



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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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)



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.

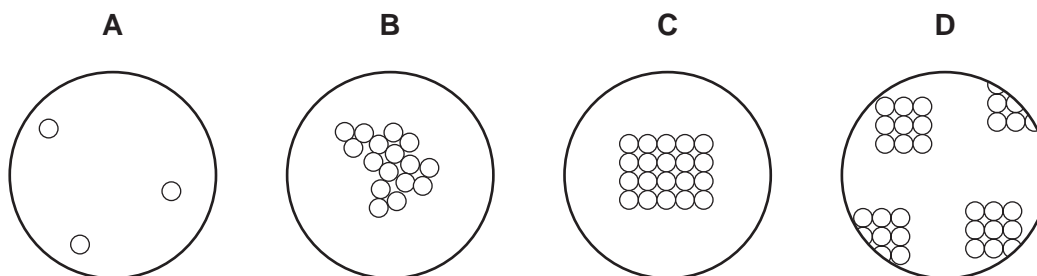
This document consists of **15** printed pages and **1** blank page.



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?



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

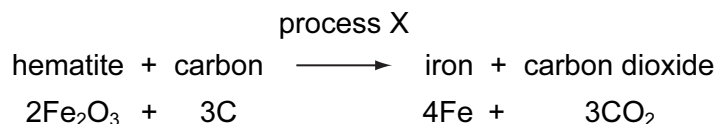
- 6 The chart shows the colour of Universal Indicator at different pH values.

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.



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

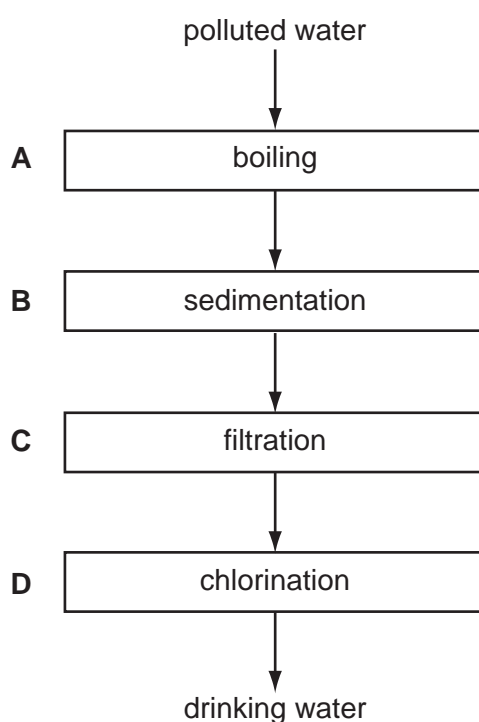
	chemical name	process X
A	iron(II) oxide	oxidation
B	iron(II) oxide	reduction
C	iron(III) oxide	oxidation
D	iron(III) oxide	reduction

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?

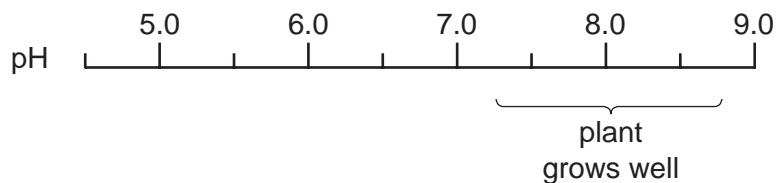
	density (g/dm ³)	melting point (°C)
A	0.97	98
B	1.96	119
C	3.12	-7
D	8.90	1455

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	✓	✓	x
C	x	✓	✓
D	x	x	✓

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

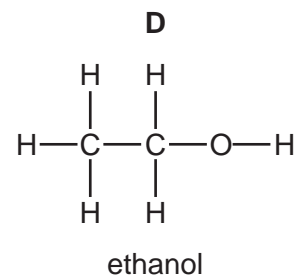
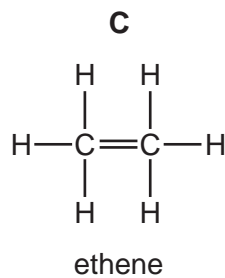
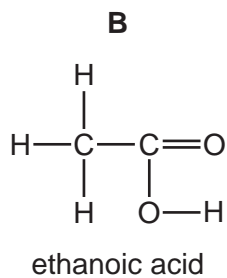
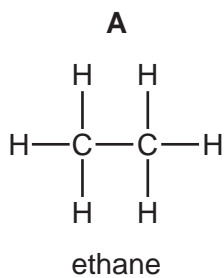
16 Three carbon-containing fuels are listed below.

