



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

www.PapaCambridge.com

COMBINED SCIENCE

0653/11

Paper 1 Multiple Choice

October/November 2011

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, 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.

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.

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A copy of the Periodic Table is printed on page 16.

This document consists of **14** printed pages and **2** blank pages.



* 2 5 7 7 1 4 0 4 0 3 *

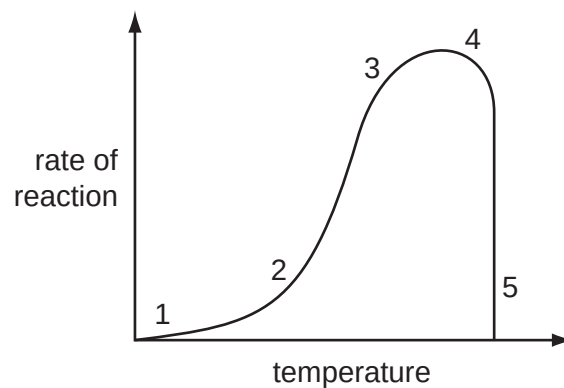
- 1 Which parts of a cell control its activities and control what enters and leaves it?

	controls cell's activities	controls what enters and leaves the cell
A	chloroplast	cell surface membrane
B	chloroplast	cell wall
C	nucleus	cell surface membrane
D	nucleus	cell wall

- 2 Which part of a plant cell is made of cellulose?

- A** cell membrane
- B** cell wall
- C** chloroplast
- D** nucleus

- 3 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

- A** 1
 - B** 2 and 3
 - C** 3 and 4
 - D** 5
- 4 Which leaf tissue has specialised cells that surround stomata?
- A** epidermis
 - B** palisade mesophyll
 - C** phloem
 - D** xylem

5 What happens during digestion?

	large pieces of food are broken into small pieces	large molecules are broken into small molecules
A	✓	✓
B	✓	x
C	x	✓
D	x	x

6 Oxygenated blood returns to the heart from the lungs in vessel X and leaves the heart to circulate around the body in vessel Y.

What are X and Y?

	X	Y
A	aorta	pulmonary vein
B	pulmonary artery	vena cava
C	pulmonary vein	aorta
D	vena cava	pulmonary artery

7 When a leaf is photosynthesising, in which direction do gases diffuse through the stomata?

	carbon dioxide	oxygen
A	in	in
B	in	out
C	out	in
D	out	out

8 The table shows the level of alcohol in a person's blood after drinking two litres of beer.

time after drinking beer (hours)	alcohol in the blood (grams/dm ³)
1	7
2	5
3	3
4	0

How long will it be (in hours) before the person's reaction time returns to normal?

- A** 0 to 1 **B** 1 to 2 **C** 2 to 3 **D** 3 to 4

9 Which method of family planning is also likely to reduce the risk of the spread of syphilis?

- A condom
- B intra-uterine device (IUD)
- C pill
- D sterilisation

10 A species of animal reproduces both sexually and asexually.

Which offspring will be clones?

	offspring from sexual reproduction	offspring from asexual reproduction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

11 Albino humans cannot make any pigment in their skin.

A pale-skinned student, who is **not** an albino, sits in the sun on a number of days. The student's skin becomes suntanned (darker).

What causes this suntanning to happen?

- A the environment and the student's albino alleles
- B the environment and the student's non-albino alleles
- C the environment only
- D the student's genes only

12 The diagram shows a food chain.



Which types of energy are represented by the black arrows and by the white arrows?

	black arrows	white arrows
A	chemical	heat
B	chemical	light
C	heat	chemical
D	light	chemical

13 Which process reduces soil erosion on hilly ground?

- A** cutting down the trees
- B** increasing the number of grazing animals
- C** ploughing up and down the hilly ground
- D** terracing the hilly ground

14 Element X has a nucleon number of 40.

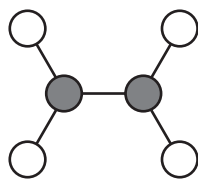
The electron arrangement of element X is 2,8,8.

Which statements about element X are correct?

- 1 It has 40 neutrons in its nucleus.
- 2 It has 2 electrons in its outer shell.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.

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

15 A model of a molecule is shown.



key

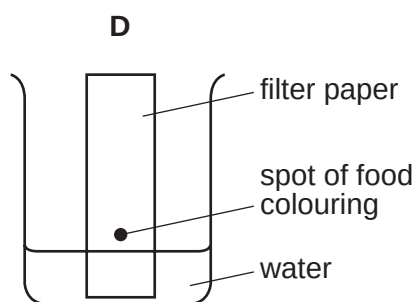
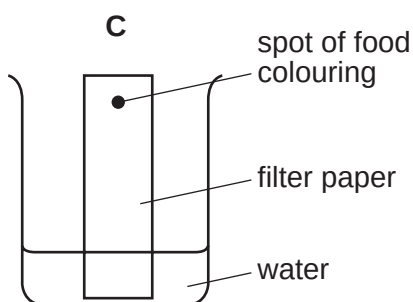
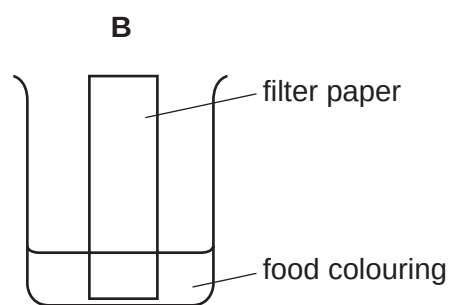
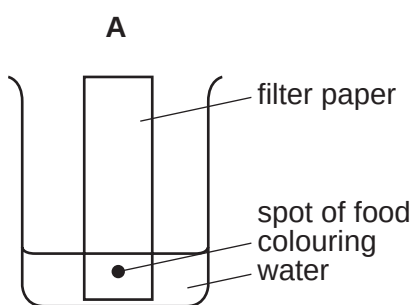
○ = hydrogen

