Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICAL SCIENCE **0652/11**

Paper 1 Multiple Choice (Core) **October/November 2021**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

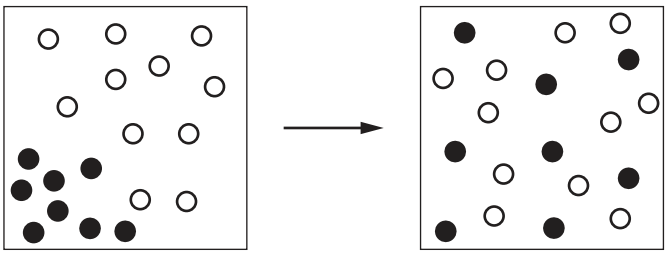
INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages.

[Turn over

1 The diagram shows the movement of particles during a physical change.



Which process is represented by the diagram?

A condensation

B diffusion

C melting

D precipitation

2 When ammonium chloride is added to water, the mixture becomes cooler.

Which piece of apparatus is used to measure this change?

A balance

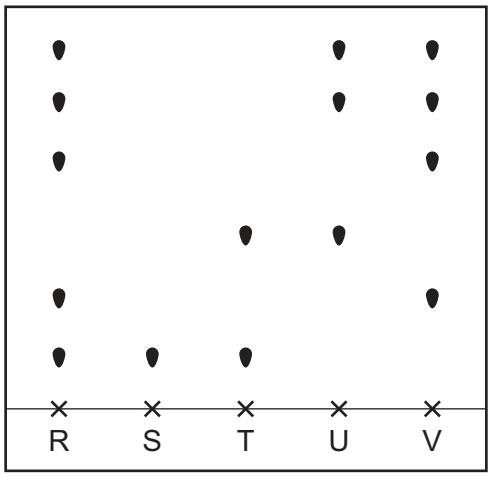
B burette

C stop-clock

D thermometer

3 Food colouring R is compared with food colourings S, T, U and V using chromatography.

The chromatogram is shown.



Which food colourings are present in food colouring R?

A S and T **B** S and U **C** S and V **D** U and V

4 The number of protons, neutrons and electrons in some particles is shown.

particle	protons	neutrons	electrons
W	11	12	11
X	12	12	10
Y	10	13	11
Z	11	13	11

Which particles are isotopes of the same element?

A W and X **B** W and Y **C** W and Z **D** Y and Z

5 The table shows the electronic structure of four atoms from four different elements.

The letters shown are not the symbols of the elements.

atom	J	K	L	M
electronic structure	2,8,1	2,7	2,8	2,1

Which atoms combine with chlorine to form an ionic compound?

A J and M **B** J only **C** K only **D** L and M

6 Cryolite is an ore of aluminium. It contains sodium, aluminium and fluorine atoms.

Cryolite contains three times as many atoms of sodium than aluminium and two times as many atoms of fluorine than sodium.

What is the formula of cryolite?

A $NaAlF_2$ **B** $NaAl_3F_6$ **C** Na_3AlF_2 **D** Na_3AlF_6

7 A hydrocarbon burns in excess oxygen, forming carbon dioxide and water.

Part of the equation is shown.

$$\text{.....} + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

What needs to be added to the equation in order to balance it?

A $3CH_4$ **B** C_3H_4 **C** C_3H_8 **D** C_3H_7OH

8 Which row shows the electrode products for the electrolysis of concentrated aqueous sodium chloride using inert electrodes?

	anode	cathode
A	chlorine	hydrogen
B	chlorine	sodium
C	hydrogen	chlorine
D	sodium	chlorine

9 Which reactions are exothermic?

1 reaction of natural gas with oxygen

2 reaction of coal with oxygen

3 reaction of hydrogen with oxygen

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

10 Which change decreases the rate of reaction between lumps of zinc and dilute sulfuric acid?

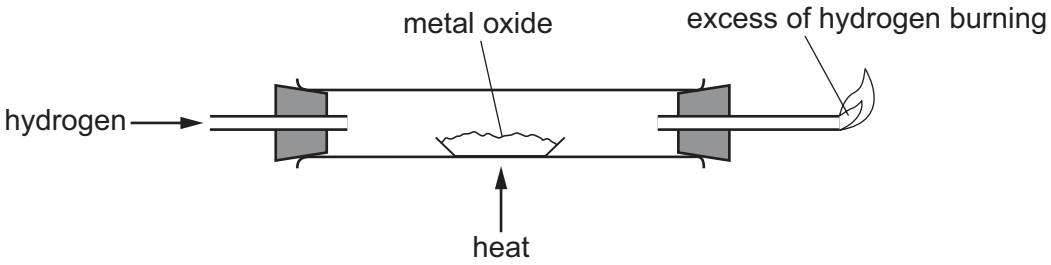
A Add a suitable catalyst.