- 1 coal
- 2 natural gas
- 3 petroleum

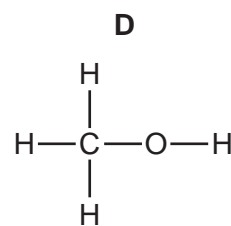
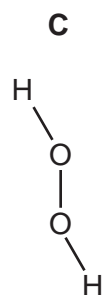
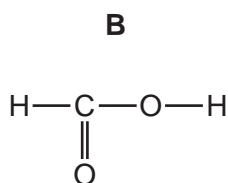
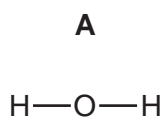
Which of these fuels are classified as 'fossil fuels' and which are fractionally distilled?

	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

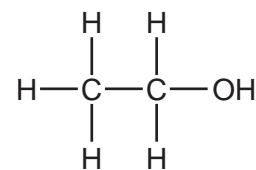
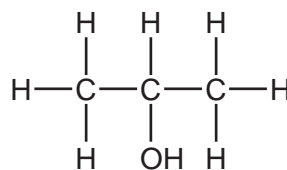
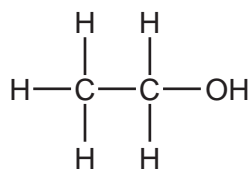
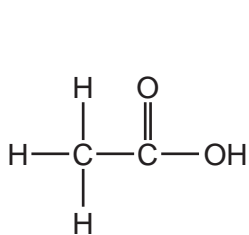
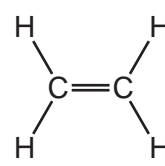
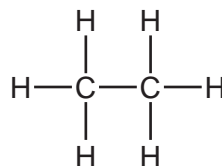
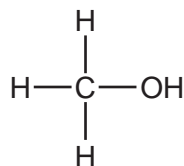
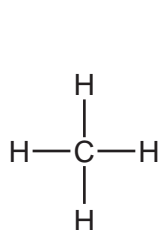
17 Which structure is **not** correct?



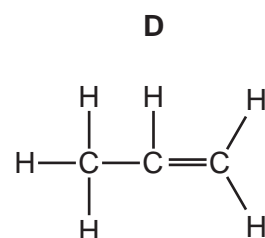
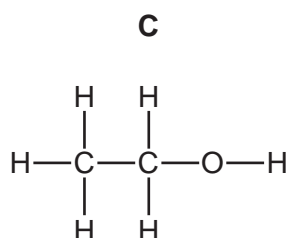
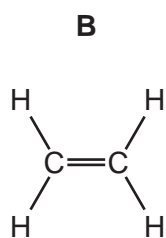
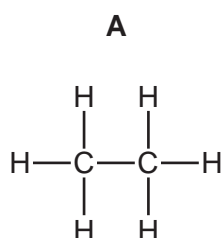
18 Which molecular structure shows an alcohol?



19 Which two substances are in the same homologous series?



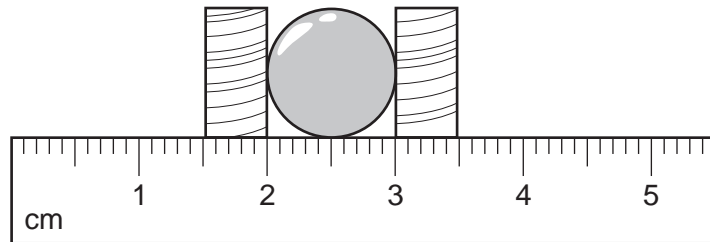
20 Which compound is the monomer used to make poly(ethene)?



21 What is the unit of weight?

- A joule
- B kilogram
- C newton
- D watt

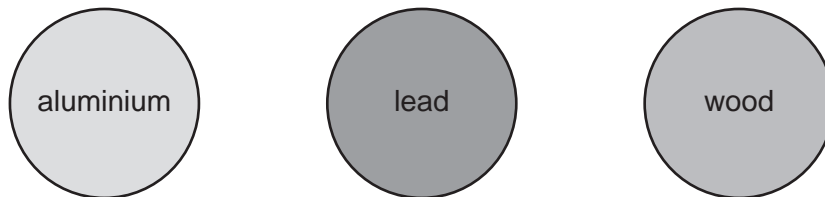
22 A student uses two blocks and a ruler to find the radius of a ball.



