UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE **0652/12**

Paper 1 Multiple Choice **October/November 2012**

45 minutes

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

0950546505

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 **15** printed pages and **1** blank page.

UNIVERSITY of CAMBRIDGE International Examinations

1 Which method can be used to obtain crystals from aqueous copper(II) sulfate?

A diluting

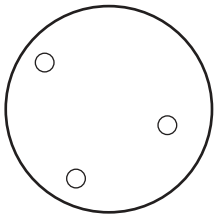
B dissolving

C evaporating

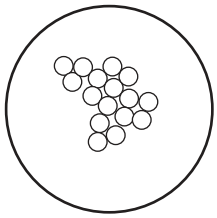
D stirring

2 Which diagram shows the arrangement of particles in a liquid?

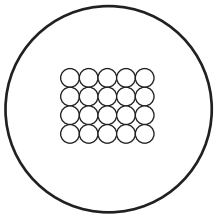
A



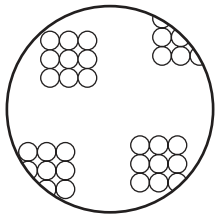
B



C



D



3 What is different for isotopes of the same element?

A number of electrons

B number of full shells

C number of nucleons

D number of protons

4 Statements 1, 2 and 3 are about diamond and graphite.

1 They are different solid forms of the same element.

2 They each conduct electricity.

3 They have atoms that form four equally strong bonds.

Which statements are correct?

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

5 Which compound has the largest relative molecular mass, M_r?

A CO_2 **B** NO_2 **C** SiO_2 **D** SO_2

6 The chart shows the colour of Universal Indicator at different pH values.

colour	red			orange			green				blue				violet
pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

Lemon juice contains citric acid which is only slightly acidic.

What colour does lemon juice give with Universal Indicator?

A blue

B green

C orange

D red

7 Aqueous ammonia is added to a solution of a metal sulfate.

A green precipitate forms that is insoluble in excess of the aqueous ammonia.

Which metal ion is present?

A Cu^{2+} **B** Fe^{2+} **C** Fe^{3+} **D** Zn^{2+}

8 The equation below shows the reaction that occurs when hematite is heated with carbon.

$$\underset{2Fe_2O_3}{\text{hematite}} + \underset{3C}{\text{carbon}} \xrightarrow{\text{process X}} \underset{4Fe}{\text{iron}} + \underset{3CO_2}{\text{carbon dioxide}}$$

What is the chemical name of hematite and what is process X?

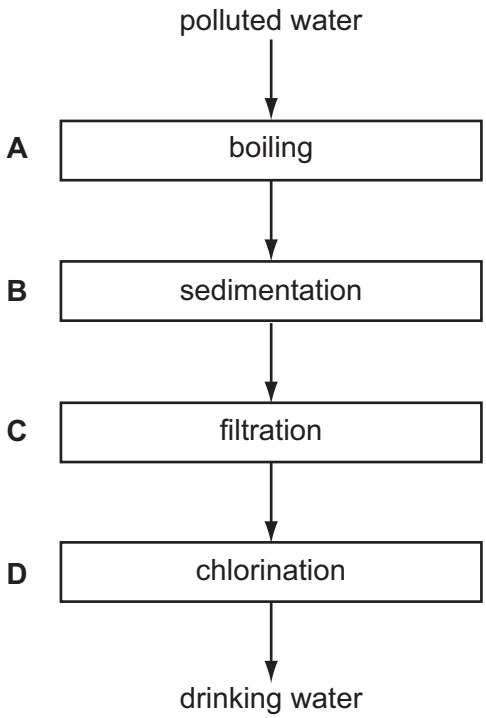
	chemical name	process X
A	iron(II) oxide	oxidation
B	iron(II) oxide	reduction
C	iron(III) oxide	oxidation
D	iron(III) oxide	reduction

9 Magnesium reacts with acids to produce hydrogen gas.

Under which set of conditions is hydrogen produced most slowly?

	magnesium	acid	temperature / °C
A	ribbon	concentrated	40
B	ribbon	dilute	20
C	powder	concentrated	40
D	powder	dilute	20

10 Which stage is **not** used to obtain the public supply of drinking water from polluted water?



11 Metal M is formed when its oxide is heated with carbon.

Which deductions from this information are correct?