● = nitrogen

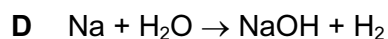
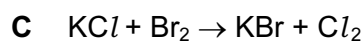
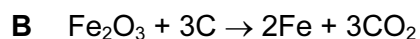
Which description and formula are correct for this molecule?

	description	formula
A	compound	NH_2
B	compound	N_2H_4
C	mixture	NH_2
D	mixture	N_2H_4

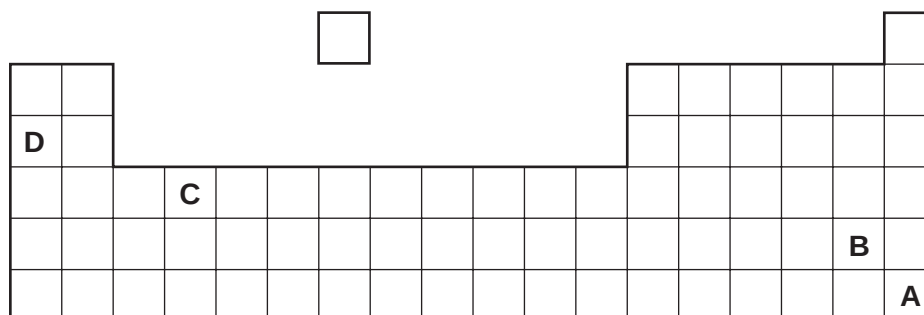
16 Which diagram shows how a mixture of dyes in a food colouring are separated?



17 Which equation is correctly balanced?



- Which letter shows the position of this metal in the Periodic Table?



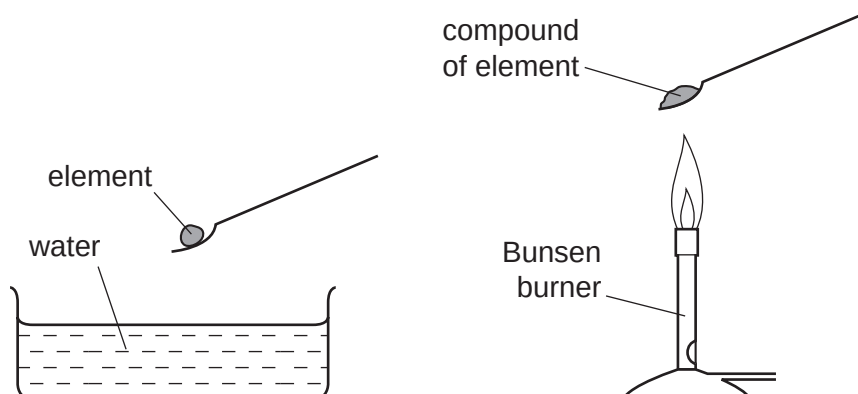
- A** carbon and sulfur
B carbon and iron
C copper and zinc
D silver and gold

- Which properties does sulfur dioxide have?

	toxic	acidic	corrosive
A	✓	✓	✓
B	✓	✓	x
C	✓	x	x
D	x	x	x

- 21 In an experiment the elements calcium, copper, potassium and sodium were separately reacted with water.

In a second experiment a flame test was carried out on compounds of each of the elements.



Which row correctly shows the reaction of the elements with water and the colour of the flame?

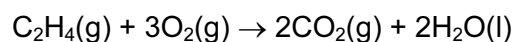
	element	reaction with water	colour of the flame
A	calcium	vigorous	green
B	copper	no reaction	red
C	potassium	vigorous	lilac
D	sodium	no reaction	yellow

- 22 When compound X is added to pure water, the pH increases.

Which formula could **not** be a correct formula for X?

- A** HNO_3 **B** KOH **C** NaOH **D** NH_3

- 23 Ethene burns as shown.

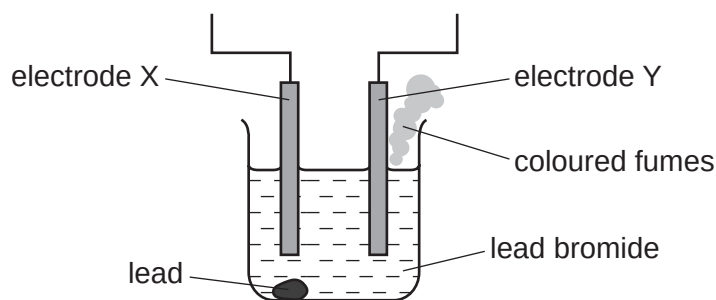


What happens to ethene in this reaction?

- A** decomposition
B neutralisation
C oxidation
D reduction

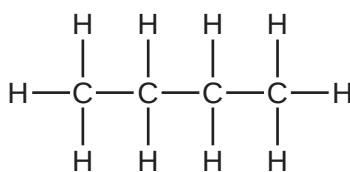
- 24 The diagram shows the electrolysis of lead(II) bromide using inert electrodes.

Lead is formed at electrode X and coloured fumes at electrode Y.



Which statement about the electrolysis of lead(II) bromide is correct?

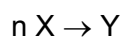
- A Electrode X is the anode.
 - B The colour of the fumes is brown.
 - C The lead(II) bromide is in aqueous solution.
 - D The mass of the lead(II) bromide does not change during the reaction.
- 25 Which change does **not** alter the rate of reaction between zinc and dilute sulfuric acid?
- A addition of a catalyst
 - B change in concentration of the acid
 - C change in atmospheric pressure
 - D change in temperature
- 26 The structure of a molecule is shown.



