UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE **0652/01**

Paper 1 Multiple Choice **October/November 2007**

45 minutes

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

0679128951

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 20.

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

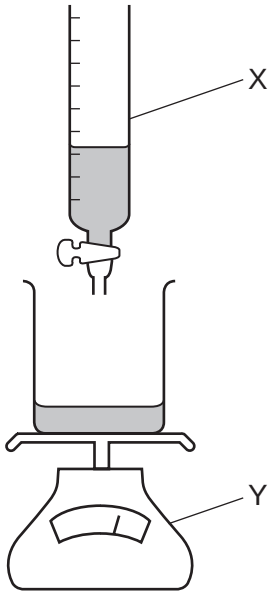
1 Diffusion involves the movement of particles.

For example, particles in a …1… travel from a region of …2… concentration to a region of …3… concentration.

Which words are correct for 1, 2 and 3?

	1	2	3
A	gas	high	low
B	gas	low	high
C	liquid	low	high
D	solid	high	low

2 A student measures the mass of a volume of liquid by using the apparatus below.



What are the correct labels for X and Y?

	X	Y
A	balance	burette
B	burette	pipette
C	burette	balance
D	pipette	balance

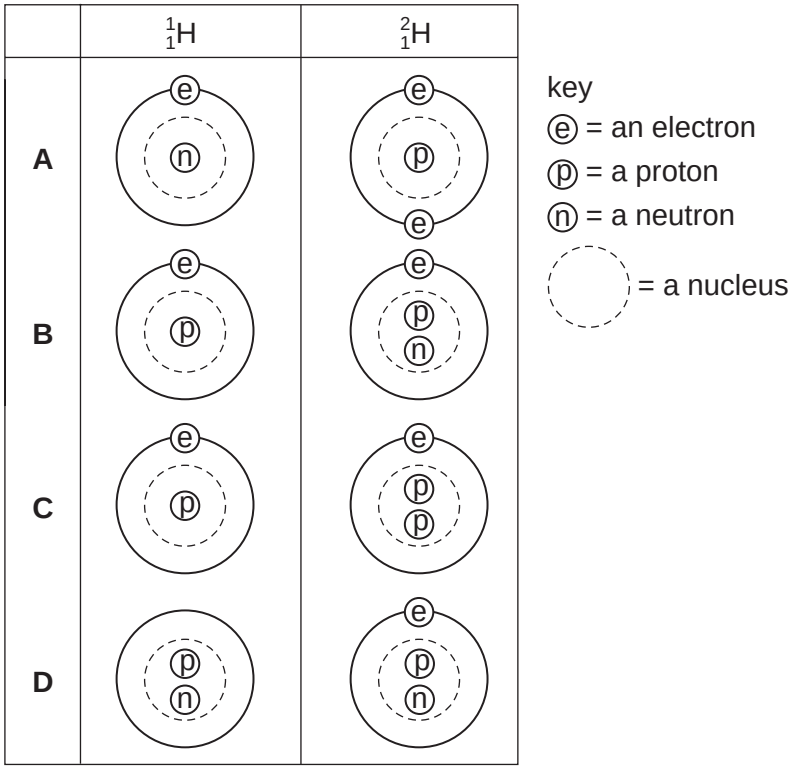
3 Element **Z** conducts electricity and forms a basic oxide.

What could **Z** be?

	Na	Mg	S	C*l*
A	✓	✗	✗	✗
B	✓	✓	✗	✗
C	✗	✗	✗	✓
D	✗	✗	✓	✓

4 Two isotopes of hydrogen are $^{1}_{1}H$ and $^{2}_{1}H$.

Which diagram shows the arrangement of particles in the two isotopes?