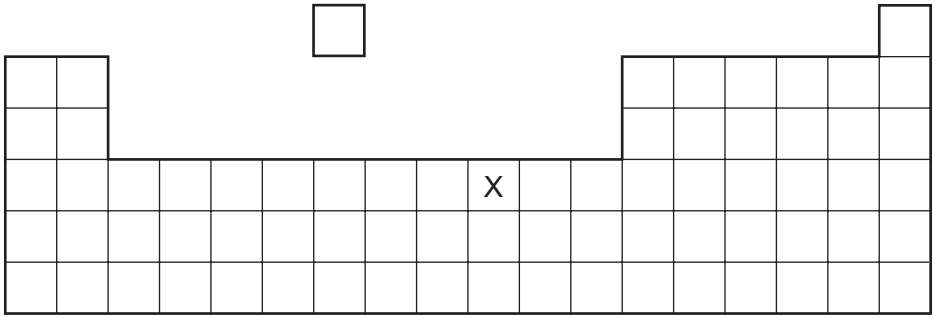
1 M is similar in reactivity to iron.

2 M is more reactive than potassium.

3 The oxide of M is acidic.

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

12 The position of an element, X, in the Periodic Table is shown.



Which correctly describes X?

	density (g/dm^3)	melting point (°C)
A	0.97	98
B	1.96	119
C	3.12	–7
D	8.90	1455

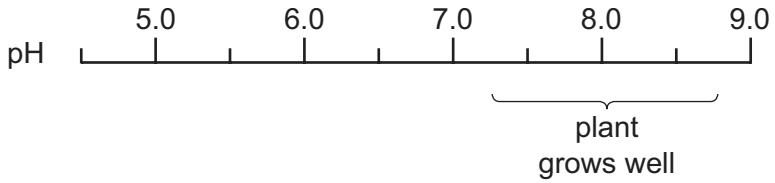
13 Copper, iron and zinc are all used to make things.

Which of these three metals are also used in the form of alloys?

	copper	iron	zinc
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✓

[Turn over

14 The diagram shows the pH range of soil in which a certain plant grows well.



The plant is to be grown in a field with a soil pH of 6.

What can be added to the soil to make the pH suitable?

A lime

B litmus

C nitric acid

D sodium chloride

15 In some reactions, carbon dioxide and water are both formed.

For which examples below is this statement correct?

1 burning of coal

2 reaction between an acid and a carbonate

3 respiration

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

16 Three carbon-containing fuels are listed below.

1 coal

2 natural gas

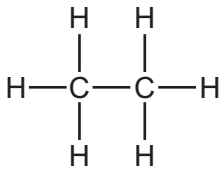
3 petroleum

Which of these fuels are classified as 'fossil fuels' and which are fractionally distilled?

	fossil fuels	fractionally distilled
A	1, 2 and 3	1 and 3 only
B	1, 2 and 3	3 only
C	1 and 3 only	1 and 3 only
D	1 and 3 only	3 only

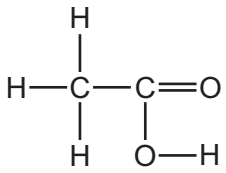
17 Which structure is **not** correct?