B Add water to the acid.

C Break the lumps of zinc into smaller pieces.

D Use a higher temperature.

11 Hydrogen is passed over a heated metal oxide as shown.



The metal and steam are formed.

What happens to the hydrogen and to the metal oxide?

	hydrogen	metal oxide
A	oxidised	oxidised
B	oxidised	reduced
C	reduced	oxidised
D	reduced	reduced

12 What is produced when an acid reacts with a metal carbonate?

A a metal salt, carbon and water

B a metal salt, carbon dioxide and water

C a metal salt and carbon dioxide only

D a metal salt and water only

13 A gas is tested as shown.

test	observation
lighted splint is placed in the gas	lighted splint goes out
damp red litmus paper is placed in the gas	red litmus paper turns blue
gas is passed through limewater	limewater is colourless

What is the gas?

A ammonia

B carbon dioxide

C chlorine

D hydrogen

[Turn over

14 Which row describes the properties of a transition element?

	melting point / °C	density / g / cm^3	colour of compounds
A	–210	0.0011	one oxide is brown, but most compounds are colourless
B	98	0.97	all the compounds are white
C	328	11.34	the iodide is yellow, but most compounds are white
D	1535	7.86	most compounds are either green or brown

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

From this information, which deductions are correct?

1 M is less reactive than carbon.

2 M is more reactive than potassium.

3 The oxide of M is acidic.

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

16 Which use of copper or aluminium is explained by both properties?

	metal	use	properties that explain the use
A	aluminium	aircraft bodies	low density and good electrical conductor
B	aluminium	food containers	malleable and good electrical conductor
C	copper	cooking pans	high density and good electrical conductor
D	copper	electrical wiring	malleable and good electrical conductor

17 Which colour change is observed when anhydrous copper(II) sulfate is added to water?

A blue to pink

B blue to white

C pink to blue

D white to blue

18 Which process does **not** produce carbon dioxide?

A an acid reacting with a carbonate

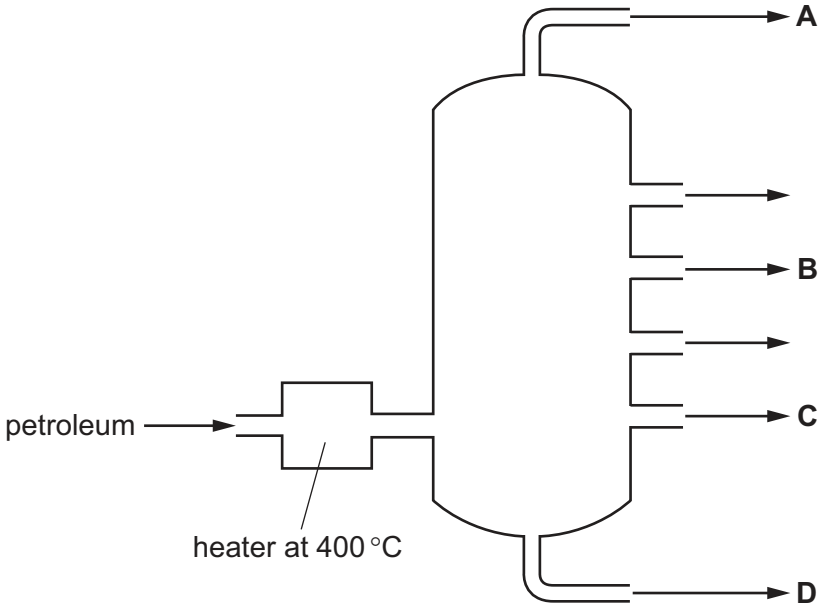
B burning coal

C burning hydrogen

D respiration

19 The fractional distillation of petroleum is shown.

From which position is methane obtained?



