	75 186 Re Rhenium	76 190 Os Osmium	77 192 Ir Iridium	78 195 Pt Platinum	79 197 Au Gold	80 201 Hg Mercury	81 204 Tl Thallium	82 207 Pb Lead	83 209 Bi Bismuth	84 210 Po Polonium	85 210 At Astatine	86 210 Rn Radon					
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The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



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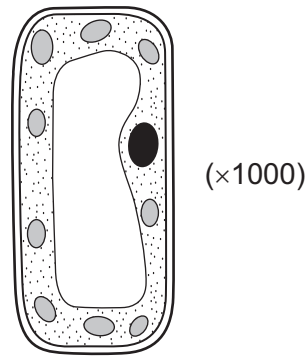
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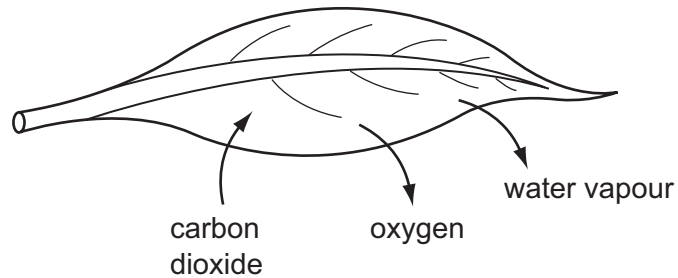


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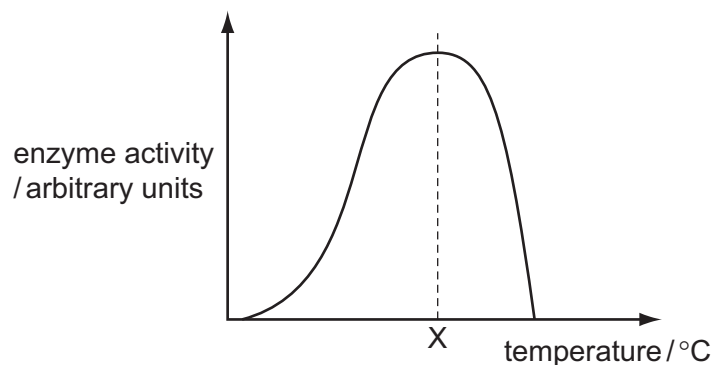
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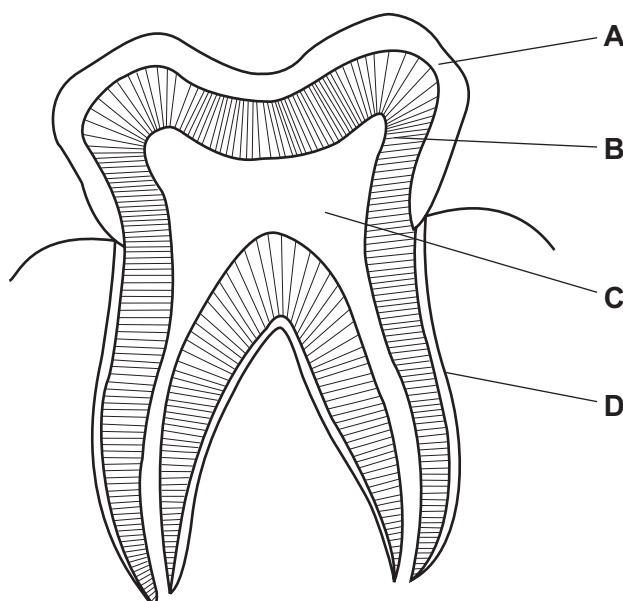
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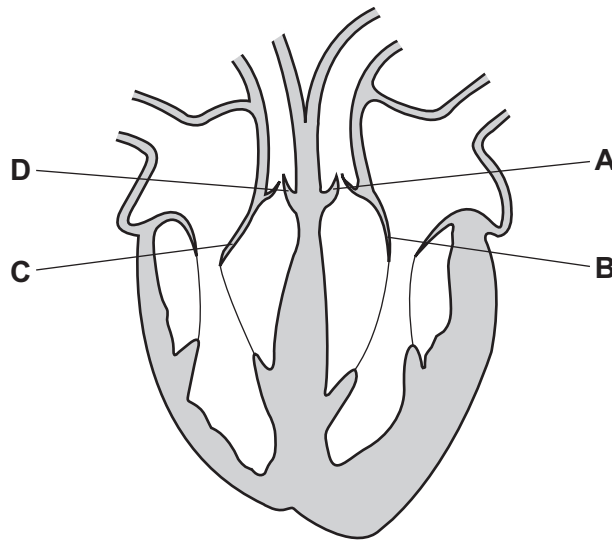


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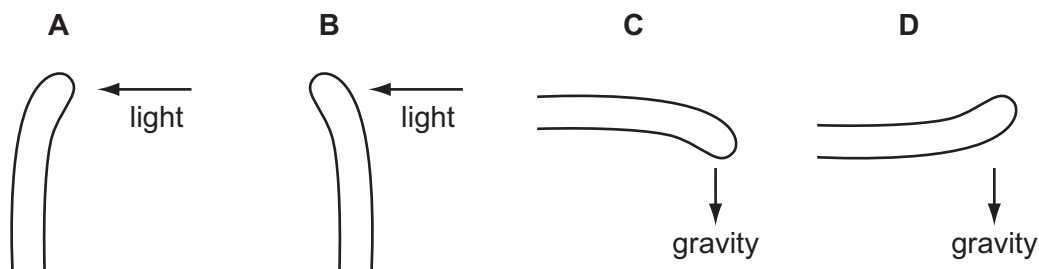
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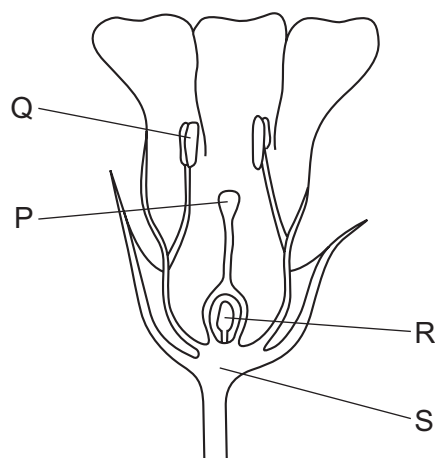
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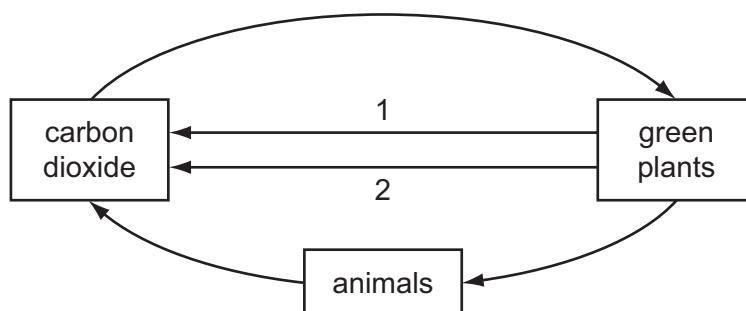
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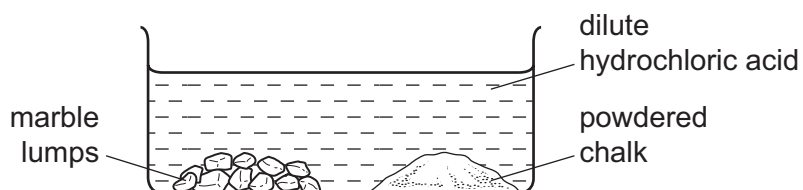


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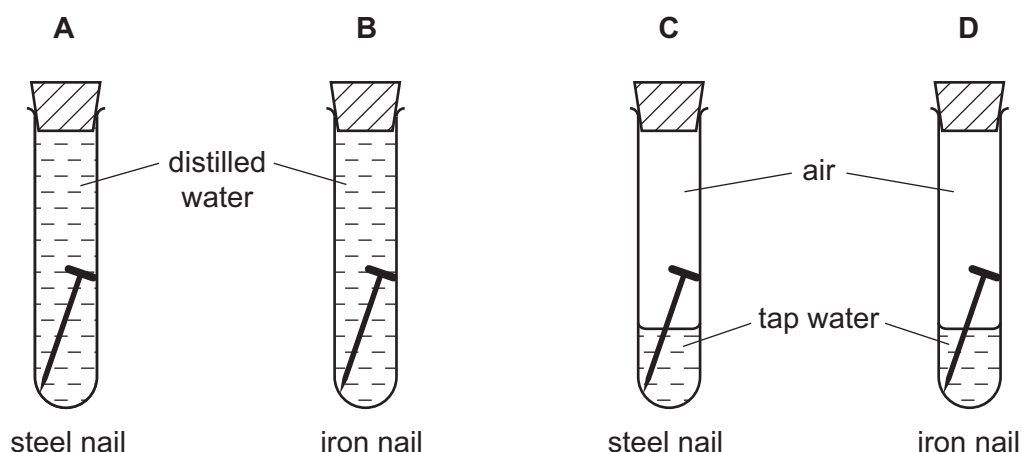
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- 17 In which test-tube does rusting occur most quickly?