A



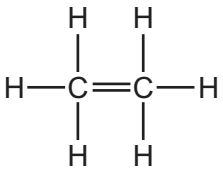
ethane

B



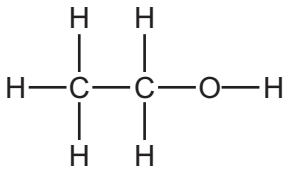
ethanoic acid

C



ethene

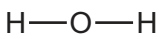
D



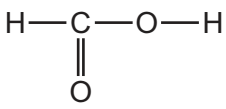
ethanol

18 Which molecular structure shows an alcohol?

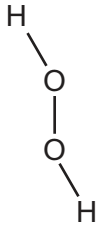
A



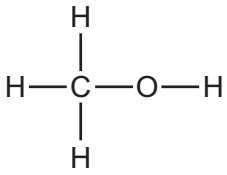
B



C

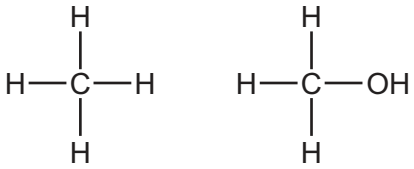


D

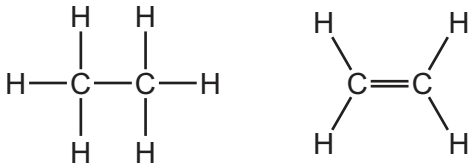


19 Which two substances are in the same homologous series?

A



B



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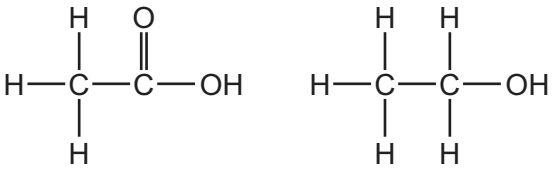
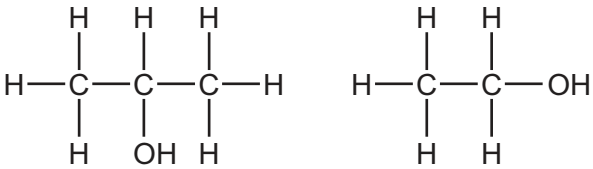
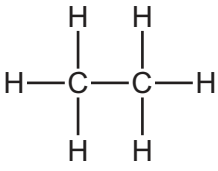


D

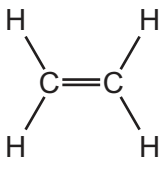


20 Which compound is the monomer used to make poly(ethene)?

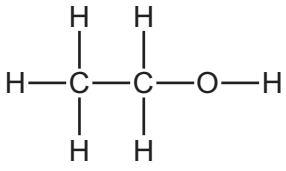
A



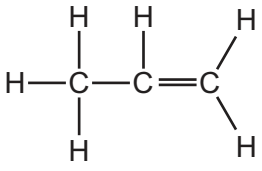
B



C



D



[Turn over

21 What is the unit of weight?

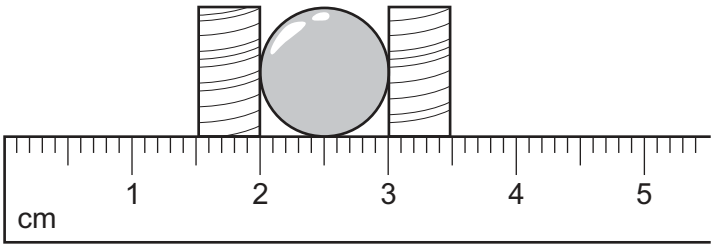
A joule

B kilogram

C newton

D watt

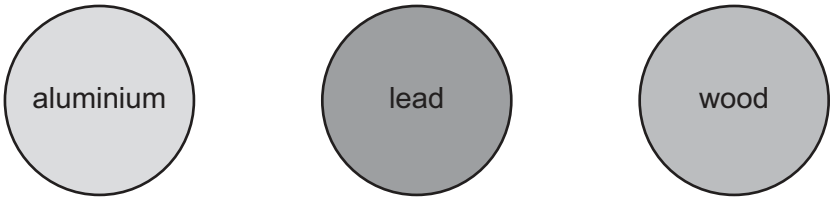
22 A student uses two blocks and a ruler to find the radius of a ball.



What is the radius of the ball?