Which term correctly describes this molecule?

- A hydrocarbon
- B monomer
- C petroleum
- D polymer

- 27 Many molecules of X combine to form a single molecule Y as shown in the equation.



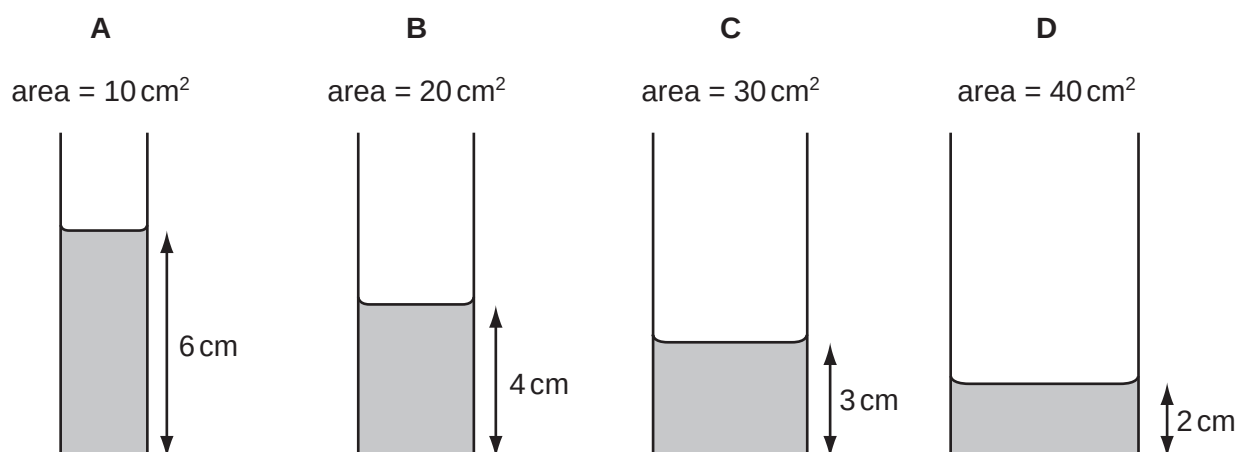
(n is a very large number)

Which terms best describe X and Y in this reaction?

	X	Y
A	fraction	monomer
B	monomer	fraction
C	monomer	polymer
D	polymer	fraction

- 28 Some water is poured into four tubes of different cross-sectional areas.

Which tube holds the largest volume of water?



- 29 What is the meaning of the *weight* of an object?

- A** the density of the material from which it is made
- B** the force exerted on it by gravity
- C** the mass of the matter it contains
- D** the pressure it exerts on the ground

- 30 The table gives information about a liquid in a container.

depth of liquid	10 cm
mass of liquid	30 g
temperature of liquid	25 °C
volume of liquid	20 cm ³

What is the density of the liquid?

- A** 0.33 cm/g **B** 1.2 g/°C **C** 1.5 g/cm³ **D** 3.0 g/cm
- 31 An object travels 6.0 km in 2 minutes.
- What is its speed?
- A** 0.050 m/s **B** 3.0 m/s **C** 50 m/s **D** 3000 m/s
- 32 Which source releases energy by burning when it is used in the process of generating electricity?
- A** a fossil fuel
B hydroelectric
C nuclear
D solar
- 33 Why is a fuse used in an electric circuit in a house?
- A** to increase the resistance of the circuit
B to keep the power used to a minimum value
C to prevent a short circuit from occurring
D to stop the cables overheating

34 Diagram 1 shows two identical resistors R_1 and R_2 connected in series in a circuit.

R_2 is then removed, as shown in diagram 2.

diagram 1

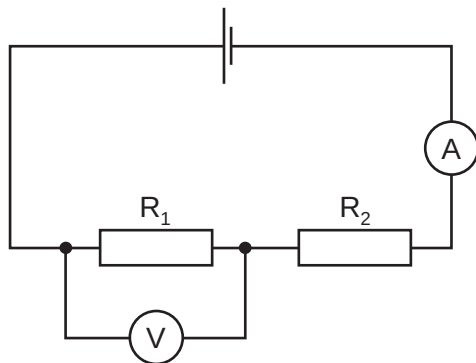
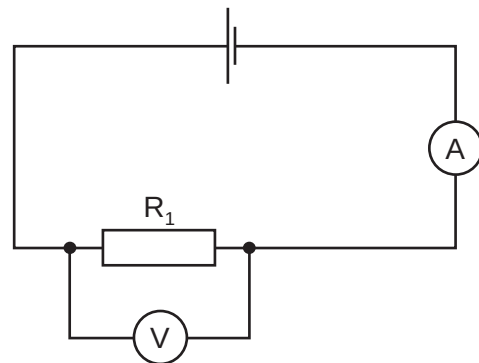


diagram 2



How do the readings on the ammeter and the voltmeter change when R_2 is removed?

	ammeter	voltmeter
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

35 Which row shows two of the essential items used in the construction of a transformer?

	iron core	permanent magnet	primary coil	slip rings
A	✓	✓		
B	✓		✓	
C		✓		✓
D			✓	✓

36 When flying, some birds use warm air currents to gain height.

What is the cause of these currents?

