



# Cambridge IGCSE™

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**PHYSICAL SCIENCE****0652/11**

Paper 1 Multiple Choice (Core)

**October/November 2022****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)

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**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**

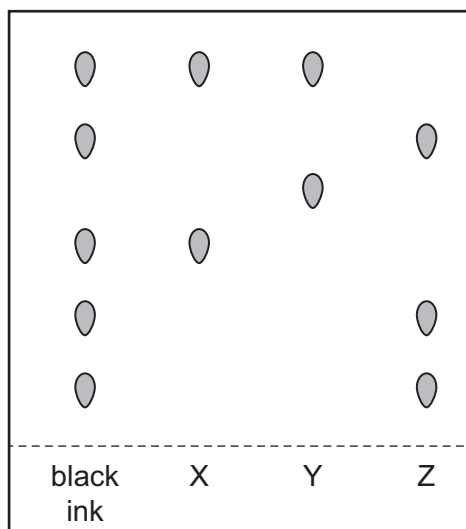
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

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This document has **16** pages.



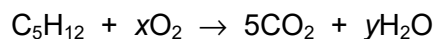
- 1 The chromatogram of a black ink and three coloured dyes, X, Y and Z, is shown.



Which colours make up the black ink?

- A** X and Y only    **B** X and Z only    **C** X, Y and Z    **D** Z only
- 2 Which statement about elements, mixtures and compounds is correct?
- A** A compound is made into different substances by chemical changes.  
**B** All mixtures contain three or more substances.  
**C** All mixtures contain atoms of different elements chemically joined together.  
**D** Every element contains more than one type of atom.
- 3 Which statement about a proton is correct?
- A** It has the same relative charge as an electron.  
**B** It has approximately the same relative mass as an electron.  
**C** It has the same relative charge as a neutron.  
**D** It has approximately the same relative mass as a neutron.
- 4 When atoms of sodium combine with atoms of chlorine, sodium chloride is formed.
- How are the bonds between sodium and chlorine formed?
- A** Chlorine gives electrons to sodium.  
**B** Sodium and chlorine lose electrons.  
**C** Sodium gives electrons to chlorine.  
**D** Sodium shares electrons with chlorine.

- 5 Pentane, C<sub>5</sub>H<sub>12</sub>, burns in oxygen.



Which values of  $x$  and  $y$  balance the equation?

	$x$	$y$
<b>A</b>	4	6
<b>B</b>	4	12
<b>C</b>	8	6
<b>D</b>	8	12

- 6 Which process occurs when an ionic compound is broken down by the passage of electricity?

- A** electrode
- B** electrolysis
- C** electrolyte
- D** electron

- 7 Anhydrous copper(II) sulfate is placed in a test-tube.

When water is added to the test-tube, the temperature changes from 17 °C to 27 °C.

Which type of reaction takes place?

- A** addition
- B** endothermic
- C** exothermic
- D** oxidation

- 8 Calcium carbonate reacts with hydrochloric acid.



Which row describes how the rate of reaction and the concentration of hydrochloric acid change as the reaction occurs?

	rate of reaction	concentration of hydrochloric acid
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	increases
<b>D</b>	increases	decreases

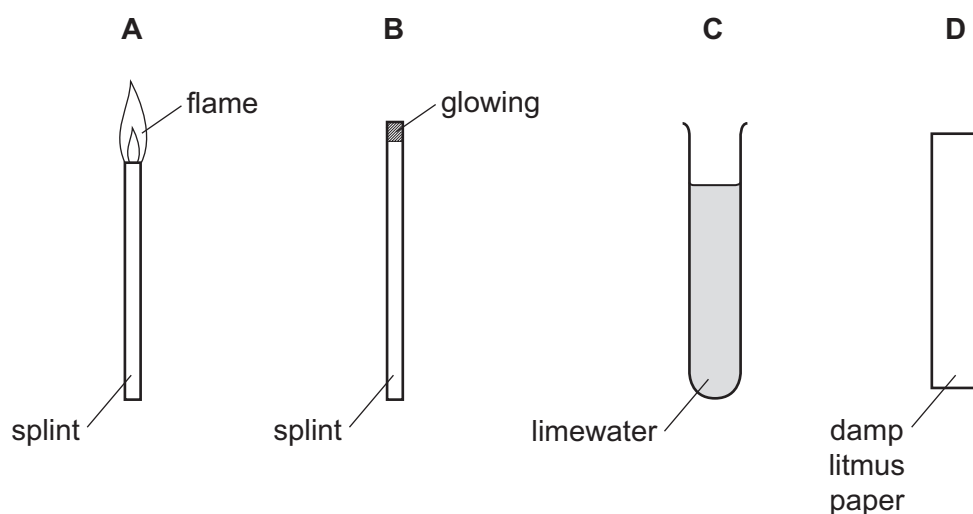
- 9 The chart shows the colour of universal indicator at different pH values.