20 Which statement about alkane molecules is correct?

A They are saturated hydrocarbons that contain one double covalent bond.

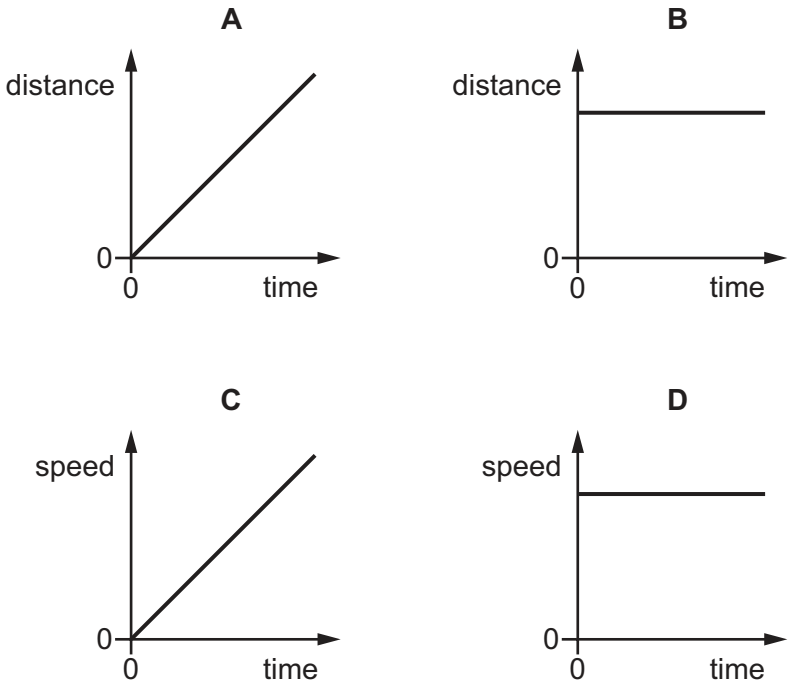
B They are saturated hydrocarbons that contain only single bonds.

C They are unsaturated hydrocarbons that contain one double covalent bond.

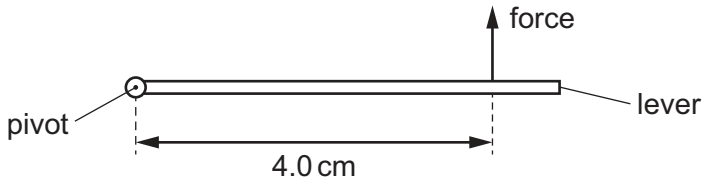
D They are unsaturated hydrocarbons that contain only single bonds.

21 The diagrams show two distance–time graphs and two speed–time graphs.

Which graph represents an object moving with uniform, non-zero acceleration?



22 A force is used to turn a lever as shown.



The force is exerted 4.0 cm from the pivot. The moment of the force about the pivot is 8.0 N cm.

What is the size of the force?

A 0.50 N **B** 2.0 N **C** 12 N **D** 32 N

23 Which energy does an object possess due to its motion?

A elastic (strain)

B gravitational potential

C kinetic

D thermal

24 Which energy source is non-renewable?

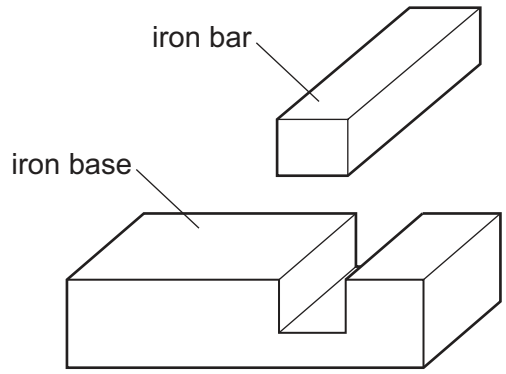
A geothermal

B hydroelectric

C oil

D wind

25 An engineer needs to fit an iron bar into a gap in an iron base.



At room temperature, the bar is slightly too big to fit into the gap.

How can the engineer make the bar fit into the gap?

A Cool the bar and heat the base.

B Cool the base and cool the bar to the same temperature.

C Cool the base and heat the bar.

D Heat the base and heat the bar to the same temperature.