- 18 The table shows the properties of four substances.

Which substance is an alkali?

	solubility in water	reaction with an acid
A	insoluble	reacts
B	insoluble	does not react
C	soluble	reacts
D	soluble	does not react

- 19 The positions of elements P, Q, R, S and T in the Periodic Table are shown.

The letters are not the symbols for the elements.

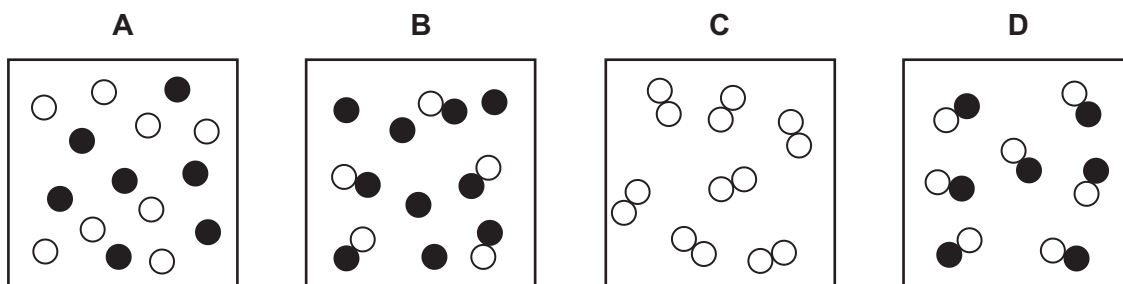
I	II															III	IV	V	VI	VII	0
P	Q																			R	S
T																					

Which element forms an ionic compound with element P?

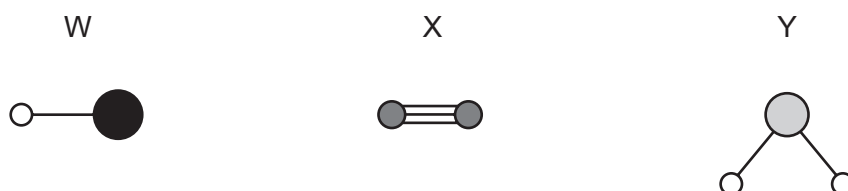
- A Q B R C S D T

- 20 In the diagrams below, ● and ○ represent different atoms.

Which diagram represents molecules of a single compound?



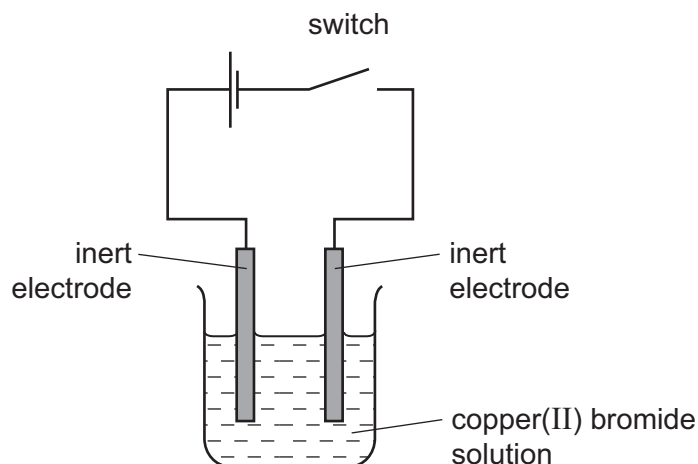
- 21 Molecules of W, X and Y are shown.



What are W, X and Y?

	W	X	Y
A	hydrogen chloride	nitrogen	water
B	hydrogen chloride	water	nitrogen
C	nitrogen	hydrogen chloride	water
D	water	nitrogen	hydrogen chloride

22 Copper(II) bromide can be electrolysed in the same way as copper(II) chloride.



Which row in the table correctly describes the products at the electrodes?

	product at anode	product at cathode
A	brown liquid	brown-red solid
B	brown-red solid	brown liquid
C	colourless gas	brown-red solid
D	silvery solid	colourless gas

23 Metal X reacts rapidly with cold water.

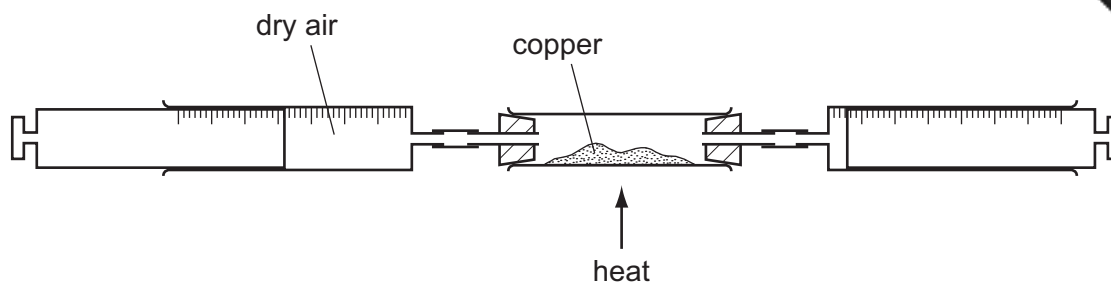
Metal Y does not react with dilute hydrochloric acid.

Metal Y is obtained from its oxide by heating with carbon.

Which row shows the more reactive metal and the type of reaction which metal Y oxide undergoes when it is heated with carbon?

	more reactive metal	type of reaction
A	X	oxidation
B	X	reduction
C	Y	oxidation
D	Y	reduction

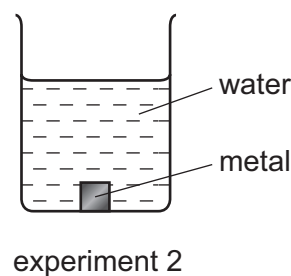
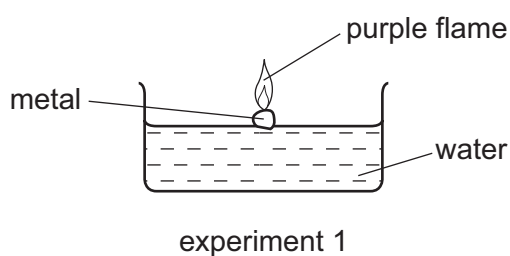
- 24 80 cm^3 of dry air is passed over hot copper until there is no further change in volume.



The volume of air decreases by 16 cm^3 .

Which gas reacts with the copper?

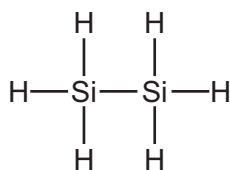
- A carbon dioxide
 - B nitrogen
 - C oxygen
 - D water vapour
- 25 The diagram shows what happens when two metals are added to water.



What are the metals?

	experiment 1	experiment 2
A	calcium	zinc
B	magnesium	copper
C	potassium	calcium
D	potassium	copper

- 26 The diagram shows a molecule of a compound of silicon and hydrogen.



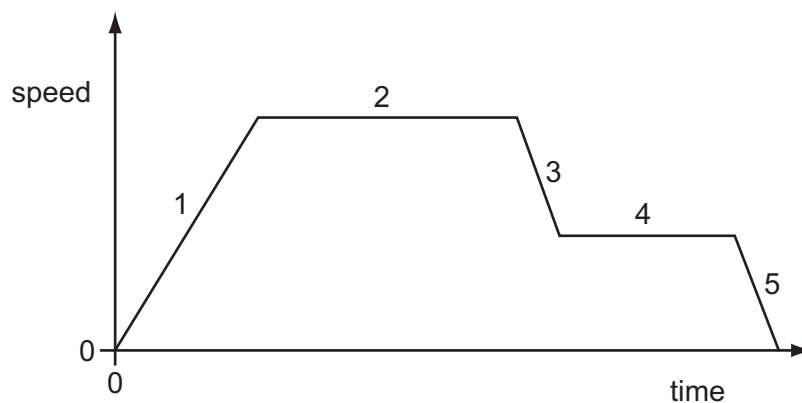
What is the molecular formula of this compound?