5 Which formula represents a **molecule** that contains 3 atoms?

A HBr **B** MgO **C** NH_3 **D** SCl_2

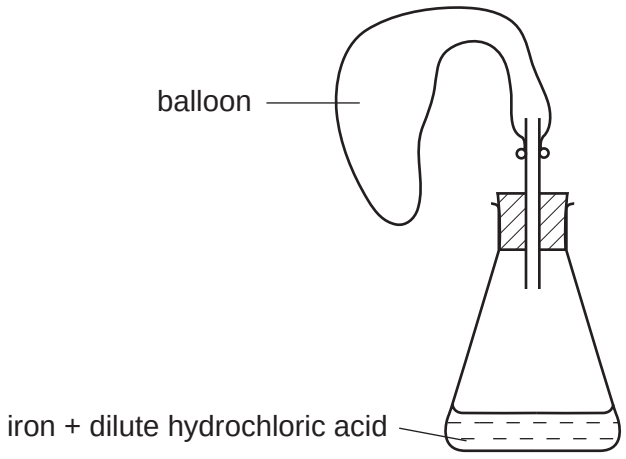
6 The production of energy is important.

Fuel …1…, burns in an …2… reaction.

What could 1 and 2 be?

	1	2
A	hydrogen	endothermic
B	hydrogen	exothermic
C	oxygen	endothermic
D	oxygen	exothermic

7 The diagram shows apparatus being used to fill a balloon with hydrogen.



Which form of iron makes the balloon fill most quickly?

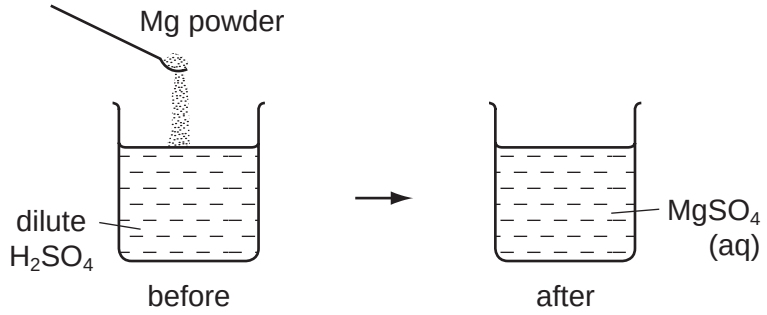
A a lump

B pieces of wire

C a powder

D thin sheets

8 The diagram shows an experiment in which magnesium powder is added to dilute sulphuric acid.



Which statement correctly compares the pH and temperature of the final solution with the values of the original acid?

	final solution has	
	higher pH	higher temperature
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

9 Which two salts are each soluble in water?

A barium chloride and barium sulphate

B barium sulphate and silver chloride

C silver chloride and silver nitrate

D silver nitrate and barium chloride

10 Hydrochloric acid is used to clean metals.

The acid reacts with the oxide layer on the surface of the metal, forming a salt and water.

Which word describes the metal oxide?

A alloy

B base

C element

D indicator

11 In the Periodic Table, how does the metallic character of the elements vary from left to right across a period?

A It decreases.

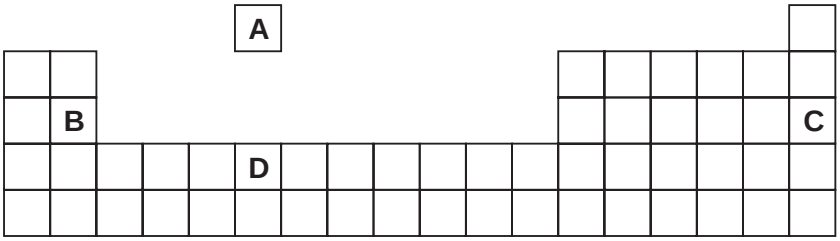
B It increases.

C It increases then decreases.

D It stays the same.

12 The positions of four elements are shown on the outline of the Periodic Table.

Which element forms a coloured oxide?



13 Water reacts with Group I metals.

$$2H_2O + 2X \rightarrow H_2 + 2XOH$$

In this reaction, the water is …1… . On going down Group I, the reaction becomes more …2… .

Which words correctly complete the gaps?

	1	2
A	oxidised	endothermic
B	oxidised	exothermic
C	reduced	endothermic
D	reduced	exothermic

14 Uranium is a radioactive element but it is also a typical metal.

What is **not** a property of uranium?

A It can be bent and moulded into shape.

B It conducts heat well.

C It dissolves in dilute hydrochloric acid to give hydrogen.

D It forms a covalent chloride.