26 How does heat energy from the Sun reach the Earth through the vacuum of space?

A by both conduction and convection

B by conduction only

C by convection only

D by radiation only

27 Which quantity is equal to the number of wavefronts per second passing a fixed point?

A the amplitude of the wave

B the frequency of the wave

C the speed of the wave

D the wavelength of the wave

28 A plane mirror is fixed to a vertical wall.

An image of the person looking into the mirror is formed by the mirror.

What are two characteristics of the image?

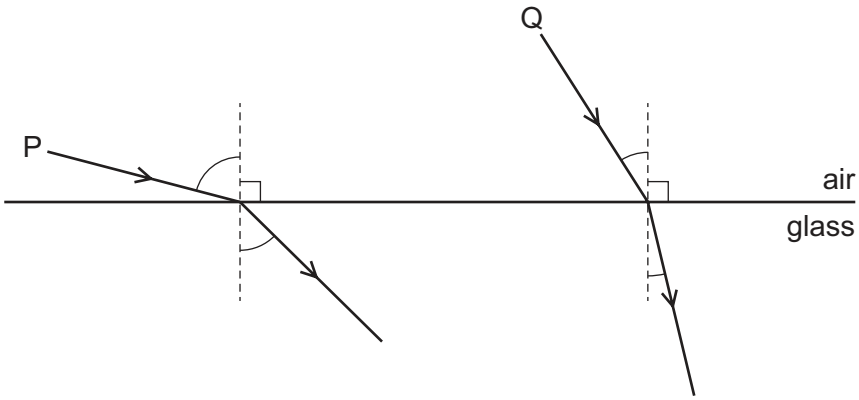
A real and laterally inverted (left to right)

B real and vertically inverted (upside down)

C virtual and laterally inverted (left to right)

D virtual and vertically inverted (upside down)

29 The diagram shows two rays of light P and Q passing from air into glass.



The angles of incidence of P and Q are i_P and i_Q.

The angles of refraction of P and Q are r_P and r_Q.

Which row compares the angles of incidence and compares the angles of refraction of rays P and Q?

	angles of incidence	angles of refraction
A	i_P bigger than i_Q	r_P bigger than r_Q
B	i_P bigger than i_Q	r_P smaller than r_Q
C	i_P smaller than i_Q	r_P bigger than r_Q
D	i_P smaller than i_Q	r_P smaller than r_Q

30 Which row shows how, in a vacuum, the speed of radio waves and the speed of X-rays compare with the speed of light?

	speed of radio waves	speed of X-rays
A	greater than light	less than light
B	the same as light	greater than light
C	less than light	greater than light
D	the same as light	the same as light

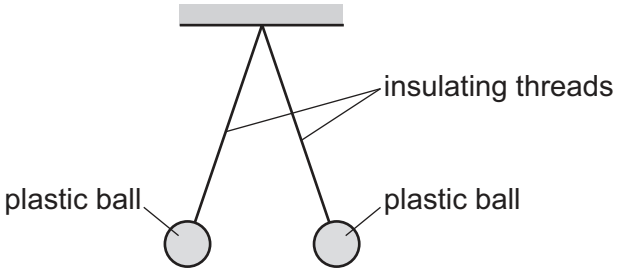
31 Which frequency is outside the range of audible frequencies for a healthy human ear?

A 30 Hz **B** 300 Hz **C** 3000 Hz **D** 30 000 Hz

32 Which row shows two methods for magnetising a piece of steel?

	method 1	method 2
A	hammer it in a magnetic field	stroke it with a permanent magnet
B	hammer it in a magnetic field	stroke it with a piece of iron
C	heat it	stroke it with a permanent magnet
D	heat it	stroke it with a piece of iron

33 The diagram shows two light plastic balls suspended by insulating threads from a support.



Which statement is an explanation of why the plastic balls hang apart from each other?

A The balls have like charges.

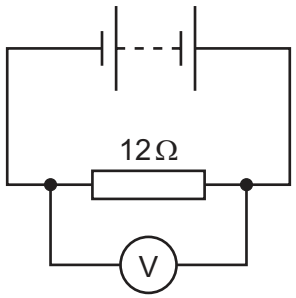
B One ball is charged; the other is uncharged.

C The balls have unlike charges.

D Both balls are uncharged.