- A** SiH_3 **B** SiH_4 **C** Si_2H_6 **D** Si_6H_2
- 27 A catalyst is a substance that 1..... a reaction and is 2..... at the end of the reaction.

Which words correctly complete gaps 1 and 2?

	1	2
A	slows down	changed
B	slows down	unchanged
C	speeds up	changed
D	speeds up	unchanged

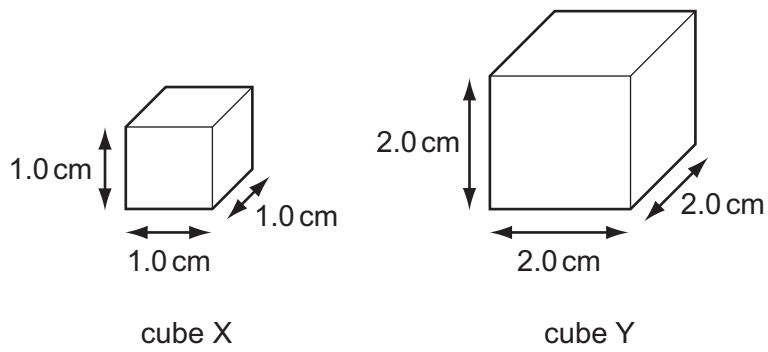
- 28 The speed/time graph for a car journey is shown.



During which two parts of the journey is the car moving at constant speed?

- A** 1 and 3 **B** 1 and 5 **C** 2 and 4 **D** 3 and 5

- 29 The diagram shows two cubes of different sizes made from the same substance.



Cube X has a density of 1.2 g/cm^3 .

What is the density of cube Y?

- A** 1.2 g/cm^3 **B** 2.4 g/cm^3 **C** 4.8 g/cm^3 **D** 9.6 g/cm^3

30 Weight lifting involves a number of different stages.

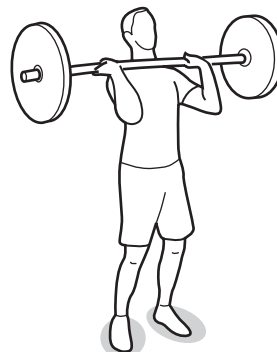
In which stage is **no** work being done on the weights?

A



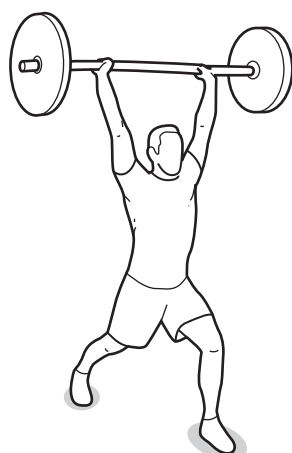
The weights are lifted from the floor to the chest.

B



The weights are raised as the lifter stands up.

C



The weights are lifted above the head.

D



The weights are held stationary above the head.

31 A drop of liquid falls on a student's skin and evaporates quickly.

What is the effect on the skin and the reason for this effect?

- A** The skin cools because the most energetic molecules escape from the liquid.
- B** The skin cools because the most energetic molecules remain in the liquid.
- C** The skin warms because the most energetic molecules escape from the liquid.
- D** The skin warms because the most energetic molecules remain in the liquid.

32 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

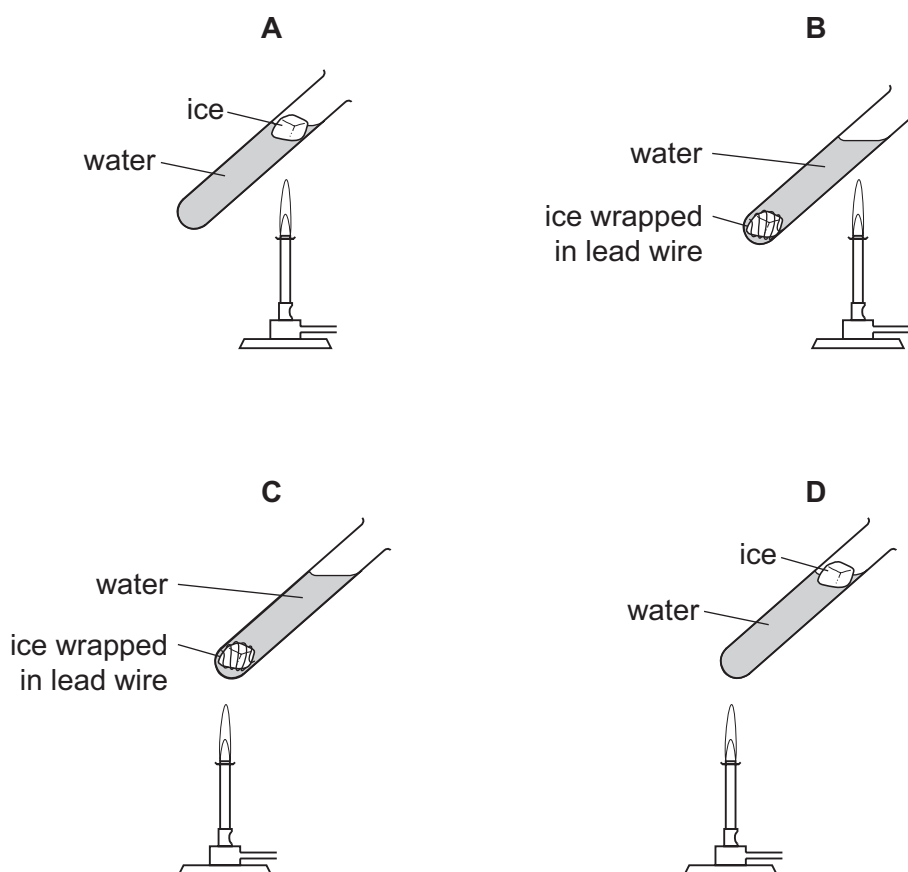
	melting point	boiling point
benzene	5.4 °C	80 °C
glycerine	18 °C	290 °C

At which temperature will both benzene and glycerine be liquid?

- A** 0 °C **B** 50 °C **C** 100 °C **D** 150 °C

33 The diagrams show four identical pieces of ice that are heated in test-tubes of water. All four burners provide heat at the same rate.

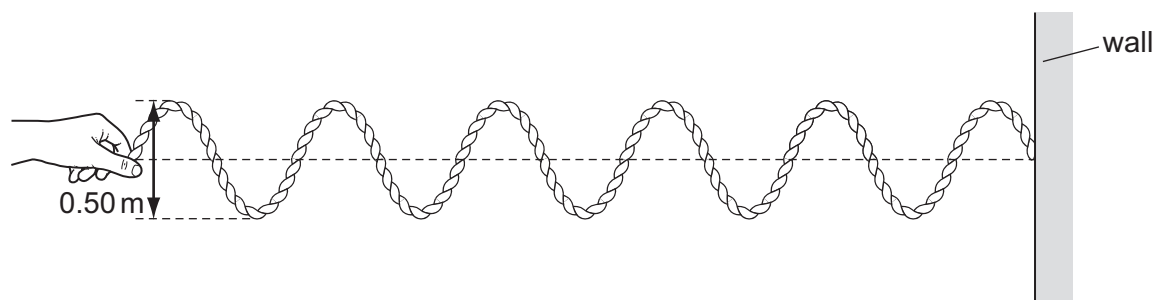
In which test-tube does the ice take the longest time to melt?



- 34 The diagram shows a rope with one end fixed to a wall.

The end of the rope is moved up and down through a distance of 0.50 m twice every second.

This makes a wave move along the rope.



Which line in the table shows the amplitude and the frequency of the wave?

	amplitude / m	frequency / Hz
A	0.25	0.50
B	0.25	2.0
C	0.50	0.50
D	0.50	2.0

- 35 A ray of light travels from glass into air. The angle of refraction is equal to the angle of incidence.

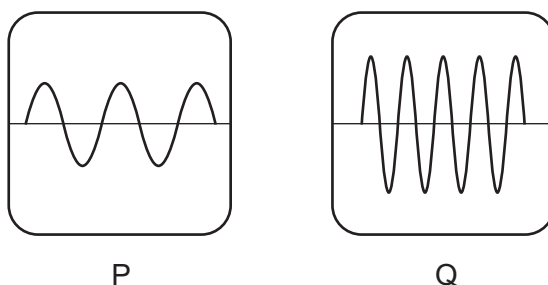
What is the angle of incidence?