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

A solution of lemon juice is only slightly acidic.

Which colour does universal indicator give with this solution?

- A** blue  
**B** orange  
**C** red  
**D** violet
- 10 Which test is used to show that a gas is ammonia?





14 Some reactions of four metals, W, X, Y and Z, and their oxides are shown.

The letters are not the chemical symbols of the metals.

metal	reaction of metal with dilute hydrochloric acid	reaction of metal oxide with carbon
W	reacts	not readily reduced
X	no reaction	readily reduced
Y	reacts	reduced
Z	fast reaction	not reduced

What is the order of reactivity of these metals?

	most reactive	—————→		least reactive
<b>A</b>	Z	W	Y	X
<b>B</b>	Z	Y	W	X
<b>C</b>	X	W	Y	Z
<b>D</b>	X	Y	W	Z

15 What is the name of the raw material from which aluminium is extracted and what is the method of extraction used?

	name of raw material	method of extraction
<b>A</b>	bauxite	electrolysis
<b>B</b>	bauxite	reaction with carbon
<b>C</b>	petroleum	electrolysis
<b>D</b>	petroleum	reaction with carbon

16 Which statements about carbon dioxide are correct?

- 1 It is produced by the reaction between an acid and a metal oxide.
- 2 It is produced by the reaction of a metal with an acid.
- 3 It is a greenhouse gas.
- 4 It is a product of respiration.

**A** 1 and 2

**B** 1 and 3

**C** 2 and 4

**D** 3 and 4

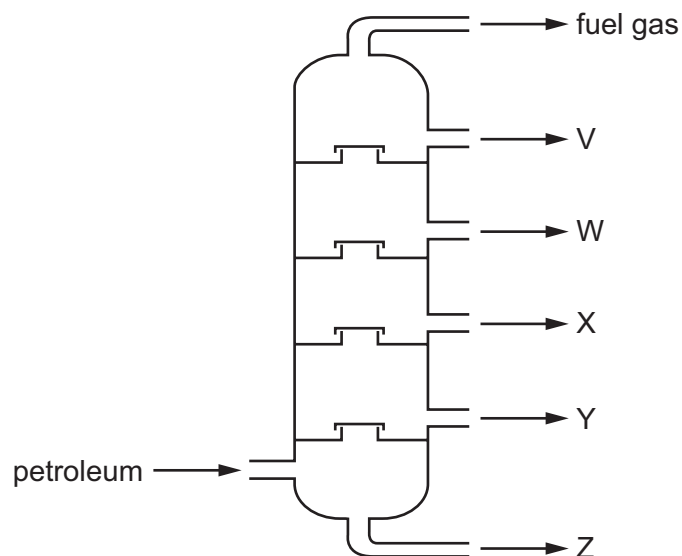
17 Which type of reaction occurs when calcium carbonate is converted into calcium oxide?

- A cracking
- B displacement
- C neutralisation
- D thermal decomposition

18 Which row shows the structure of the named compound?

	name	structure
<b>A</b>	methane	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{O}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$
<b>B</b>	ethane	$\begin{array}{c} \text{H} \\   \\ \text{H}-\text{C}-\text{H} \\   \\ \text{H} \end{array}$
<b>C</b>	ethene	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{C}=\text{C} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$
<b>D</b>	ethanol	$\begin{array}{c} \text{H} \quad \text{H} \\   \quad   \\ \text{H}-\text{C}-\text{C}-\text{H} \\   \quad   \\ \text{H} \quad \text{H} \end{array}$

19 The diagram shows the fractional distillation of petroleum.



Which row shows the correct use for the fraction?

	fraction	use
<b>A</b>	V	aircraft fuel
<b>B</b>	W	making roads
<b>C</b>	X	diesel fuel
<b>D</b>	Z	making polishes and waxes