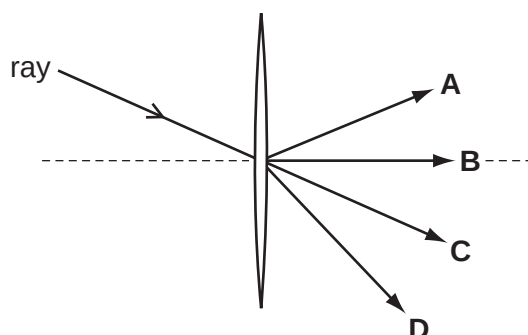
- A** conduction
- B** convection
- C** evaporation
- D** radiation

37 Which is the best description of a wave that is a quiet, high-pitched sound?

- A large amplitude and high frequency.
- B large amplitude and low frequency.
- C small amplitude and high frequency.
- D small amplitude and low frequency.

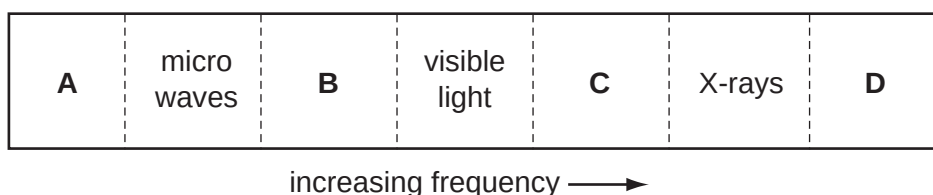
38 A ray of light passes through the centre of a thin converging lens.

In which direction does the ray leave the lens?



39 The diagram shows the spectrum of electromagnetic waves.

Which labelled region represents gamma rays?



40 Which nuclear process occurs in the Sun, and which process is used in a nuclear power station?

	in the Sun	in a nuclear power station
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion

DATA SHEET
The Periodic Table of the Elements

Group																																										
I	II											III	IV	V	VI	VII	0																									
		1 H Hydrogen																																								
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10																									
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18																									
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36																									
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	98 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54																									
133 Cs Cesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86																									
Fr Francium 87	Ra Radium 88	Ac Actinium 89																																								
58-71 Lanthanoid series																																										
90-103 Actinoid series																																										
140 Ce Cerium 58																		141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103
Key	X	a	a = relative atomic mass																																							
			X = atomic symbol																																							
		b	b = proton (atomic) number																																							

Key

a	X	a = relative atomic mass
	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.).



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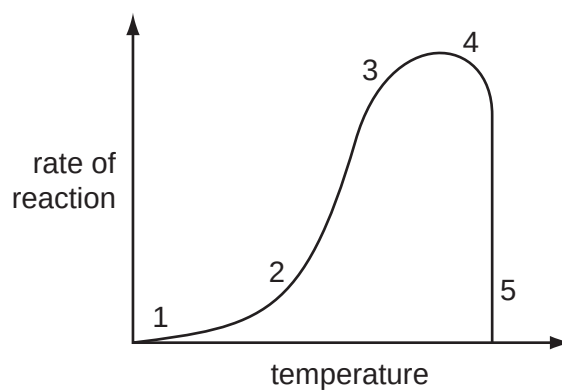
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4 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

- A 1
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- 7 Oxygenated blood returns to the heart from the lungs in vessel X and leaves the heart to circulate around the body in vessel Y.

What are X and Y?

	X	Y
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D	vena cava	pulmonary artery

- 8 Which method of family planning is also likely to reduce the risk of the spread of syphilis?

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- 9 A species of animal reproduces both sexually and asexually.

Which offspring will be clones?

	offspring from sexual reproduction	offspring from asexual reproduction
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C	✗	✓
D	✗	✗

- 10 The table shows the level of alcohol in a person's blood after drinking two litres of beer.

time after drinking beer (hours)	alcohol in the blood (grams/dm ³)
1	7
2	5
3	3
4	0

How long will it be (in hours) before the person's reaction time returns to normal?

- A** 0 to 1 **B** 1 to 2 **C** 2 to 3 **D** 3 to 4

- 11 The diagram shows a food chain.



Which types of energy are represented by the black arrows and by the white arrows?

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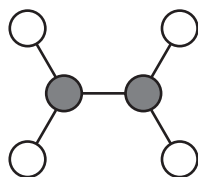
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- C the environment only
- D the student's genes only

14 A model of a molecule is shown.



key

○ = hydrogen

● = nitrogen

Which description and formula are correct for this molecule?

	description	formula
A	compound	NH ₂
B	compound	N ₂ H ₄
C	mixture	NH ₂
D	mixture	N ₂ H ₄

15 Element X has a nucleon number of 40.

The electron arrangement of element X is 2,8,8.

Which statements about element X are correct?

- 1 It has 40 neutrons in its nucleus.
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- 4 It is in Group 0 of the Periodic Table.

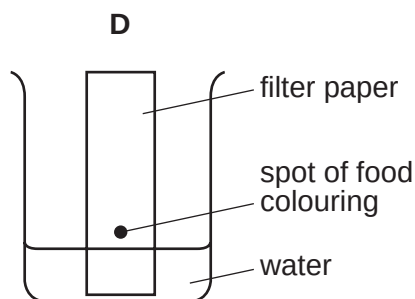
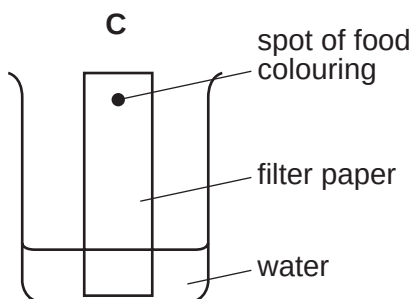
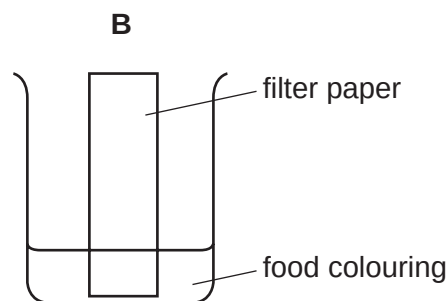
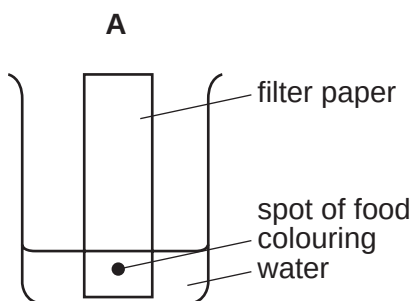
A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