15 Why is mild steel used instead of iron to make car bodies?

A Iron cannot be painted.

B Mild steel does not rust.

C Mild steel is more brittle than iron.

D Mild steel is stronger than iron.

16 Urea, $CO(NH_2)_2$, is used as a fertiliser.

Which element that plants need is provided by the urea?

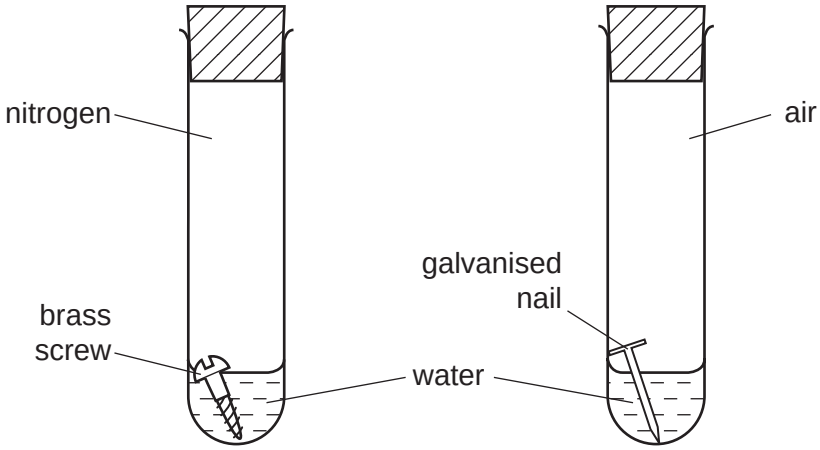
A carbon

B hydrogen

C nitrogen

D oxygen

17 In experiments on rusting, some students are given metal objects to study.



One student set up his apparatus as shown.

Which object rusted?

	brass screw	galvanized nail
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

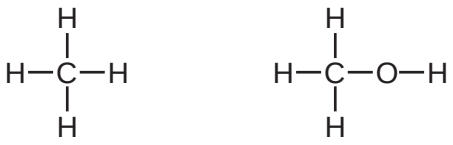
18 Butane, ethanol and hydrogen are fuels.

Which substances produce **both** carbon dioxide **and** water when used as a fuel?

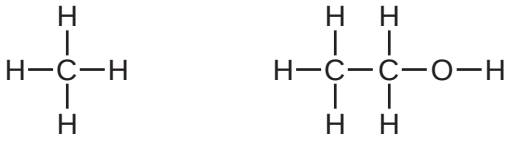
	butane	ethanol	hydrogen
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✓	✓	✓