- A** 0° **B** 45° **C** 60° **D** 90°

- 36 Which electromagnetic waves are found immediately either side of the visible region of the electromagnetic spectrum?

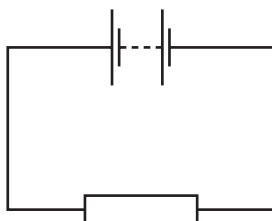
- A** infrared and ultra-violet
B microwaves and infrared
C microwaves and X-rays
D ultra-violet and X-rays

- 37 Two sound waves P and Q are displayed on an oscilloscope. The settings on the are the same for P and Q.



Which statement correctly compares the pitch and the loudness of the two sounds?

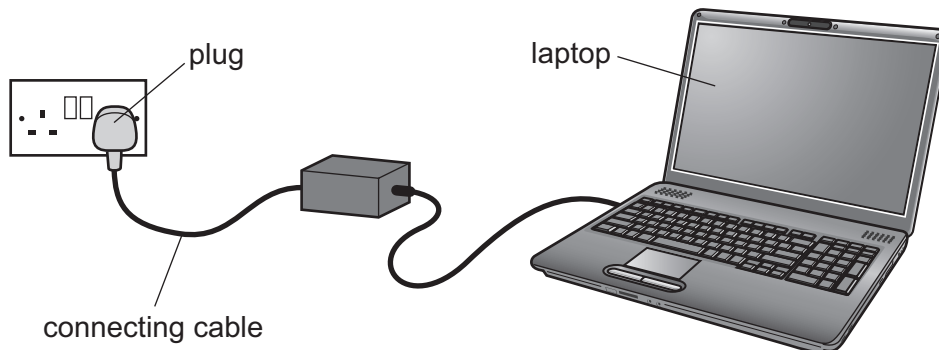
- A** P has a higher pitch and is louder than Q.
B P has a higher pitch and is quieter than Q.
C P has a lower pitch and is louder than Q.
D P has a lower pitch and is quieter than Q.
- 38 There is an electric current in the circuit shown.



Which two changes will each increase the current?

	change 1	change 2
A	decrease the voltage of the battery	decrease the resistance of the resistor
B	decrease the voltage of the battery	increase the resistance of the resistor
C	increase the voltage of the battery	decrease the resistance of the resistor
D	increase the voltage of the battery	increase the resistance of the resistor

- 39 The charger for a laptop computer is connected by a cable to the mains supply through a plug. The plug contains a 13 A fuse. The thin wires in the cable are designed to carry a current of 5 A. A fault develops and the current in the wires rises to 5 A.



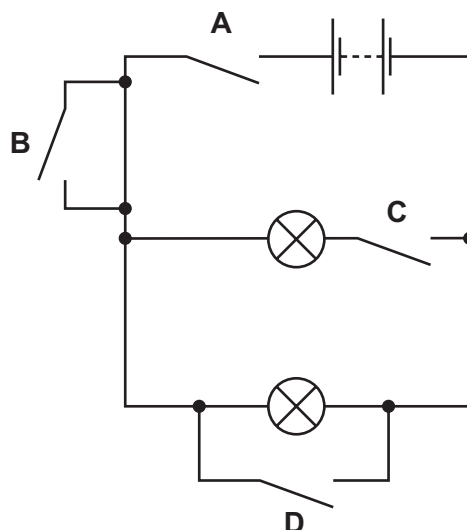
What is the danger caused by this larger current?

- A A large amount of electrical energy could be wasted.
- B Somebody might receive an electric shock.
- C The fuse could blow and start a fire.
- D The wires could overheat and start a fire.

- 40 The circuit shown contains four labelled switches.

All the switches are closed.

Which switch can be opened without changing the brightness of either bulb?



DATA SHEET

The Periodic Table of the Elements

Group																						
I	II											III	IV	V	VI	VII	0					
		1 H Hydrogen																				
3 7 Li Lithium	4 9 Be Beryllium																5 11 B Boron	6 12 C Carbon	7 14 N Nitrogen	8 16 O Oxygen	9 19 F Fluorine	2 4 He Helium
11 23 Na Sodium	12 24 Mg Magnesium																13 27 Al Aluminium	14 28 Si Silicon	15 31 P Phosphorus	16 32 S Sulfur	17 35.5 Cl Chlorine	10 20 Ne Neon
19 39 K Potassium	20 40 Ca Calcium	21 45 Sc Scandium	22 48 Ti Titanium	23 51 V Vanadium	24 52 Cr Chromium	25 55 Mn Manganese	26 56 Fe Iron	27 59 Co Cobalt	28 59 Ni Nickel	29 64 Cu Copper	30 65 Zn Zinc	31 70 Ga Gallium	32 73 Ge Germanium	33 75 As Arsenic	34 79 Se Selenium	35 80 Br Bromine	36 84 Kr Krypton					
37 85 Rb Rubidium	38 88 Sr Strontium	39 89 Y Yttrium	40 91 Zr Zirconium	41 93 Nb Niobium	42 96 Mo Molybdenum	43 98 Tc Technetium	44 101 Ru Ruthenium	45 103 Rh Rhodium	46 106 Pd Palladium	47 108 Ag Silver	48 112 Cd Cadmium	49 115 In Indium	50 119 Sn Tin	51 122 Sb Antimony	52 128 Te Tellurium	53 127 I Iodine	54 131 Xe Xenon					
55 133 Cs Caesium	56 137 Ba Barium	57 139 La Lanthanum	72 178 Hf Hafnium	73 181 Ta Tantalum	74 184 W Tungsten	75 186 Re Rhenium	76 190 Os Osmium	77 192 Ir Iridium	78 195 Pt Platinum	79 197 Au Gold	80 201 Hg Mercury	81 204 Tl Thallium	82 207 Pb Lead	83 209 Bi Bismuth	84 210 Po Polonium	85 210 At Astatine	86 210 Rn Radon					
87 Fr Francium	88 226 Ra Radium	89 227 Ac Actinium																				
58-71 Lanthanoid series																						
90-103 Actinoid series																						
Key		a	X	a = relative atomic mass X = atomic symbol b = proton (atomic) number																		

Key

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

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



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
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COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice

October/November 2013

45 minutes

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

* 7 8 0 4 1 9 5 2 1 0 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

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.

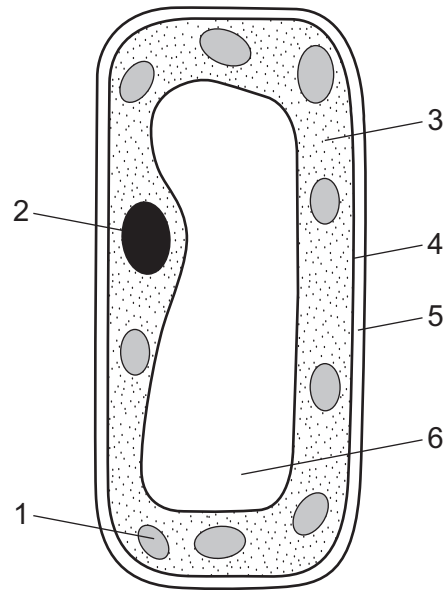
A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

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

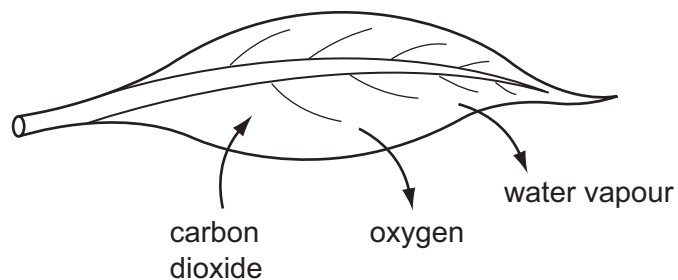


- 1 The diagram shows a plant cell.



Which parts of the cell are found in plant cells **only**?

- A** 1, 2 and 3 **B** 2, 3 and 4 **C** 4, 5 and 6 **D** 1, 5 and 6
- 2 The diagram shows a leaf in sunlight and some of the substances that diffuse into and out of it.



Which of the following has a higher concentration outside the leaf than inside the leaf?