What is the radius of the ball?

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

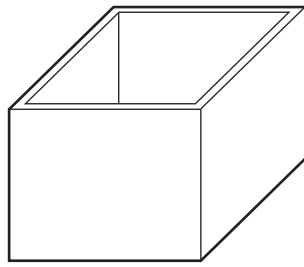
23 Three balls made of different materials are dropped from a bench.



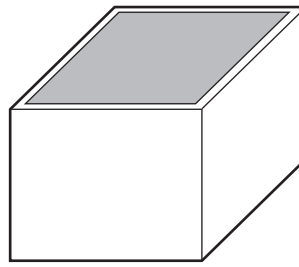
Which balls fall with the same acceleration?

- 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



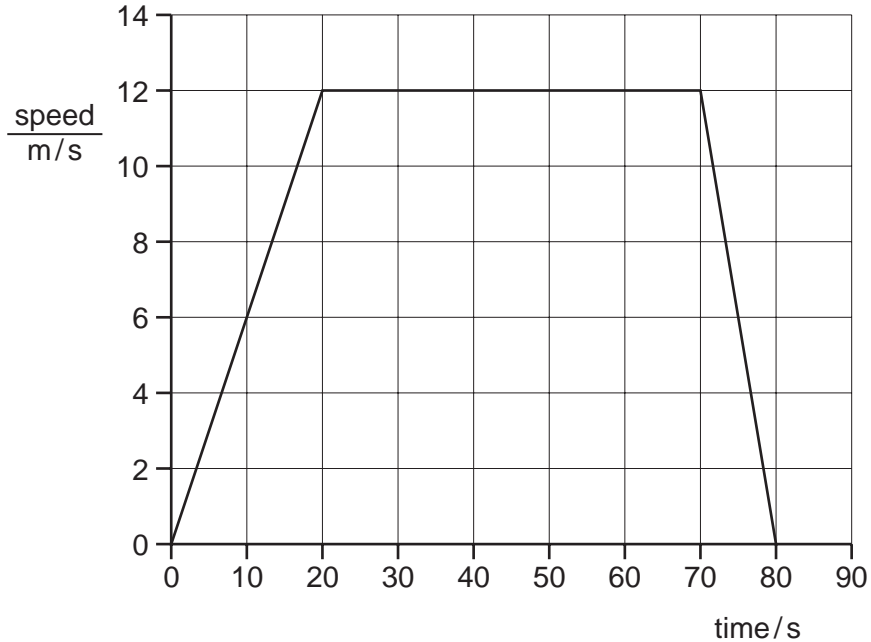
box filled with liquid
total mass = 300 g

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

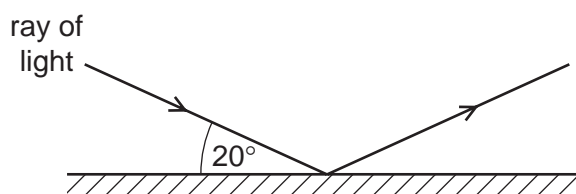
28 Which energy source stores gravitational energy?