A 0.5 cm **B** 1.0 cm **C** 2.0 cm **D** 3.0 cm

23 Three balls made of different materials are dropped from a bench.



Which balls fall with the same acceleration?

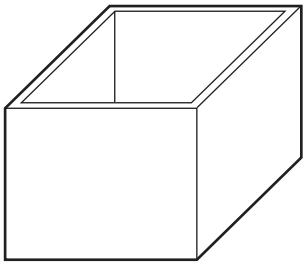
A aluminium and lead only

B aluminium and wood only

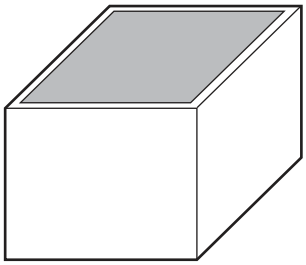
C lead and wood only

D aluminium, lead and wood

24 The diagrams show a rectangular box empty and filled with liquid.



empty box
mass = 60 g



box filled with liquid
total mass = 300 g

The box has a mass of 60 g when empty. When filled with a liquid, the total mass of the box and the liquid is 300 g. The density of the liquid is 1.2 g / cm^3.

What is the volume of the liquid in the box?

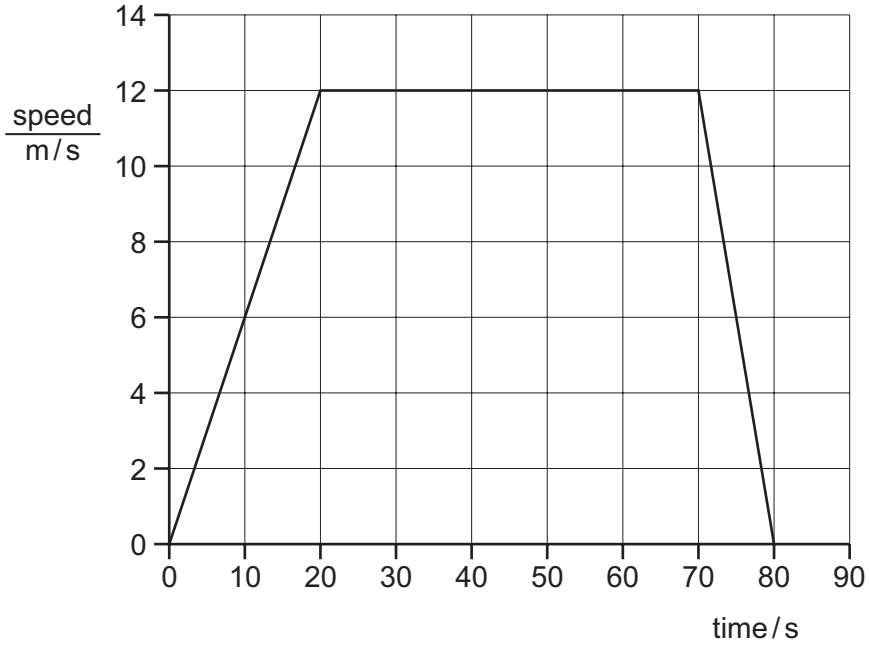
A 50 cm^3

B 200 cm^3

C 250 cm^3

D 300 cm^3

25 The speed / time graph shown is for a bus as it travels from one bus stop to the next.



How far apart are the two bus stops?

A 120 m **B** 600 m **C** 780 m **D** 960 m

26 Which property of an object **cannot** be changed by a force?

A its mass

B its motion

C its shape

D its size

27 A car starts from rest and climbs a hill.

At the top of the hill, the car has gained 200 000 J of gravitational energy and 25 000 J of energy of motion. The thermal energy of the car and the surroundings has increased by 100 000 J.

How much chemical energy is used by the car?