19 Which two structures show methane and ethanol?

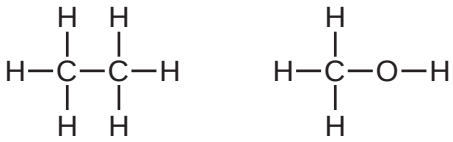
A



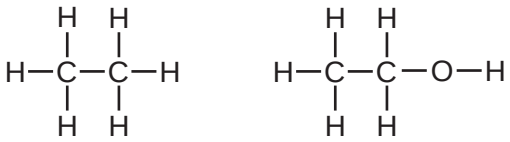
B



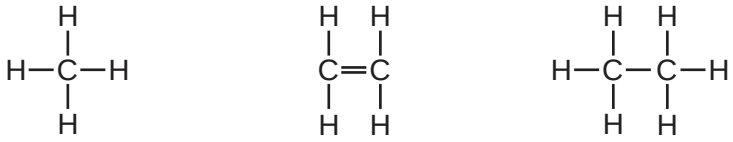
C



D



20 The diagram shows the structures of three hydrocarbons.



1 2 3

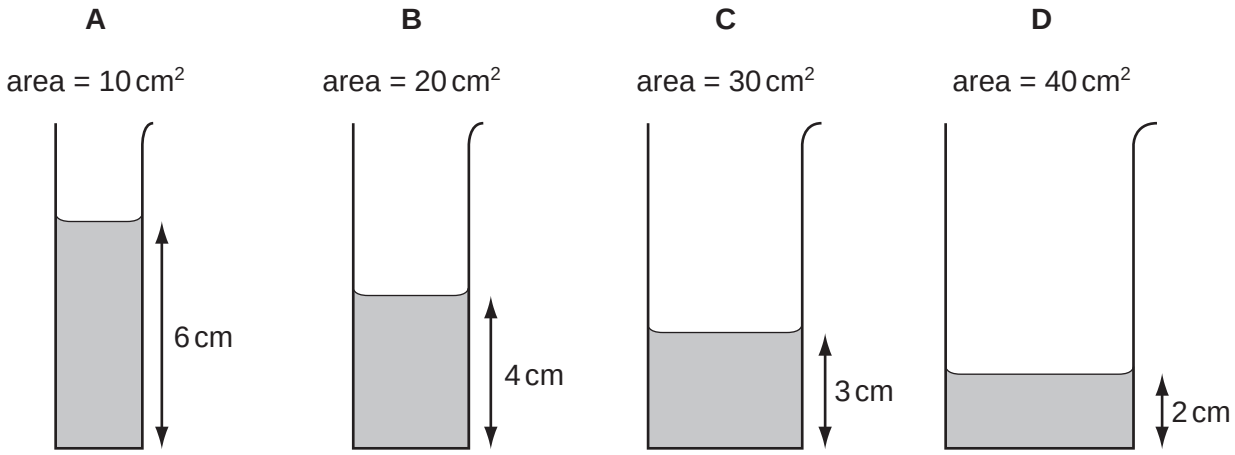
Substances that can react with some hydrocarbons include hydrogen, oxygen and steam.

Which of the hydrocarbons above can be made to react with **all three** substances?

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

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

Which tube contains the largest volume of water?



22 Four students try to explain what is meant by acceleration.

Which student makes a correct statement?

A It is related to the changing speed of an object.

B It is the distance an object travels in one second.

C It is the force acting on an object divided by the distance it travels in one second.

D It is the force acting on an object when it is near to the Earth.

23 The table shows the weight of a 10 kg mass on each of five planets.

planet	weight of a 10 kg mass / N
Mercury	40
Venus	90
Earth	100
Mars	40
Jupiter	250

On which planets would an astronaut have a smaller weight than on Earth?

A Mercury, Mars and Jupiter

B Mercury, Venus and Mars

C Mercury, Venus and Jupiter

D Venus, Mars and Jupiter

[Turn over

24 A metal drum has a mass of 200 kg when empty and 1000 kg when filled with 1.0 m^3 of methylated spirit.

What is the density of methylated spirit?