34 The diagram shows a battery connected to a 12 Ω resistor and a voltmeter.

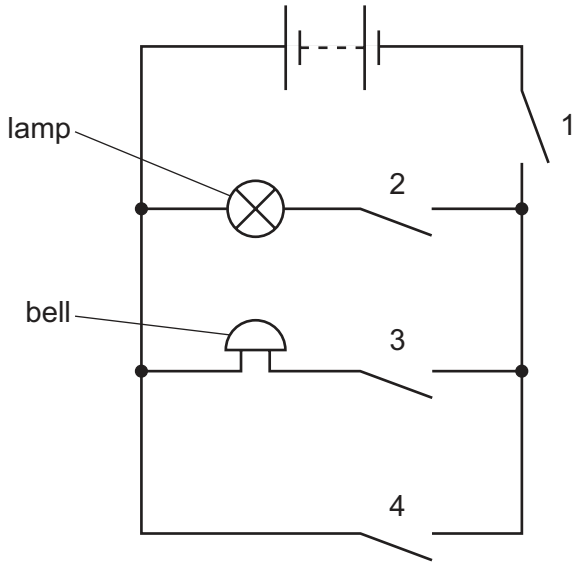
The reading on the voltmeter is 24 V.



Which row shows the current in the circuit and the electromotive force (e.m.f.) of the battery?

	current in circuit / A	e.m.f. of battery / V
A	0.5	2.0
B	0.5	24
C	2.0	2.0
D	2.0	24

35 A student connects a lamp, a bell and four switches in the circuit shown.



Which switches must be closed for the lamp to light and the bell to ring?

A 1, 2, 3 and 4

B 1, 2 and 3 only

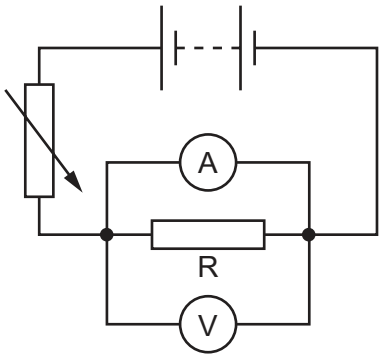
C 2, 3 and 4 only

D 2 and 3 only

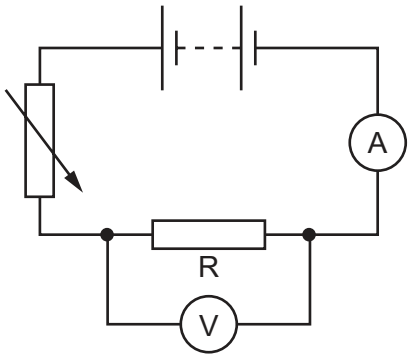
36 A student investigates how the current in a resistor R varies with the voltage across it.

Which circuit does the student use?

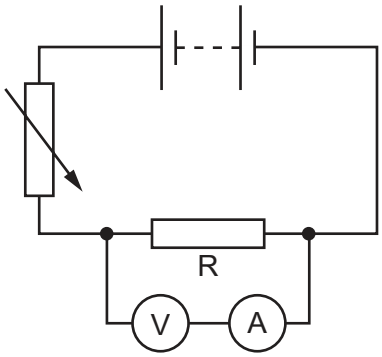
A



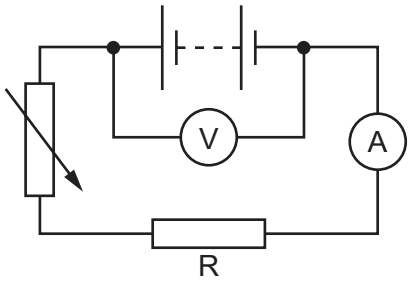
B



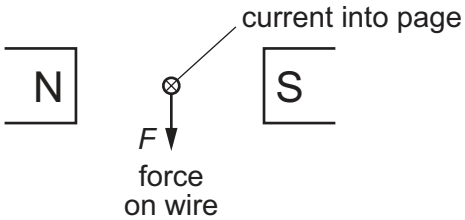
C



D

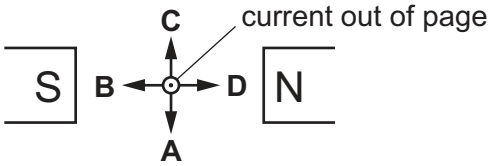


37 A current-carrying wire is placed between the poles of a magnet. This causes a force to act on the wire in the direction shown.