- 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

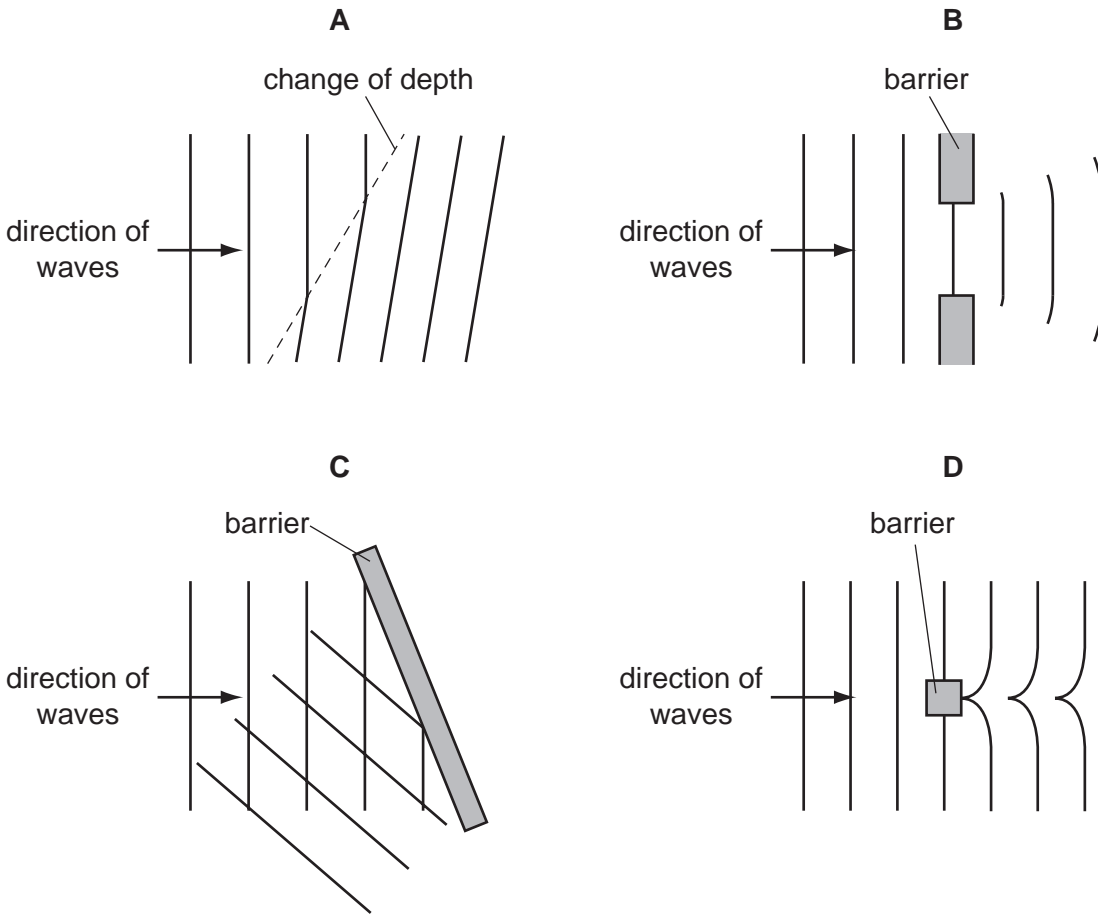
30 A ray of light strikes a plane mirror and reflects. The angle between the ray of light and the mirror is 20° .



What is the size of the angle of reflection?

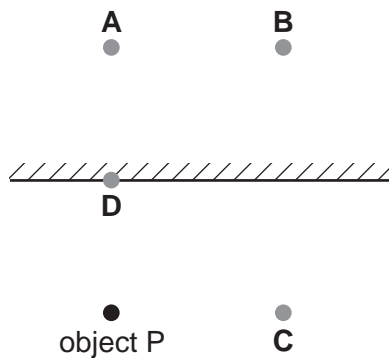
- A 20° B 70° C 140° D 160°

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?

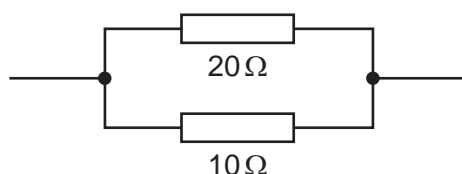
- A 1 Hz to 1000 Hz
- B 1 kHz to 1000 kHz
- C 20 Hz to 20 000 Hz
- D 20 kHz to 20 000 kHz

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.

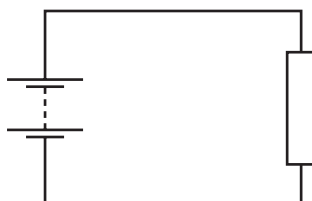
35 A 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

- A less than 10Ω
- B 10Ω
- C 20Ω
- D more than 20Ω

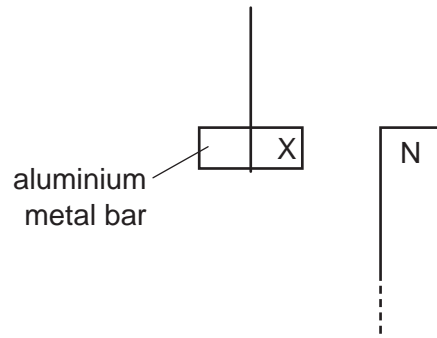
36 An electric circuit contains a battery connected to a resistor.