A $0.0050\,kg/m^3$

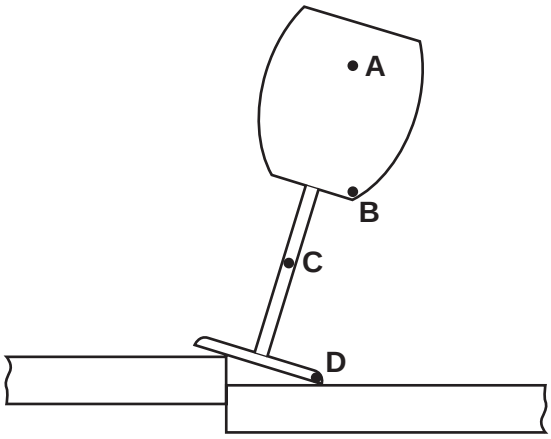
B $0.11\,kg/m^3$

C $800\,kg/m^3$

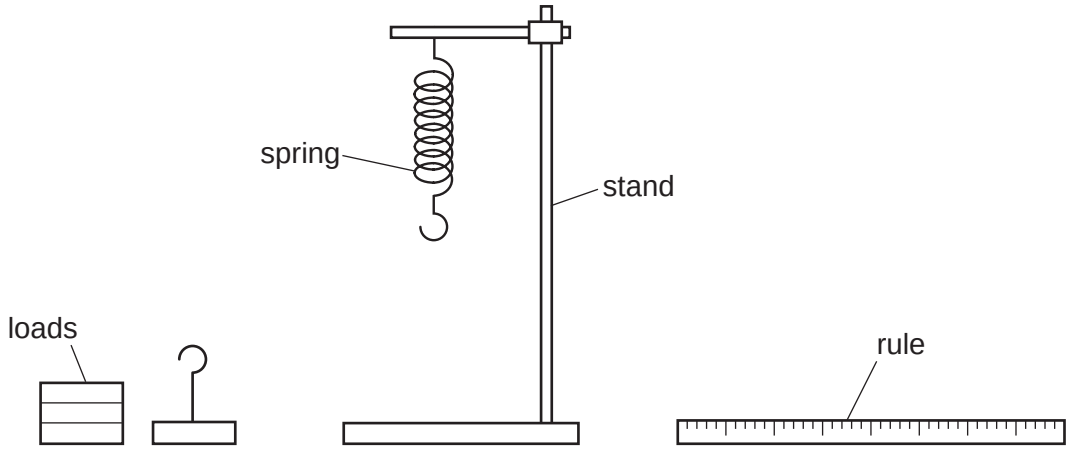
D $1000\,kg/m^3$

25 An empty glass is placed on a join between two tables as shown. The glass remains stable.

Which point is the centre of mass of the glass?

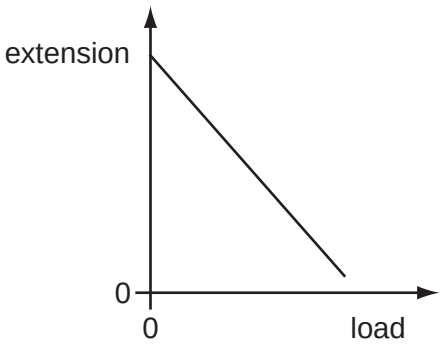


26 A spring is suspended from a stand. Loads are added and the extensions are measured.

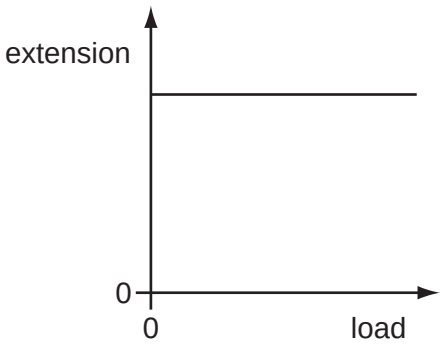


Which graph shows the result of plotting extension against load?

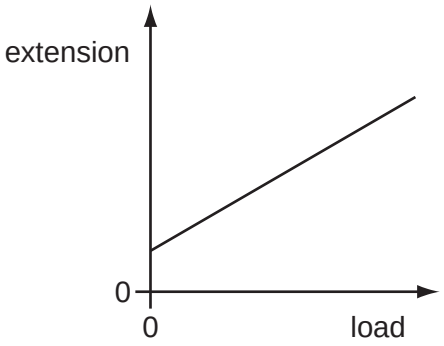
A



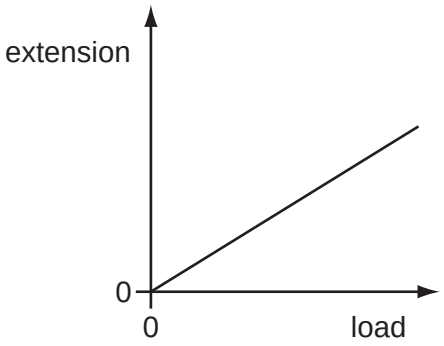
B



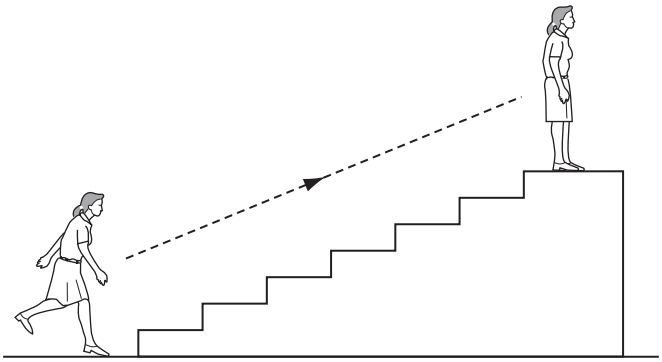
C



D



27 A person uses chemical energy to run up some stairs.



She stops at the top of the stairs.