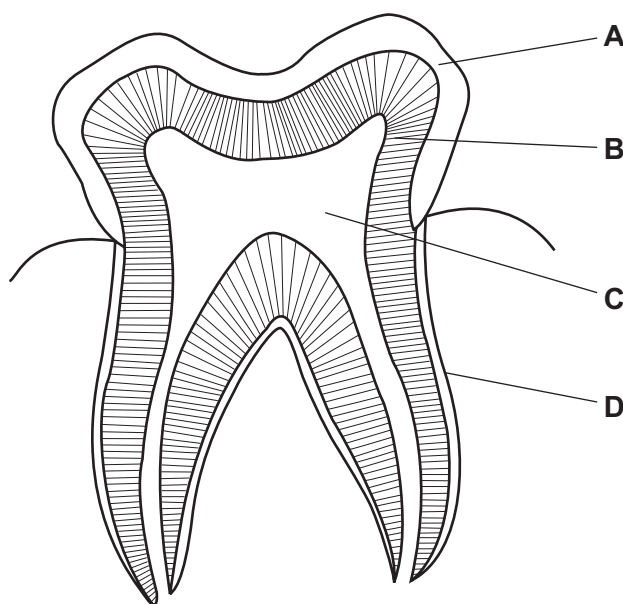
- A** carbon dioxide only
B carbon dioxide and oxygen
C oxygen and water vapour
D water vapour only
- 3 Enzymes are made from
- A** fat.
B hormones.
C proteins.
D starch.

4 What are the main products of photosynthesis?

- A carbon dioxide + oxygen
- B carbon dioxide + water
- C simple sugars + oxygen
- D simple sugars + water

5 The diagram shows a section through a human tooth.

Which part is made of the hardest material?



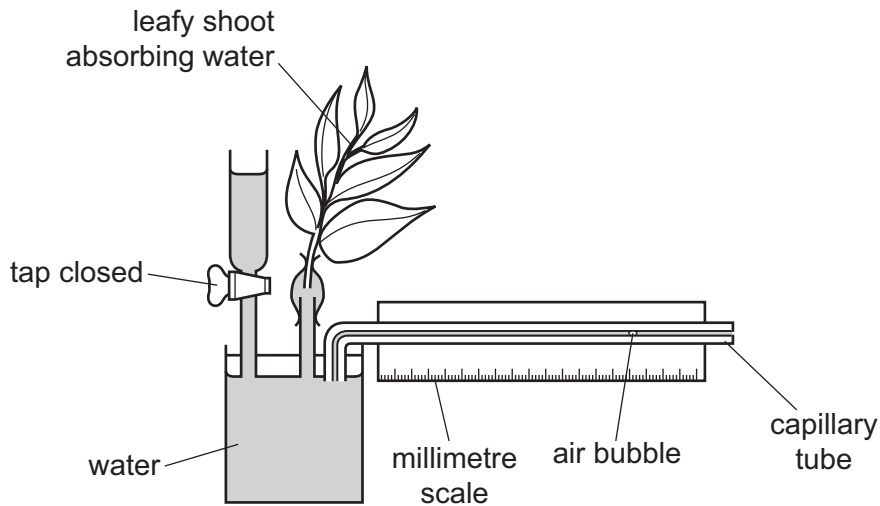
6 How do the contents of expired air differ from those of inspired air?

	carbon dioxide	nitrogen	oxygen
A	less	less	more
B	more	more	less
C	more	same	less
D	same	more	same

7 Which chambers of the heart have the thickest and most muscular walls?

- A left atrium and right atrium
- B left atrium and right ventricle
- C left ventricle and right atrium
- D left ventricle and right ventricle

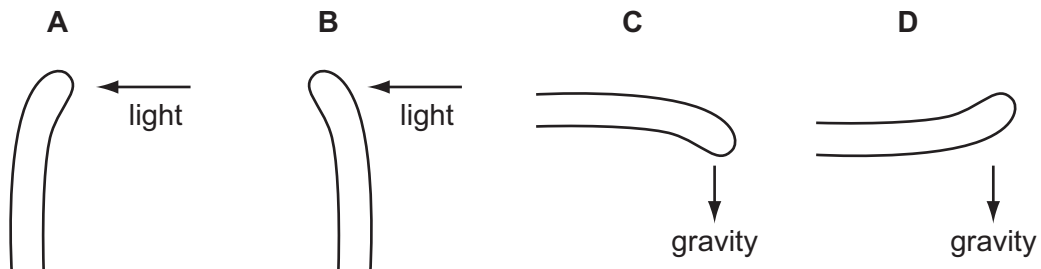
- 8 The diagram shows an apparatus that was used to measure the uptake of water by a



What will happen to the air bubble during the measurement?

- A It will get larger.
 - B It will get smaller.
 - C It will move to the left.
 - D It will move to the right.
- 9 The diagrams show shoots of maize seedlings.

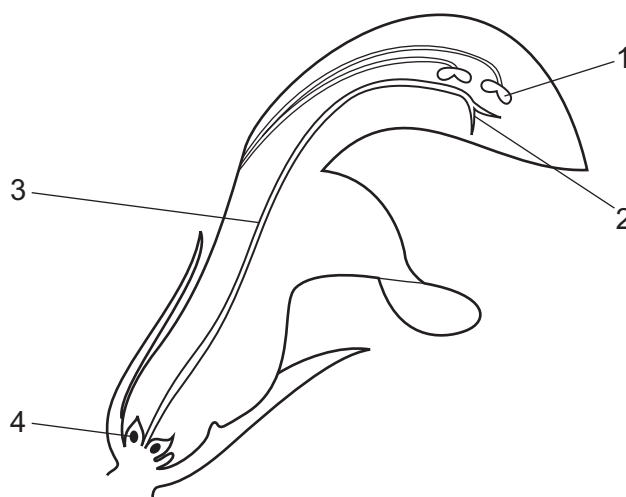
Which shoot shows a geotropic response in which it grows away from the stimulus?



- 10 How often is an egg usually released from the ovaries of a woman?

- A once a week
- B once every 14 days
- C once every 28 days
- D once every 9 months

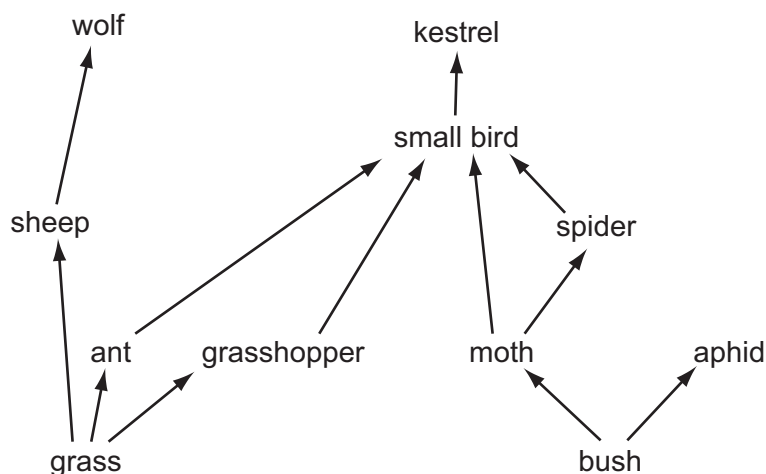
11 The diagram shows a section through a flower.



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

12 The diagram shows part of a food web.



How many different types of carnivores and herbivores are shown?

	carnivores	herbivores
A	2	3
B	3	4
C	4	5
D	5	4

13 Which is a greenhouse gas that plants help to remove from the atmosphere?

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

14 Which method of separation can be used to obtain pure water from aqueous potassium chloride?

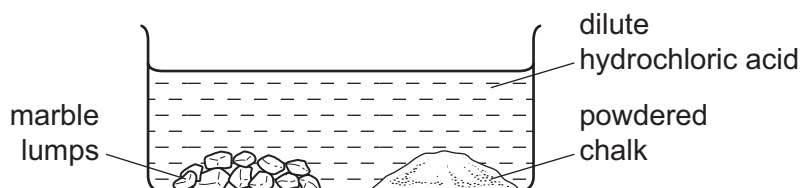
- A** chromatography
- B** crystallisation
- C** distillation
- D** filtration

15 Which reaction involves combustion?

- A calcium carbonate $\rightarrow$ calcium oxide + carbon dioxide
- B methane + oxygen $\rightarrow$ carbon dioxide + water
- C sodium carbonate + hydrochloric acid $\rightarrow$ sodium chloride + water + carbon dioxide
- D sodium hydroxide + hydrochloric acid $\rightarrow$ sodium chloride + water

16 Marble and chalk are two forms of calcium carbonate.

The diagram shows equal masses of lumps of marble and powdered chalk placed in dilute hydrochloric acid.