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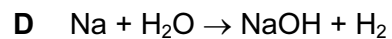
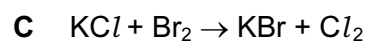
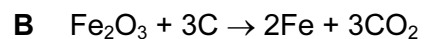


17 Sulfur dioxide is formed as a pollutant when fossil fuels are burned.

Which properties does sulfur dioxide have?

	toxic	acidic	corrosive
A	✓	✓	✓
B	✓	✓	x
C	✓	x	x
D	x	x	x

A $2Al + 3Cl_2 \rightarrow 2AlCl_3$



Which letter shows the position of this metal in the Periodic Table?

A 4x10 grid representing a periodic table. The grid is divided into four main sections by a gap in the top row. The top row has a single cell in the 3rd column and a single cell in the 10th column. The second row has two cells in the 1st and 2nd columns, and six cells in the 7th through 12th columns. The third and fourth rows are continuous across all 10 columns. Labels are placed in the following cells: 'D' in the 2nd row, 1st column; 'C' in the 3rd row, 3rd column; 'B' in the 3rd row, 9th column; and 'A' in the 4th row, 10th column.

D											
		C								B	A

A carbon and sulfur

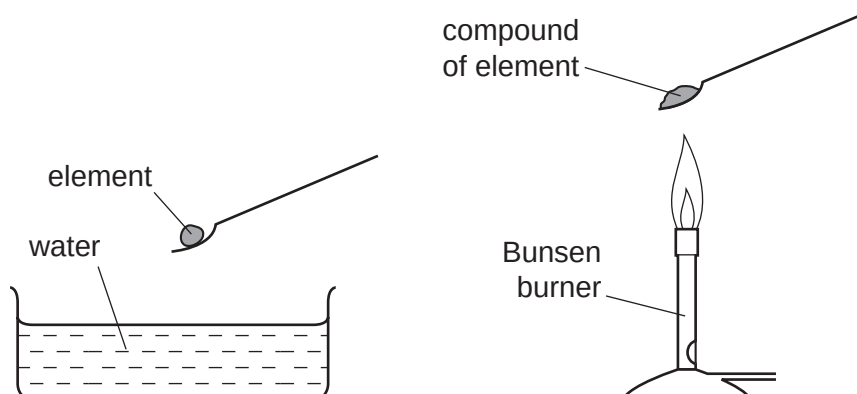
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C copper and zinc

D silver and gold

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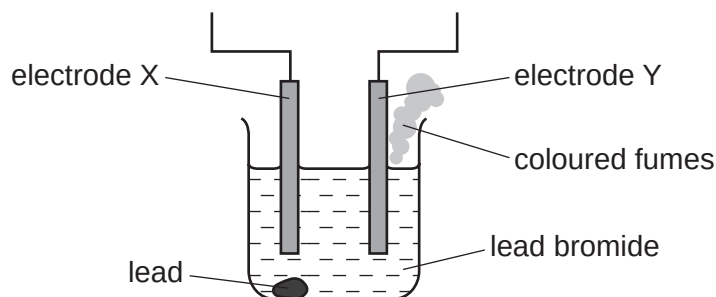


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	element	reaction with water	colour of the flame
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C	potassium	vigorous	lilac
D	sodium	no reaction	yellow