What has the chemical energy been converted to when she is at the top of the stairs?

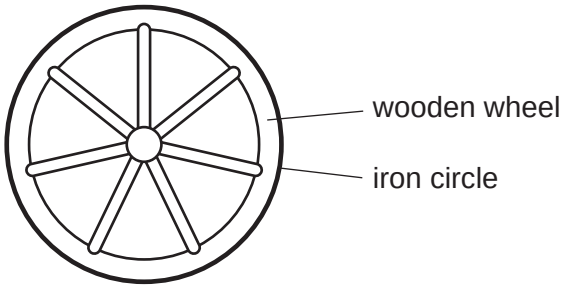
A energy of motion and gravitational energy

B energy of motion and strain energy

C gravitational energy and heat energy

D strain energy and heat energy

28 A wooden wheel can be strengthened by putting a tight circle of iron around it.



Which action would make it easier to fit the circle over the wood?

A cooling the iron circle

B heating the iron circle

C heating the wooden wheel

D heating the wooden wheel and cooling the iron circle

29 Which statement refers to convection?

A It does not involve energy transfer.

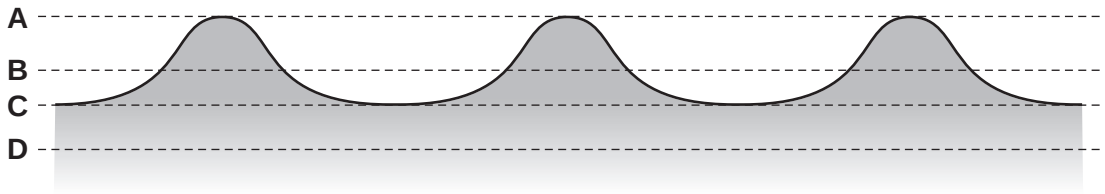
B It is the transfer of heat energy without the movement of particles.

C It only occurs in liquids or gases.

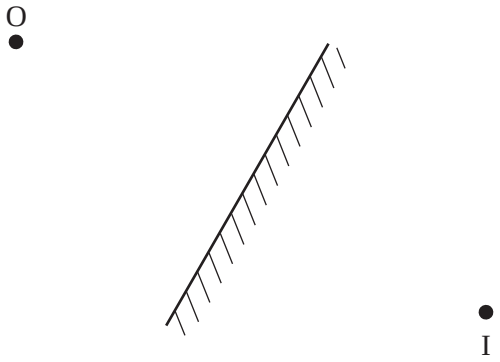
D It only occurs in solids.

30 The diagram shows a section through a series of waves on water.

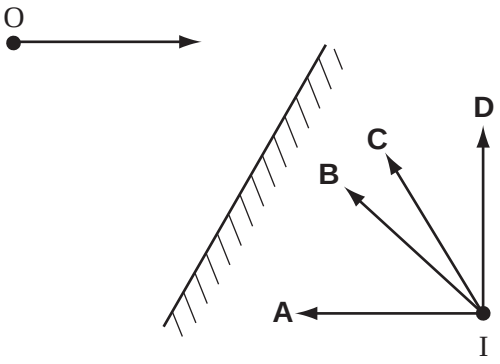
Which dotted line shows the position of the still water surface after the waves have passed?



31 An object placed in front of a plane mirror at O produces an image at I.



If the object moves towards the mirror in the direction shown by the arrow, in which direction does the image move?

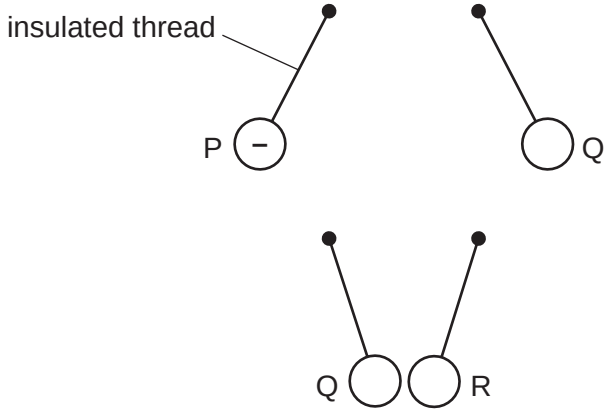


32 Which materials are suitable for making a permanent magnet and the core of an electromagnet?

	permanent magnet	core of an electromagnet
A	iron	iron
B	iron	steel
C	steel	iron
D	steel	steel