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

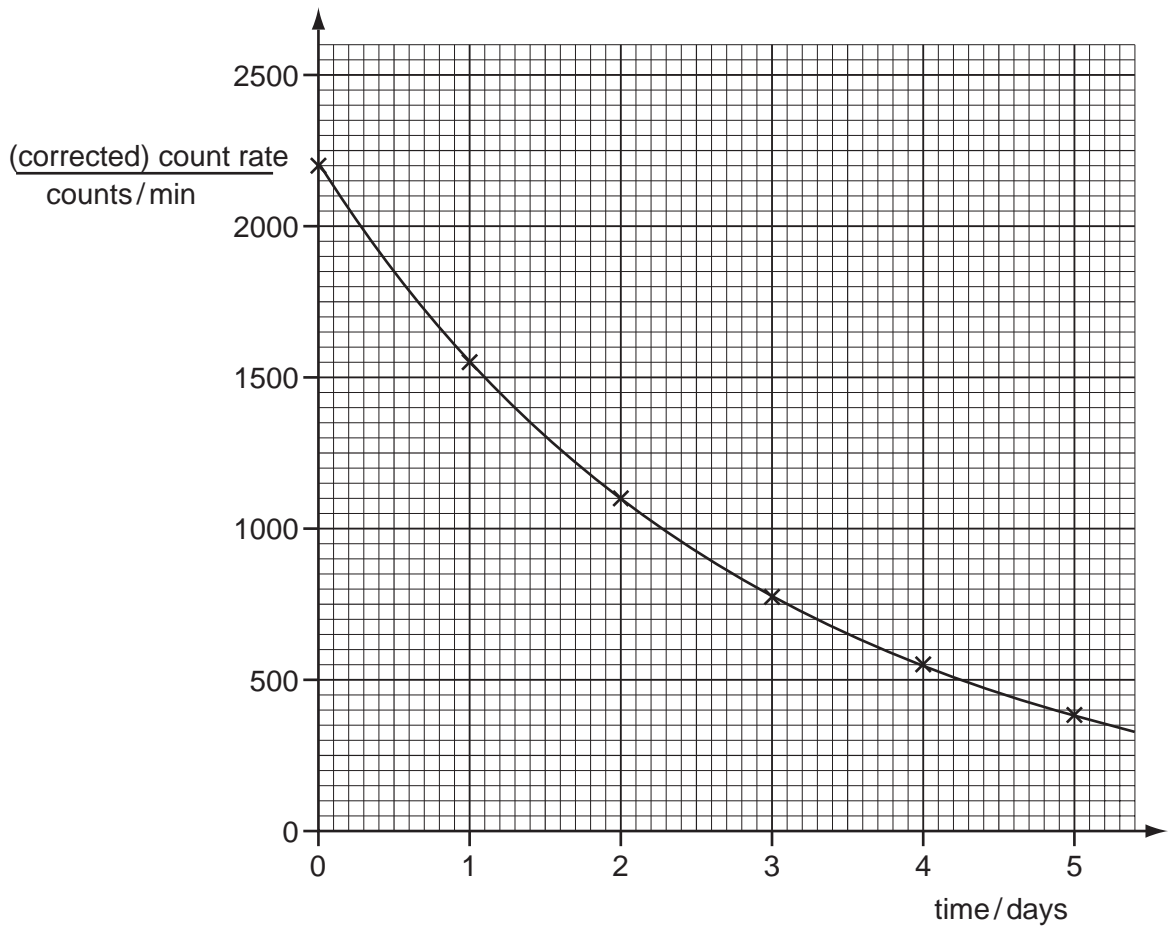
37 An aluminium bar is suspended near the north pole of a magnet.