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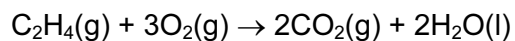
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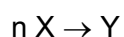
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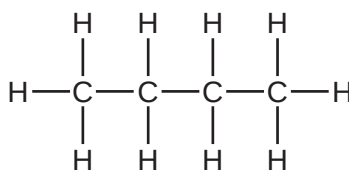
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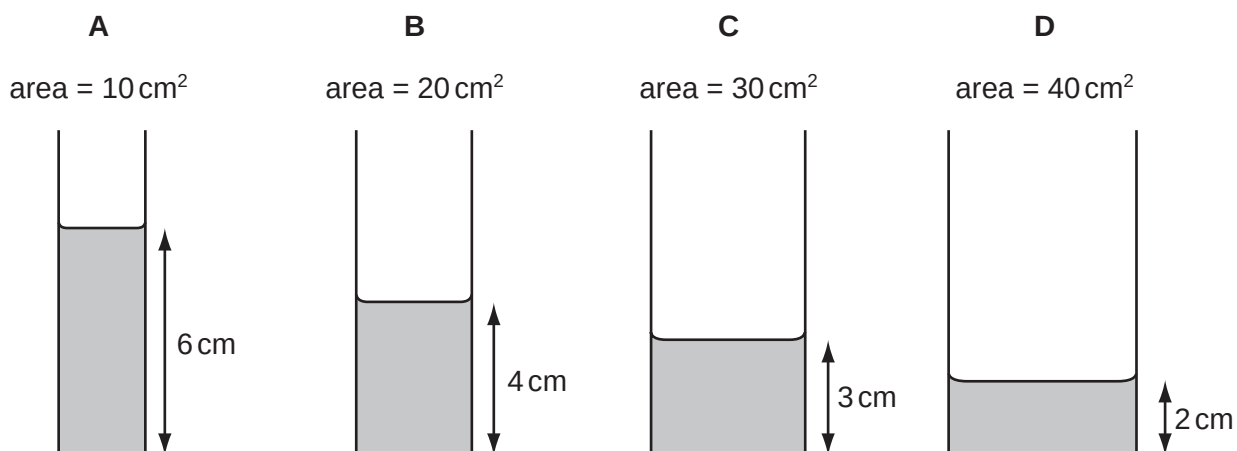
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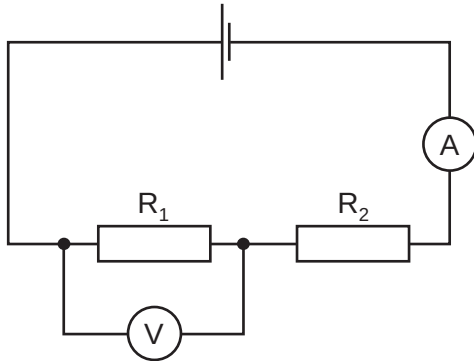
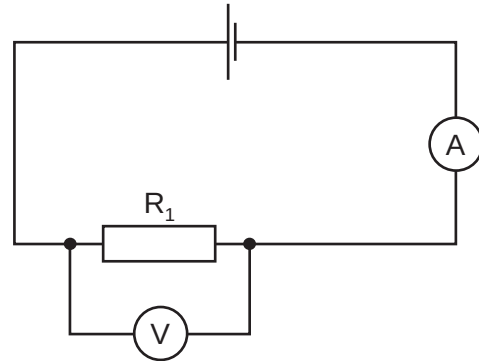


diagram 2



How do the readings on the ammeter and the voltmeter change when R_2 is removed?

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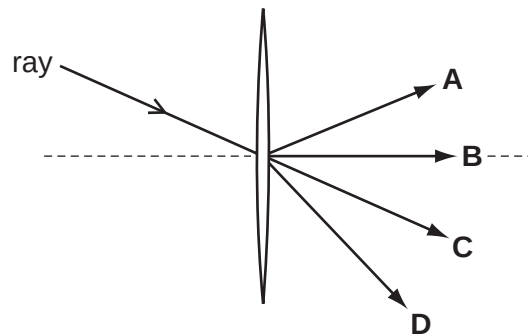
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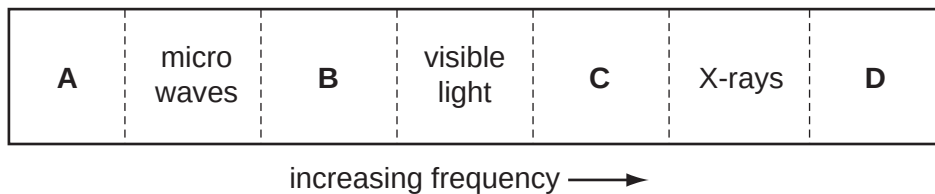
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	in the Sun	in a nuclear power station
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion

DATA SHEET

58-71 Lanthanoid series
90-103 Actinoid series

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

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COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice

October/November 2011

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, 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.

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 16.

This document consists of **14** printed pages and **2** blank pages.

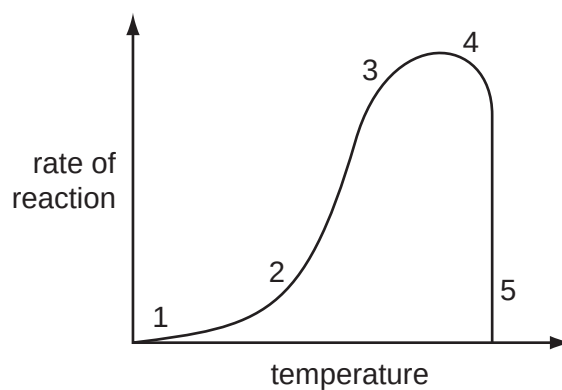


- 1 Which part of a plant cell is made of cellulose?
- A cell membrane
 - B cell wall
 - C chloroplast
 - D nucleus
- 2 Which leaf tissue has specialised cells that surround stomata?
- A epidermis
 - B palisade mesophyll
 - C phloem
 - D xylem

- 3 Which parts of a cell control its activities and control what enters and leaves it?

	controls cell's activities	controls what enters and leaves the cell
A	chloroplast	cell surface membrane
B	chloroplast	cell wall
C	nucleus	cell surface membrane
D	nucleus	cell wall

- 4 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

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

- 5 Oxygenated blood returns to the heart from the lungs in vessel X and leaves the heart around the body in vessel Y.

What are X and Y?

	X	Y
A	aorta	pulmonary vein
B	pulmonary artery	vena cava
C	pulmonary vein	aorta
D	vena cava	pulmonary artery

- 6 When a leaf is photosynthesising, in which direction do gases diffuse through the stomata?

	carbon dioxide	oxygen
A	in	in
B	in	out
C	out	in
D	out	out

- 7 What happens during digestion?

	large pieces of food are broken into small pieces	large molecules are broken into small molecules
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

- 8 A species of animal reproduces both sexually and asexually.

Which offspring will be clones?

	offspring from sexual reproduction	offspring from asexual reproduction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

- 9 The table shows the level of alcohol in a person's blood after drinking two litres of beer.

time after drinking beer (hours)	alcohol in the blood (grams/dm ³)
1	7
2	5
3	3
4	0

How long will it be (in hours) before the person's reaction time returns to normal?