A 125 000 J **B** 225 000 J **C** 300 000 J **D** 325 000 J

28 Which energy source stores gravitational energy?

A coal

B geothermal

C hydroelectric

D nuclear

29 Which process involves convection?

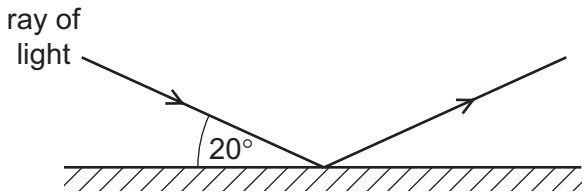
A bread toasting under a grill

B heat energy passing through a copper bar

C heat from the Sun warming a road surface

D hot air rising to the top of a cool room

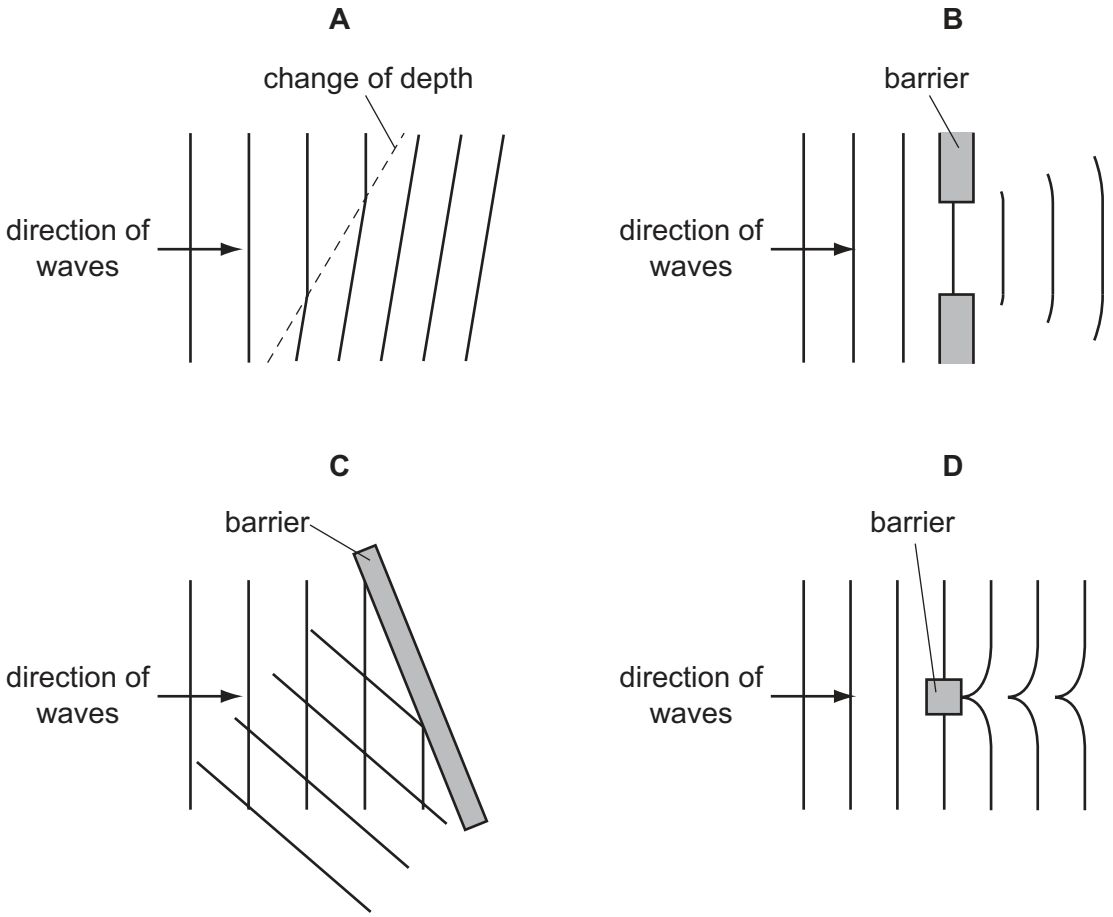
30 A ray of light strikes a plane mirror and reflects. The angle between the ray of light and the mirror is 20°.