[Turn over

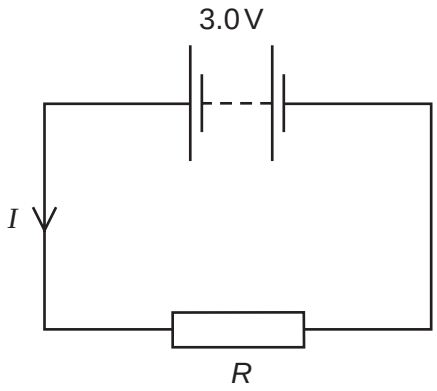
33 Three charged balls, P, Q and R, are suspended by insulated threads. Ball P is negatively charged.



What are the charges on Q and on R?

	Q	R
A	positive	positive
B	positive	negative
C	negative	positive
D	negative	negative

34 The circuit shows a current I in a resistor of resistance R.

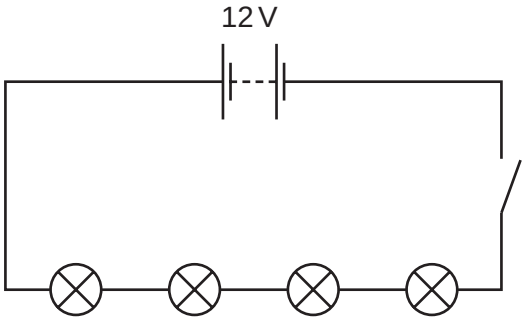


Which line gives possible values of I and R?

	I / A	R / Ω
A	1.5	1.5
B	1.5	2.0
C	6.0	2.0
D	4.0	12

35 Four lamps are connected in a circuit as shown in the diagram.

Each lamp is designed to operate at 12 V.



The circuit is now switched on.

Which statement is correct?

A Each lamp can be switched off independently.

B If one lamp breaks all the others will stay alight.

C The current is the same in all the lamps.

D The lamps will all light at normal brightness.

36 A mains electrical circuit uses insulated copper cable and the cable overheats.

To prevent the cable overheating, how should the cable be changed, and why?

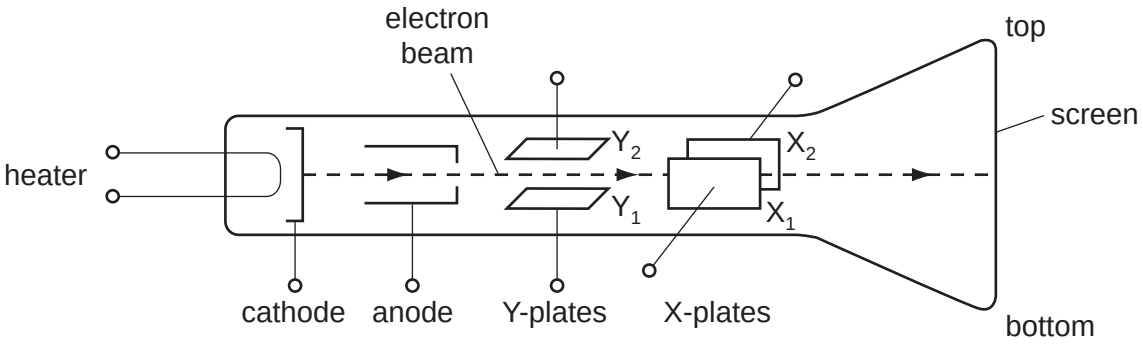
A Use thicker copper cable which has less resistance.

B Use thicker insulation which stops the heat escaping.

C Use thinner copper cable which has more resistance.

D Use thinner insulation which allows less heat to escape.

37 The diagram shows a cathode-ray tube.



What must be done to deflect the electron beam upwards?