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

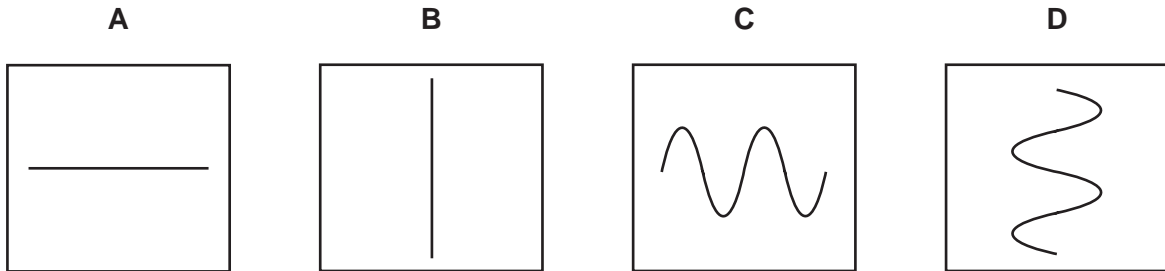
39 A radium nuclide is represented by ${}_{88}^{226}\text{Ra}$.

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?



DATA SHEET The Periodic Table of the Elements

		Group										
		I	II	III	IV	V	VI	VII	0			
	1	2										
	H Hydrogen 1											
3	Li Lithium 4	9	20									
	Be Beryllium 4											
11	Na Sodium 12	24	10									
	Mg Magnesium 12											
19	K Potassium 19	40	84									
	Ca Calcium 20											
37	Rb Rubidium 37	88	131									
	Sr Strontium 38											
55	Cs Caesium 55	137	226									
	Ba Barium 56											
87	Fr Francium 87	226	89									
	Ra Radium 88											
		†										
		†										
		†										
		†										

5	B Boron 5	11	C Carbon 6	12	N Nitrogen 7	14	O Oxygen 8	16	F Fluorine 9	19	Ne Neon 10
13	Al Aluminium 13	27	Si Silicon 14	28	P Phosphorus 15	31	S Sulfur 16	32	Cl Chlorine 17	35.5	Ar Argon 18
31	Ga Gallium 31	70	Ge Germanium 32	73	As Arsenic 33	75	Se Selenium 34	79	Br Bromine 35	80	Kr Krypton 36
49	In Indium 49	115	Sn Tin 50	119	Sb Antimony 51	122	Te Tellurium 52	128	I Iodine 53	127	Xe Xenon 54
81	Tl Thallium 81	204	Pb Lead 82	207	Bi Bismuth 83	209	Po Polonium 84	210	At Astatine 85	210	Rn Radon 86
80	Hg Mercury 80	201		201	Hg Mercury 80						
79	Au Gold 79	197		197	Au Gold 79						
78	Pt Platinum 78	195		195	Pt Platinum 78						
47	Ag Silver 47	108		108	Ag Silver 47						
48	Cd Cadmium 48	112		112	Cd Cadmium 48						
46	Pd Palladium 46	106		106	Pd Palladium 46						
77	Ir Iridium 77	192		192	Ir Iridium 77						
76	Os Osmium 76	190		190	Os Osmium 76						
75	Re Rhenium 75	186		186	Re Rhenium 75						
74	W Tungsten 74	184		184	W Tungsten 74						
73	Ta Tantalum 73	181		181	Ta Tantalum 73						
61	Pm Promethium 61										
62	Sm Samarium 62	150		150	Sm Samarium 62						
63	Eu Europium 63	152		152	Eu Europium 63						
64	Gd Gadolinium 64	157		157	Gd Gadolinium 64						
65	Tb Terbium 65	159		159	Tb Terbium 65						
66	Dy Dysprosium 66	162		162	Dy Dysprosium 66						
68	Er Erbium 68	167		167	Er Erbium 68						
69	Tm Thulium 69	169		169	Tm Thulium 69						
70	Yb Ytterbium 70	173		173	Yb Ytterbium 70						
71	Lu Lutetium 71	175		175	Lu Lutetium 71						
85	At Astatine 85										
100	Fm Fermium 100										
101	Md Mendelevium 101										
102	No Nobelium 102										
98	Cf Californium 98										
99	Es Einsteinium 99										
96	Cm Curium 96										
95	Am Americium 95										
94	Pu Plutonium 94										
93	Np Neptunium 93										
92	U Uranium 92										
91	Pa Protactinium 91										
89	Ac Actinium 89										

*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.).

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