What is the size of the angle of reflection?

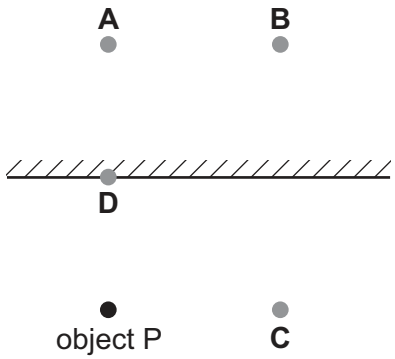
A 20° **B** 70° **C** 140° **D** 160°

31 Which diagram represents the reflection of water waves?



32 A small object P is placed in front of a plane mirror as shown.

Where is the image of P formed?



33 What is the approximate range of frequencies that can be heard by the human ear?

A 1 Hz to 1000 Hz

B 1 kHz to 1000 kHz

C 20 Hz to 20 000 Hz

D 20 kHz to 20 000 kHz

34 The live, neutral and earth wires inside a mains lead are each covered by plastic insulation.

What is one purpose of the plastic?

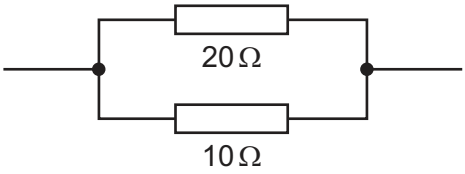
A It increases the resistance of the wires.

B It makes the wires stronger.

C It stops current passing between the wires.

D It stops heat escaping from the wires.

35 A 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

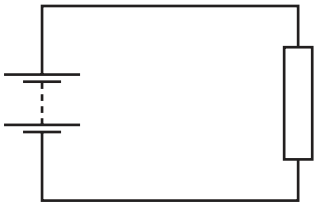
A less than 10Ω

B 10Ω

C 20Ω

D more than 20Ω

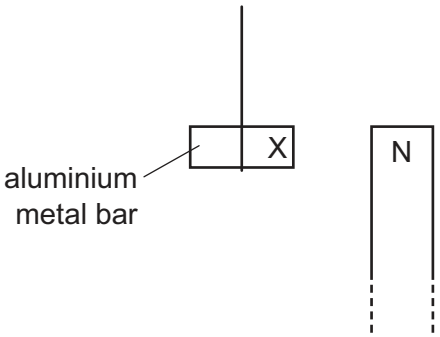
36 An electric circuit contains a battery connected to a resistor.



Which values of electromotive force (e.m.f.) and resistance will produce the largest current?

	e.m.f. / V	resistance / Ω
A	3	5
B	3	10
C	12	40
D	12	80

37 An aluminium bar is suspended near the north pole of a magnet.



What happens to the aluminium bar?