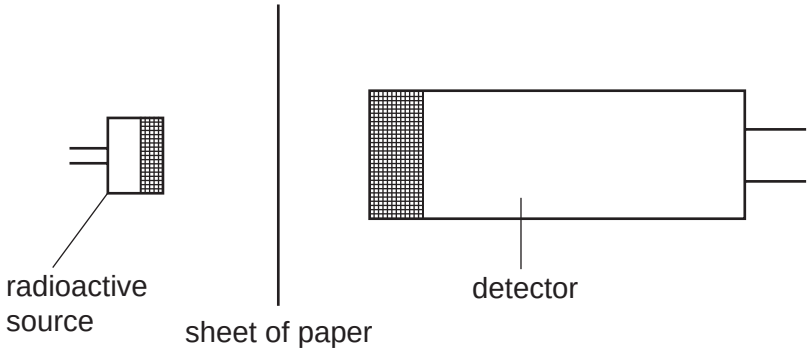
A make X_1 more positive than X_2

B make X_2 more positive than X_1

C make Y_1 more positive than Y_2

D make Y_2 more positive than Y_1

38 A sheet of paper is placed between a radioactive source and a detector.



Which types of radiation can pass through the paper?

A alpha-particles and beta-particles only

B alpha-particles and gamma-rays only

C beta-particles and gamma-rays only

D alpha-particles, beta-particles and gamma-rays

39 A sample of radioactive isotope is decaying.

The nuclei of which atoms will decay first?

A impossible to know, because radioactive decay is random

B impossible to know, unless the age of the material is known

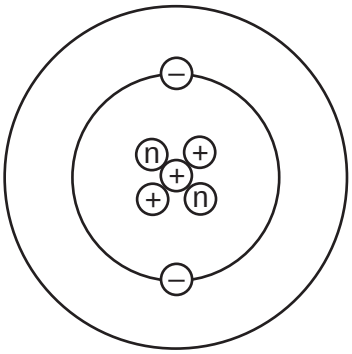
C atoms near the centre, because they are surrounded by more atoms

D atoms near the surface, because the radiation can escape more easily

40 An atom of the element lithium has a nucleon number of 7 and a proton number of 3.

Which diagram represents a neutral atom of lithium?

A



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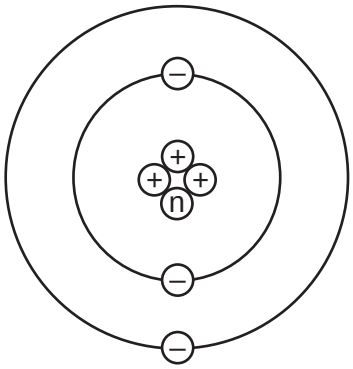

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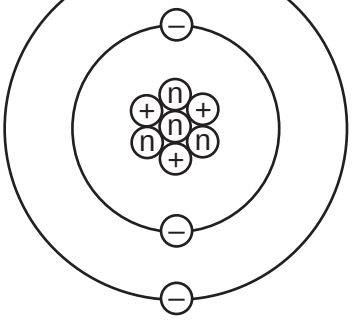

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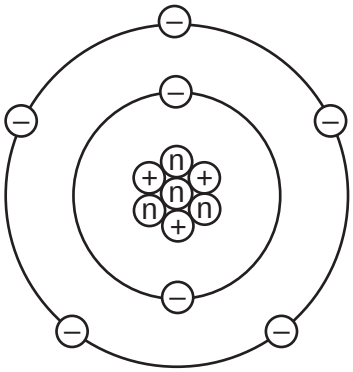

key

n = a neutron

\+ = a proton

– = an electron

(not to scale)

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DATA SHEET
The Periodic Table of the Elements

	Group																	
	I	II									III	IV	V	VI	VII	0
																4 **He** Helium 2
						1 **H** Hydrogen 1					11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
	7 **Li** Lithium 3	9 **Be** Beryllium 4									27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulphur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
	23 **Na** Sodium 11	24 **Mg** Magnesium 12									70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
	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	112 **Cd** Cadmium 48	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
	85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	115 **In** Indium 49	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
	133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79							
		226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

*58-71 Lanthanoid series	140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	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
†90-103 Actinoid series	232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

Key

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

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