- A** 0 to 1 **B** 1 to 2 **C** 2 to 3 **D** 3 to 4
- 10 Which method of family planning is also likely to reduce the risk of the spread of syphilis?
- A** condom
B intra-uterine device (IUD)
C pill
D sterilisation
- 11 Which process reduces soil erosion on hilly ground?
- A** cutting down the trees
B increasing the number of grazing animals
C ploughing up and down the hilly ground
D terracing the hilly ground
- 12 Albino humans cannot make any pigment in their skin.

A pale-skinned student, who is **not** an albino, sits in the sun on a number of days. The student's skin becomes suntanned (darker).

What causes this suntanning to happen?

- A** the environment and the student's albino alleles
B the environment and the student's non-albino alleles
C the environment only
D the student's genes only

13 The diagram shows a food chain.



Which types of energy are represented by the black arrows and by the white arrows?

	black arrows	white arrows
A	chemical	heat
B	chemical	light
C	heat	chemical
D	light	chemical

14 Element X has a nucleon number of 40.

The electron arrangement of element X is 2,8,8.

Which statements about element X are correct?

- 1 It has 40 neutrons in its nucleus.
- 2 It has 2 electrons in its outer shell.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.

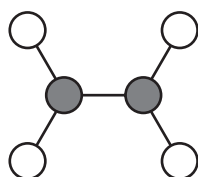
A 1 and 2

B 1 and 3

C 2 and 4

D 3 and 4

15 A model of a molecule is shown.



key

○ = hydrogen

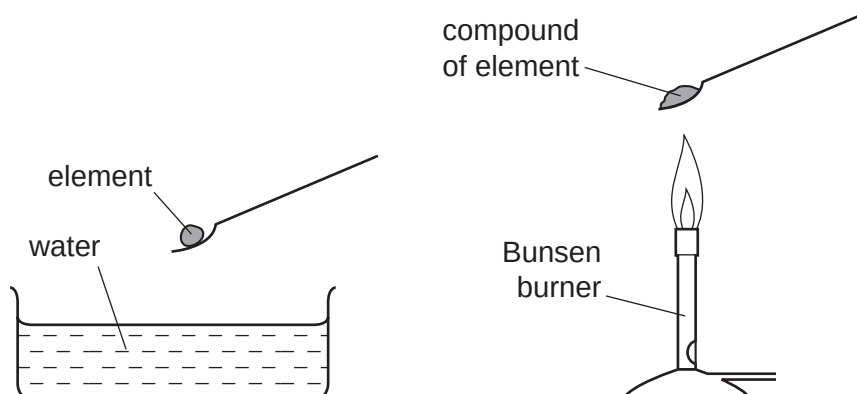
● = nitrogen

Which description and formula are correct for this molecule?

	description	formula
A	compound	NH ₂
B	compound	N ₂ H ₄
C	mixture	NH ₂
D	mixture	N ₂ H ₄

- 16 In an experiment the elements calcium, copper, potassium and sodium were separately reacted with water.

In a second experiment a flame test was carried out on compounds of each of the elements.



Which row correctly shows the reaction of the elements with water and the colour of the flame?

	element	reaction with water	colour of the flame
A	calcium	vigorous	green
B	copper	no reaction	red
C	potassium	vigorous	lilac
D	sodium	no reaction	yellow

- 17 Which two elements do **not** form an alloy?

- A** carbon and sulfur
- B** carbon and iron
- C** copper and zinc
- D** silver and gold

- 18 Sulfur dioxide is formed as a pollutant when fossil fuels are burned.

Which properties does sulfur dioxide have?

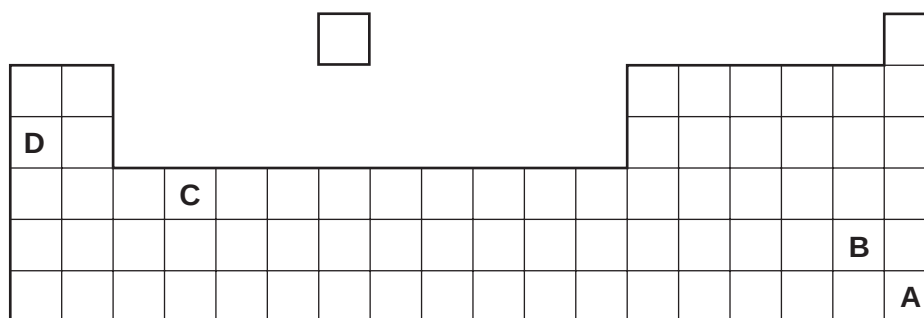
	toxic	acidic	corrosive
A	✓	✓	✓
B	✓	✓	x
C	✓	x	x
D	x	x	x

A $2Al + 3Cl_2 \rightarrow 2AlCl_3$

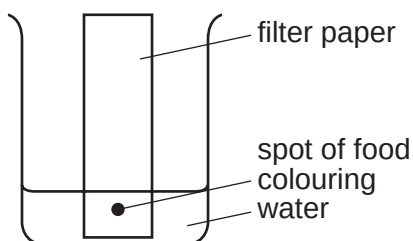
C $\text{KCl} + \text{Br}_2 \rightarrow \text{KBr} + \text{Cl}_2$

D $\text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2$

Which letter shows the position of this metal in the Periodic Table?