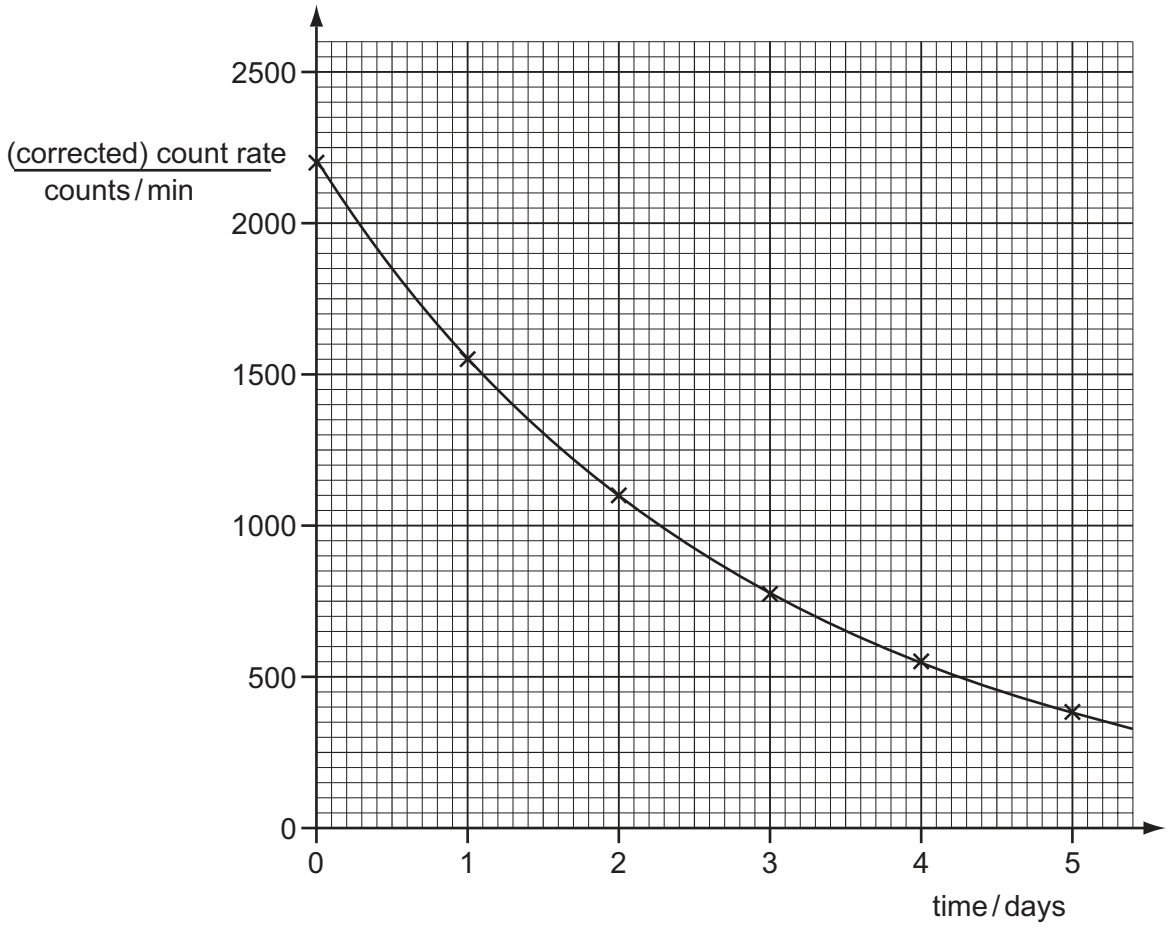
A A north pole forms at X and the bar is attracted.

B A north pole forms at X and the bar is repelled.

C A south pole forms at X and the bar is attracted.

D No pole forms at X and the bar is not affected.

38 The graph shows the decay curve for one particular radioactive isotope.



What is the half-life of this nuclide?

A 1.0 day **B** 1.5 days **C** 2.0 days **D** 2.5 days

39 A radium nuclide is represented by $^{226}_{88}Ra$.

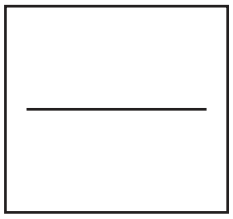
How many nucleons are there in this nuclide?

A 88 **B** 138 **C** 226 **D** 314

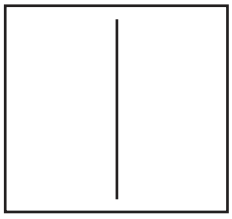
40 The diagrams show patterns which you might see on the screen of a cathode-ray oscilloscope.

Which pattern would appear if an alternating potential difference is applied to the Y-plates, with the time-base switched off?

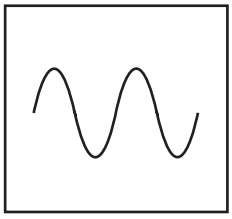
A



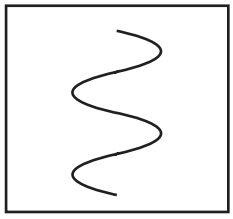
B



C



D



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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											
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	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	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	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

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
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

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

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

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