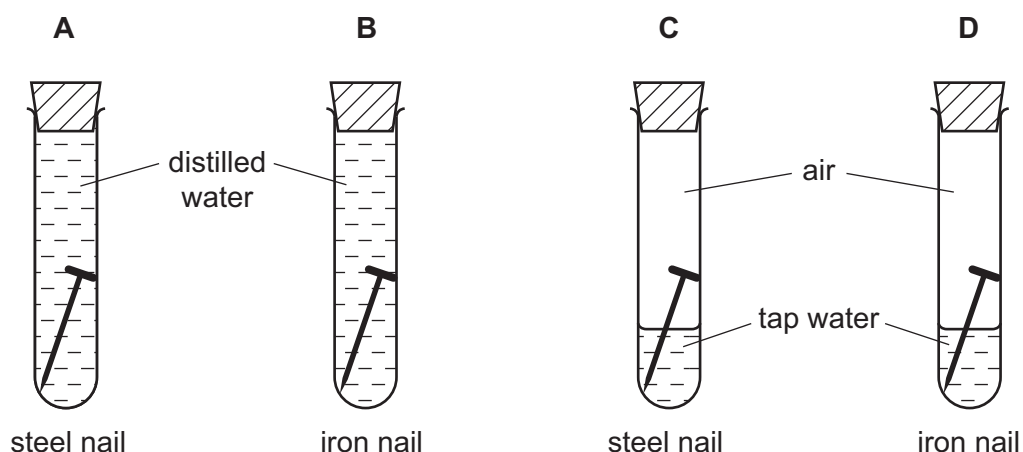


The marble takes longer than the chalk to dissolve in the acid.

Why is this?

- A Marble is more reactive than chalk.
- B Marble is more soluble than chalk.
- C The marble has the smaller surface area.
- D The marble is more basic.

17 In which test-tube does rusting occur most quickly?



- 18 The table shows the properties of four substances.

Which substance is an alkali?

	solubility in water	reaction with an acid
A	insoluble	reacts
B	insoluble	does not react
C	soluble	reacts
D	soluble	does not react

- 19 A sodium atom has a proton number of 11 and a nucleon number of 23.

Which row shows the correct number of protons, neutrons and electrons in the atom of sodium?

	protons	neutrons	electrons
A	11	11	12
B	11	12	11
C	11	23	11
D	11	23	12

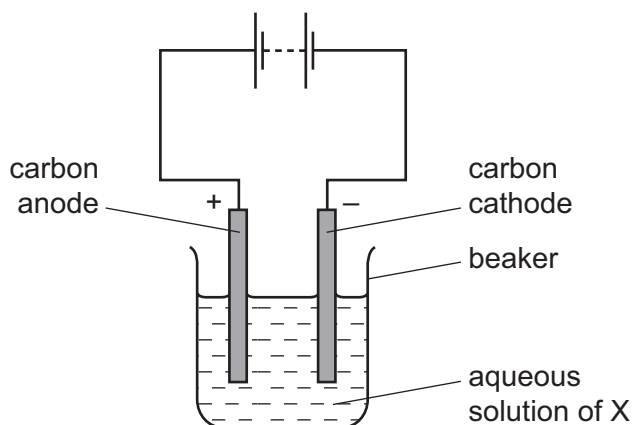
- 20 The breakdown of molten lead bromide by 1..... forms the elements lead and bromine.

Lead is formed at the 2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	electrolysis	anode
B	electrolysis	cathode
C	reduction	anode
D	reduction	cathode

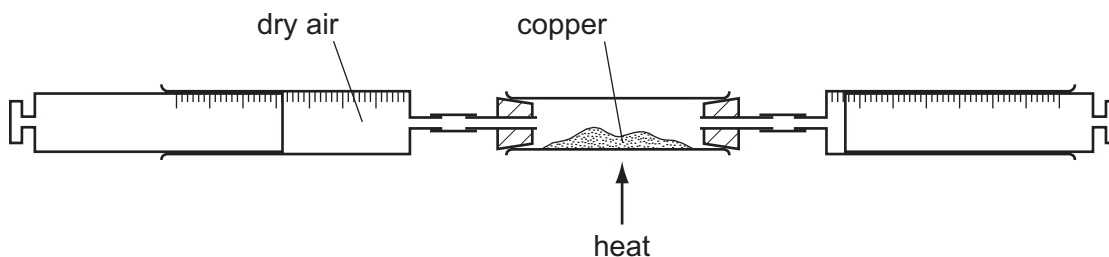
- 21 An aqueous solution of X is electrolysed.



The cathode increases in mass and turns red-brown.

What is X?

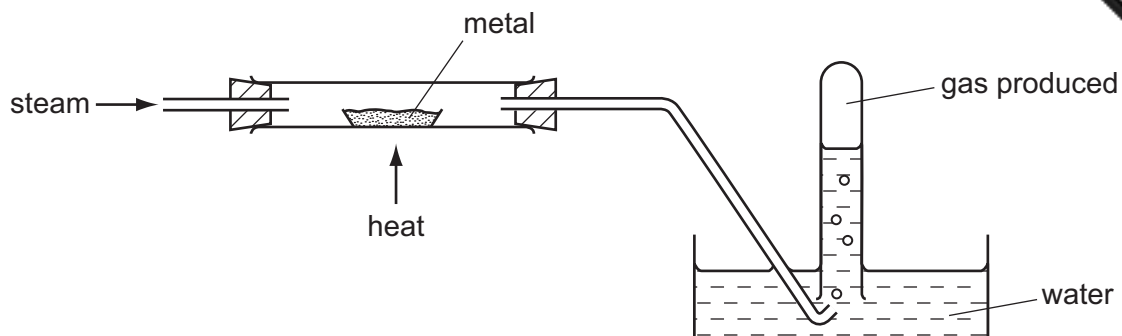
- A copper(II) chloride
 - B iodine
 - C lead(II) bromide
 - D sodium chloride
- 22 60 cm^3 of dry air is passed over hot copper until all the oxygen has reacted.



Which volume of gas remains at the end of the reaction?

- A 6 cm^3
- B 12 cm^3
- C 48 cm^3
- D 54 cm^3

23 Steam is passed over a heated metal.



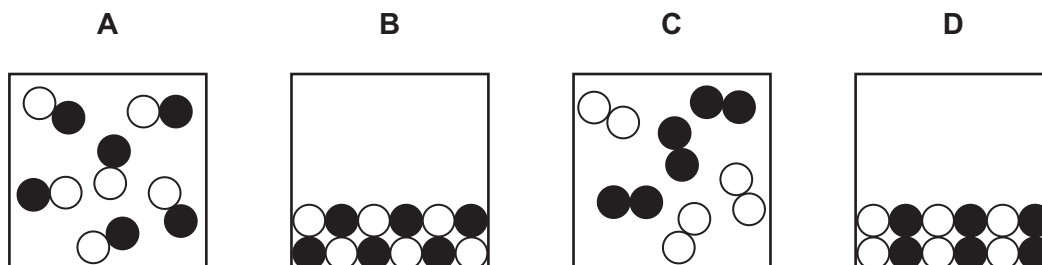
The metal reacts and a gas is produced.

The gas ignites with a pop when tested with a lighted splint.

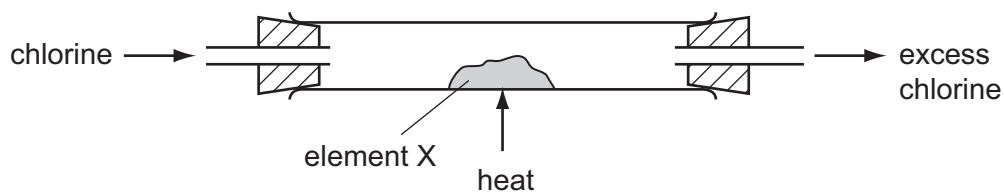
What are the metal and the gas?

	metal	gas
A	copper	hydrogen
B	copper	oxygen
C	magnesium	oxygen
D	zinc	hydrogen

24 Which diagram represents gaseous hydrogen chloride, HCl ?



- 25 Element X reacts with chlorine to form a red-brown compound.



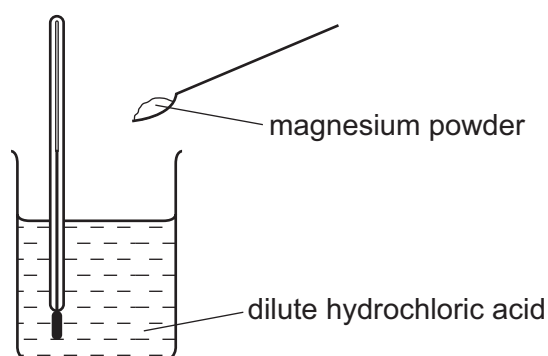
Which row describes element X and its melting point?

	type of element	melting point of X
A	alkali metal	high
B	alkali metal	low
C	transition element	high
D	transition element	low

- 26 Which row describes the physical state of some of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

- 27 The diagram shows how the temperature change can be measured when magnesium reacts with hydrochloric acid.