The poles of the magnet and the current direction are both reversed.

Which labelled arrow now shows the direction of the force on the wire?



38 The nucleus of an element is represented by the nuclide symbol shown.

$$^{A}_{Z}X$$

What do the letters *A* and *Z* represent?

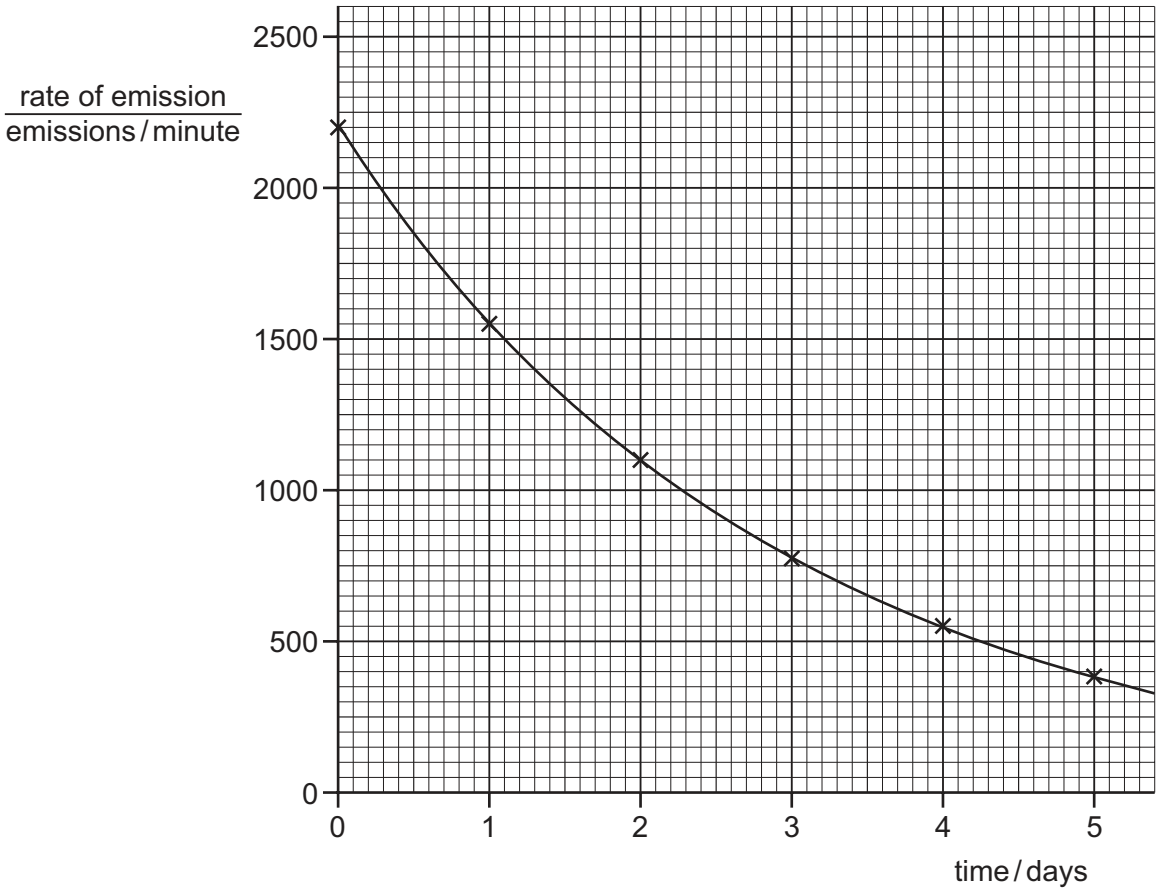
	A	*Z*
A	nucleon number	electron number
B	nucleon number	proton number
C	neutron number	electron number
D	neutron number	proton number

39 The emissions from a radioactive source are stopped by a thin sheet of paper.

Which type of radiation is emitted from the source and what is the charge of the radiation?

	type of radiation	charge of radiation
A	α	negative
B	α	positive
C	γ	negative
D	γ	positive

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



What is the half-life of this isotope?

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

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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