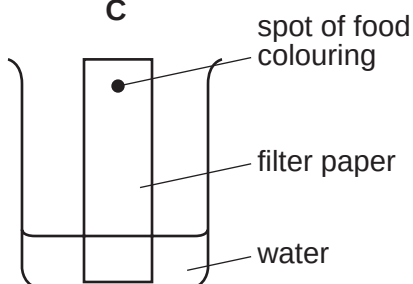
A



filter paper

food colouring

C

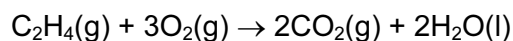


filter paper

spot of food colouring

water

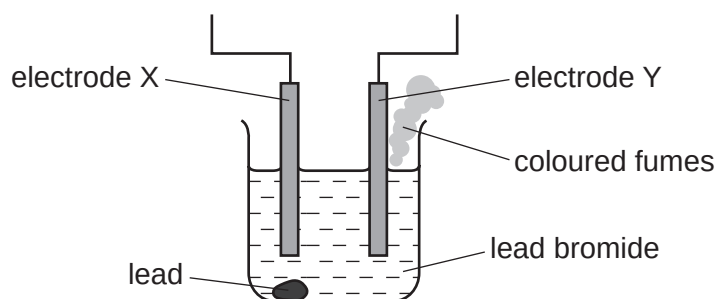
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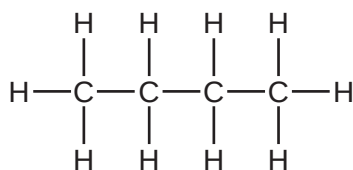
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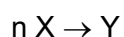
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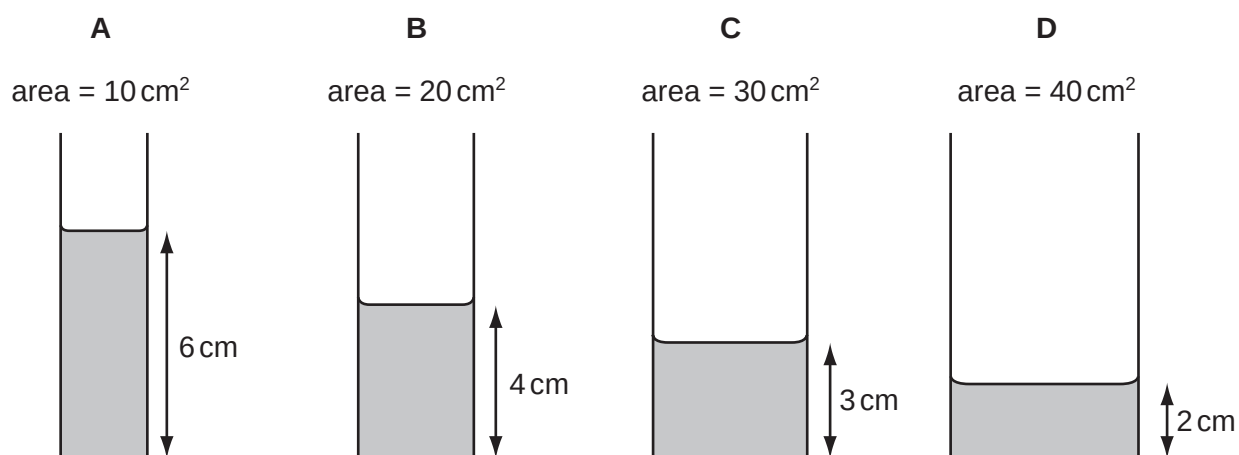
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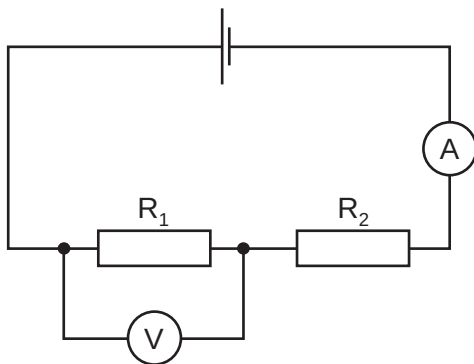
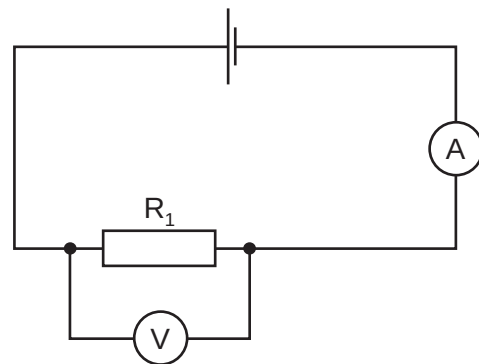


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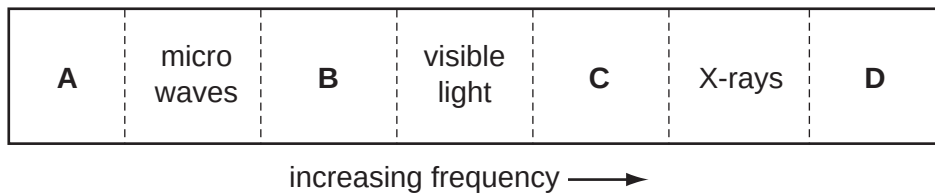
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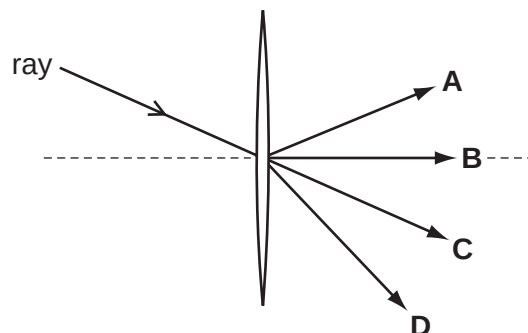


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Group

Key

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