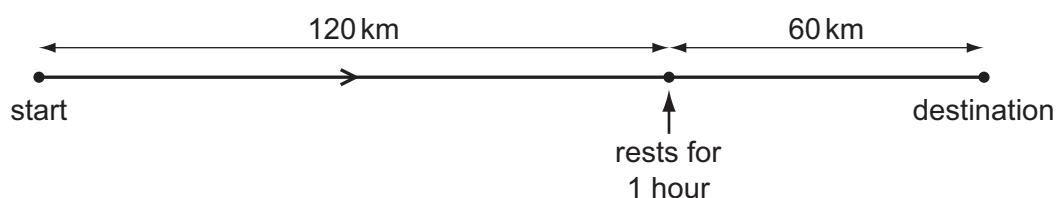


Thermometer reading before adding magnesium powder = 20.6°C

Thermometer reading after adding magnesium powder = 32.4°C

Which statement is correct?

- A The reaction is endothermic and gives out heat.
 - B The reaction is endothermic and takes in heat.
 - C The reaction is exothermic and gives out heat.
 - D The reaction is exothermic and takes in heat.
- 28 A car travels between two towns. After 1 hour the driver has travelled 120 km. She then stops and rests for an hour. She takes another hour to travel a further 60 km to reach her destination.

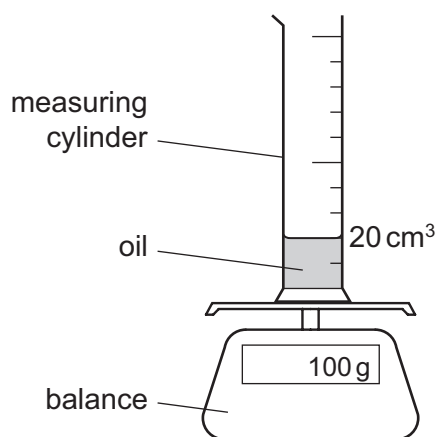


What is the average speed of the car for the whole journey?

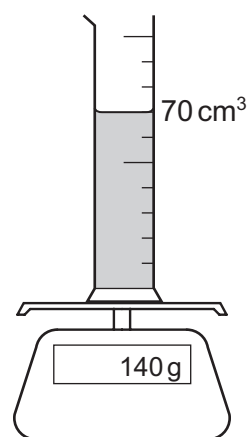
- A 60 km/h
- B 90 km/h
- C 120 km/h
- D 180 km/h

- 29 A measuring cylinder contains 20 cm^3 of oil. The measuring cylinder is placed on a balance and the reading on the balance is 100 g .

The volume of oil in the measuring cylinder is now increased to 70 cm^3 . The reading on the balance is now 140 g .



before extra oil is added

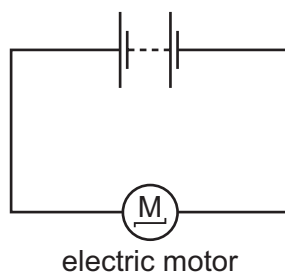


after extra oil is added

What is the density of the oil?

- A** 0.50 g/cm^3 **B** 0.80 g/cm^3 **C** 1.25 g/cm^3 **D** 2.00 g/cm^3

- 30 An electric circuit contains a battery and an electric motor.



electric motor

Which energy transfer takes place in the battery and which takes place in the electric motor?

	battery	electric motor
A	chemical to electrical	electrical to kinetic
B	chemical to electrical	kinetic to electrical
C	electrical to chemical	electrical to kinetic
D	electrical to chemical	kinetic to electrical

- 31** A drop of liquid falls on a student's skin and evaporates quickly.

What is the effect on the skin and the reason for this effect?

- A** The skin cools because the most energetic molecules escape from the liquid.
- B** The skin cools because the most energetic molecules remain in the liquid.
- C** The skin warms because the most energetic molecules escape from the liquid.
- D** The skin warms because the most energetic molecules remain in the liquid.

- 32** Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

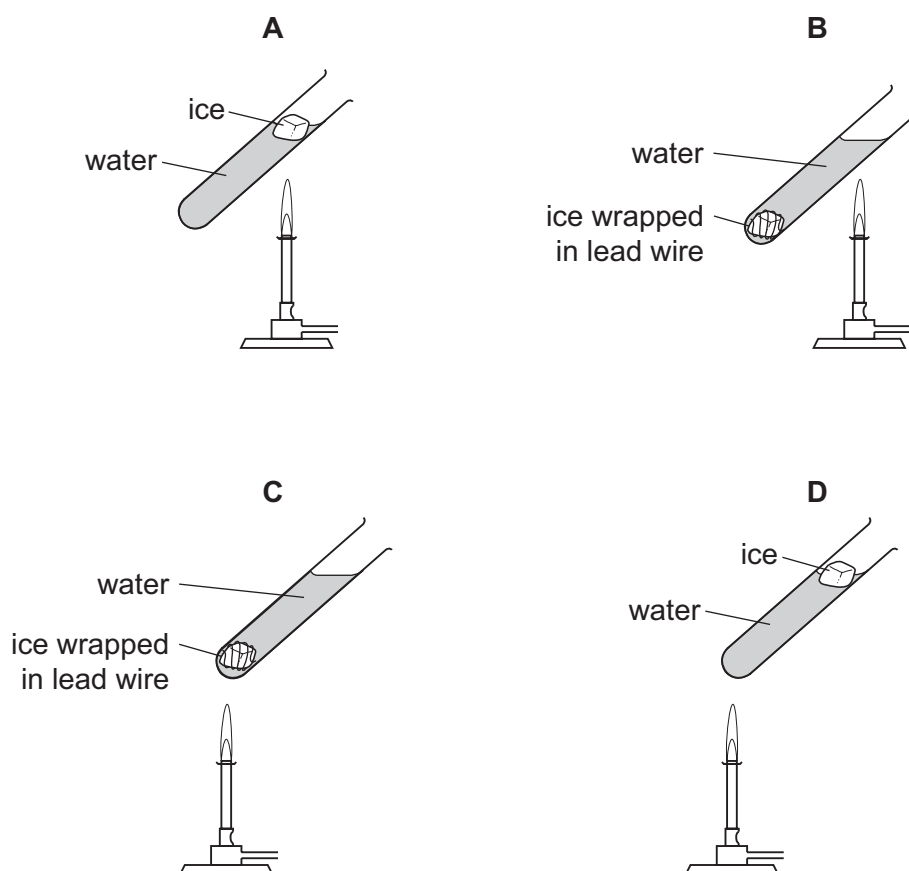
	melting point	boiling point
benzene	5.4 °C	80 °C
glycerine	18 °C	290 °C

At which temperature will both benzene and glycerine be liquid?

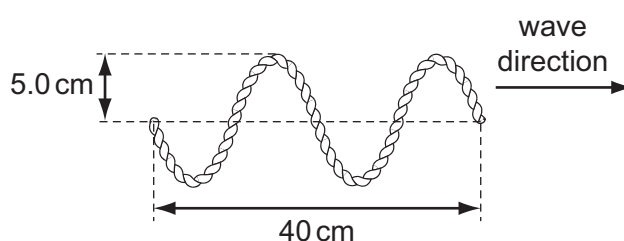
- A** 0 °C **B** 50 °C **C** 100 °C **D** 150 °C

- 33 The diagrams show four identical pieces of ice that are heated in test-tubes of water. Bunsen burners provide heat at the same rate.

In which test-tube does the ice take the longest time to melt?



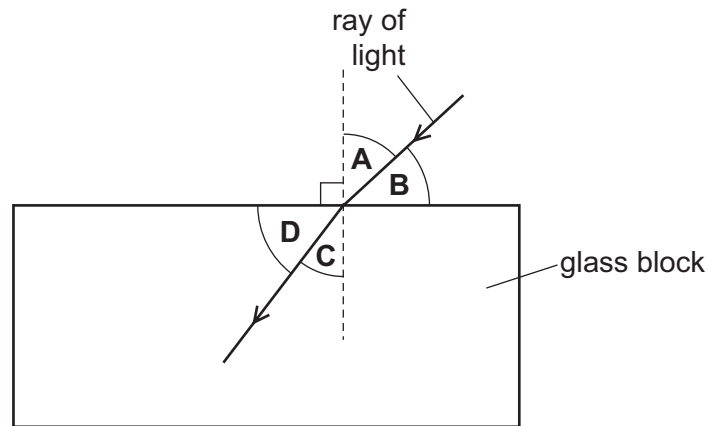
- 34 A student vibrates the end of a horizontal rope and sends a wave along the rope. The wave is shown in the diagram.



What is the amplitude of the wave, and what is the wavelength of the wave?

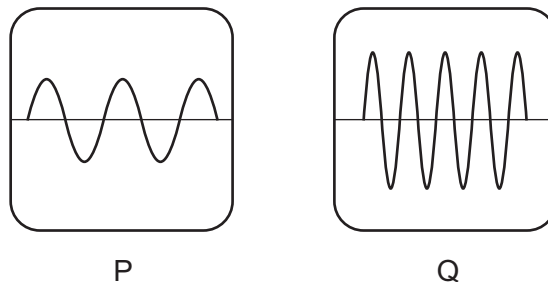
	amplitude / cm	wavelength / cm
A	5.0	10
B	5.0	20
C	10	10
D	10	20

- 35 The diagram shows a ray of light as it enters a block of glass.



Which of the labelled angles is the angle of refraction?

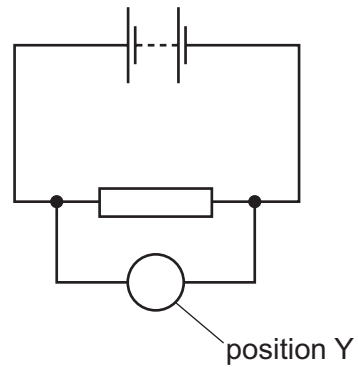
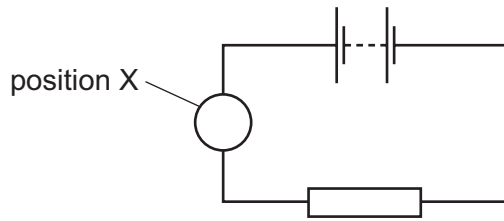
- 36 Which two colours of the visible spectrum of light have the greatest difference in their wavelengths?
- A** blue and red
B red and green
C orange and red
D yellow and blue
- 37 Two sound waves P and Q are displayed on an oscilloscope. The settings on the oscilloscope are the same for P and Q.



Which statement correctly compares the pitch and the loudness of the two sounds?

- A** P has a higher pitch and is louder than Q.
B P has a higher pitch and is quieter than Q.
C P has a lower pitch and is louder than Q.
D P has a lower pitch and is quieter than Q.

- 38 A student wishes to measure the potential difference across a resistor. The circuit shows two different positions in which a meter can be connected.



What meter is used, and where is it connected in the circuit?

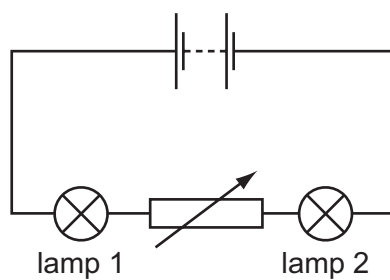
- A an ammeter in position X
 - B an ammeter in position Y
 - C a voltmeter in position X
 - D a voltmeter in position Y
- 39 When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A whilst the computer is in use.

The mains plug for the computer contains a fuse.

Which value of fuse would be suitable to use and would provide the greatest protection?

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

- 40 A circuit contains two lamps and a variable resistor.



The resistance of the variable resistor is increased.

What happens to the brightness of lamp 1 and what happens to the brightness of lamp 2?

	brightness of lamp 1	brightness of lamp 2
A	decreases	decreases
B	decreases	increases
C	no change	decreases
D	no change	increases

DATA SHEET
The Periodic Table of the Elements

Group																		
I	II											III	IV	V	VI	VII	0	
		1 H Hydrogen																
3 7 Li Lithium	4 9 Be Beryllium											5 11 B Boron	6 12 C Carbon	7 14 N Nitrogen	8 16 O Oxygen	9 19 F Fluorine	2 4 He Helium	
11 23 Na Sodium	12 24 Mg Magnesium											13 27 Al Aluminium	14 28 Si Silicon	15 31 P Phosphorus	16 32 S Sulfur	17 35.5 Cl Chlorine	18 40 Ar Argon	
19 39 K Potassium	20 40 Ca Calcium	21 45 Sc Scandium	22 48 Ti Titanium	23 51 V Vanadium	24 52 Cr Chromium	25 55 Mn Manganese	26 56 Fe Iron	27 59 Co Cobalt	28 59 Ni Nickel	29 64 Cu Copper	30 65 Zn Zinc	31 70 Ga Gallium	32 73 Ge Germanium	33 75 As Arsenic	34 79 Se Selenium	35 80 Br Bromine	36 84 Kr Krypton	
37 85 Rb Rubidium	38 88 Sr Strontium	39 89 Y Yttrium	40 91 Zr Zirconium	41 93 Nb Niobium	42 96 Mo Molybdenum	43 101 Tc Technetium	44 101 Ru Ruthenium	45 103 Rh Rhodium	46 106 Pd Palladium	47 108 Ag Silver	48 112 Cd Cadmium	49 115 In Indium	50 119 Sn Tin	51 122 Sb Antimony	52 128 Te Tellurium	53 127 I Iodine	54 131 Xe Xenon	
55 133 Cs Caesium	56 137 Ba Barium	57 139 La Lanthanum	72 178 Hf Hafnium	73 181 Ta Tantalum	74 184 W Tungsten	75 186 Re Rhenium	76 190 Os Osmium	77 192 Ir Iridium	78 195 Pt Platinum	79 197 Au Gold	80 201 Hg Mercury	81 204 Tl Thallium	82 207 Pb Lead	83 209 Bi Bismuth	84 209 Po Polonium	85 209 At Astatine	86 209 Rn Radon	
87 226 Fr Francium	88 226 Ra Radium	89 227 Ac Actinium																
58-71 Lanthanoid series																		
90-103 Actinoid series																		
a X b a = relative atomic mass X = atomic symbol b = proton (atomic) number																		
Key																		
		175 Lu Lutetium																
		173 Yb Ytterbium																
		169 Tm Thulium																
		167 Er Erbium																
		165 Ho Holmium																
		162 Dy Dysprosium																
		159 Tb Terbium																
		157 Gd Gadolinium																
		152 Eu Europium																
		150 Sm Samarium																
		144 Nd Neodymium																
		141 Pr Praseodymium																
		140 Ce Cerium																
		138 La Lanthanum																
		136 Ce Cerium																
		134 Pr Praseodymium																
		132 Nd Neodymium																
		130 Pm Promethium																
		128 Sm Samarium																
		126 Eu Europium																
		124 Gd Gadolinium																
		122 Tb Terbium																
		120 Dy Dysprosium																
		118 Ho Holmium																
		116 Er Erbium																
		114 Tm Thulium																
		112 Yb Ytterbium																
		110 Lu Lutetium																
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		106 Tm Thulium																
		104 Er Erbium																
		102 Ho Holmium																
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		98 Tb Terbium																
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		94 Eu Europium																
		92 Sm Samarium																
		90 Nd Neodymium																
		88 Ce Cerium																
		86 Ba Barium																
		84 Sr Strontium																
		82 Ca Calcium																
		80 Mg Magnesium																
		78 Zn Zinc																
		76 Fe Iron																
		74 Cr Chromium																
		72 Ti Titanium																
		70 Ca Calcium																
		68 Sr Strontium																
		66 Ba Barium																
		64 Ce Cerium																
		62 Nd Neodymium																
		60 Sm Samarium																
		58 Ce Cerium																
		56 Ba Barium																
		54 Xe Xenon																
		52 Te Tellurium																
		50 Sn Tin																
		48 Cd Cadmium																
		46 Pd Palladium																
		44 Ru Ruthenium																
		42 Mo Molybdenum																
		40 Zr Zirconium																
		38 Sr Strontium																
		36 Kr Krypton																
		34 Se Selenium																
		32 S Sulfur																
		30 Zn Zinc																
		28 Si Silicon																
		26 Fe Iron																
		24 Cr Chromium																
		22 Ti Titanium																
		20 Ca Calcium																
		18 Ar Argon																
		16 O Oxygen																
		14 N Nitrogen																
		12 C Carbon																
		10 Ne Neon																
		8 O Oxygen																
		6 C Carbon																
		4 He Helium																

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

a	X	a = relative atomic mass
b	X	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.).