20 Hexane is an alkane. It is a liquid at room temperature.

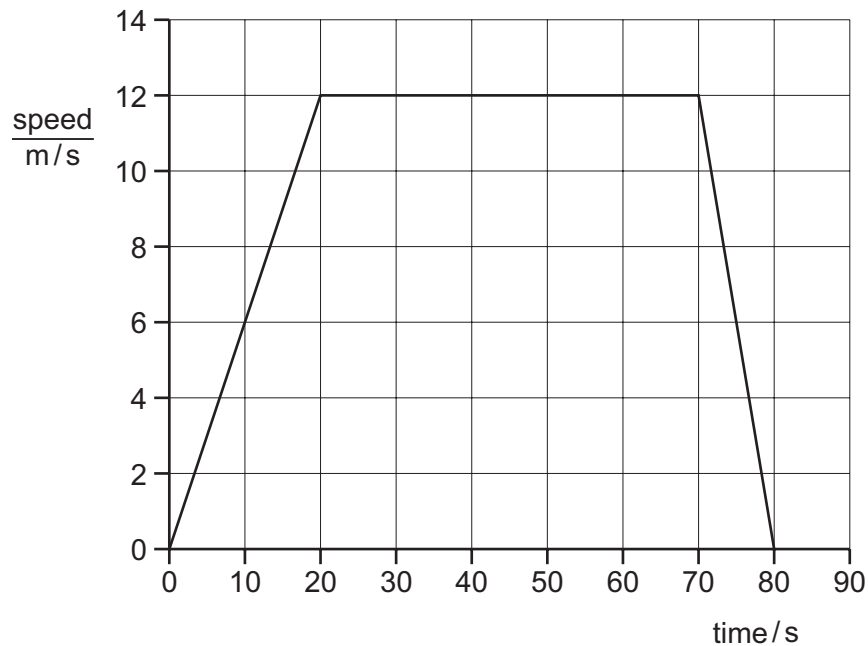
What are the properties of hexane?

- 1 It burns completely to give carbon dioxide and water.
- 2 It does not decolourise bromine water.
- 3 It is an unsaturated compound.

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



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



What is the distance between the two bus stops?

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

22 Which quantity has the same unit as force?

- A** current  
**B** energy  
**C** speed  
**D** weight

23 The mass of an empty beaker is 120 g.

When the beaker contains  $50 \text{ cm}^3$  of a liquid, the total mass of the beaker and liquid is 160 g.

What is the density of the liquid?

- A**  $0.80 \text{ g/cm}^3$       **B**  $2.4 \text{ g/cm}^3$       **C**  $3.2 \text{ g/cm}^3$       **D**  $5.6 \text{ g/cm}^3$

24 The work done by a force acting on an object depends on the magnitude of the force.

In order to calculate the work done, which other quantity must be known?

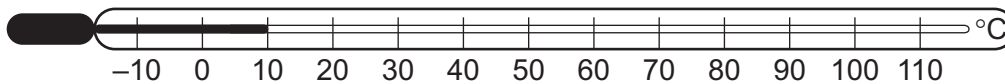
- A** the distance moved by the object  
**B** the mass of the object  
**C** the shape of the object  
**D** the time for which the force acts

25 Different energy resources are used to produce electricity.

Which resource is the least reliable?

- A geothermal
- B hydroelectric
- C nuclear
- D wind

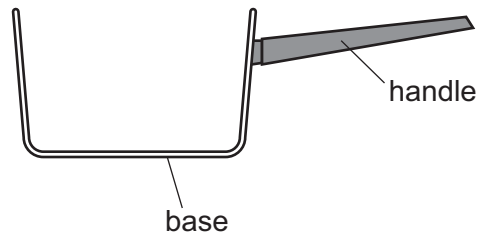
26 A liquid-in-glass thermometer is marked with a scale in °C.



What are the fixed points for this thermometer?

- A  $-10^{\circ}\text{C}$  and  $10^{\circ}\text{C}$
- B  $-10^{\circ}\text{C}$  and  $110^{\circ}\text{C}$
- C  $0^{\circ}\text{C}$  and  $100^{\circ}\text{C}$
- D  $10^{\circ}\text{C}$  and  $110^{\circ}\text{C}$

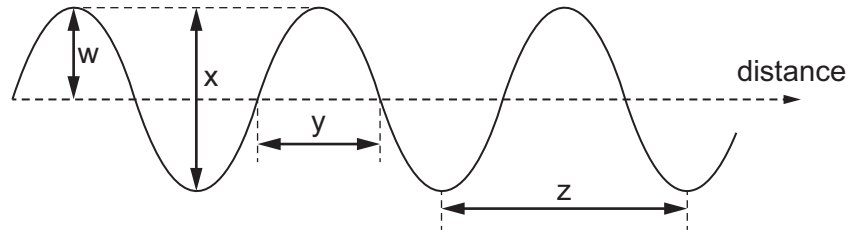
27 The diagram shows a saucepan.



What are suitable thermal conduction properties for the materials used to make the base and the handle?

	base	handle
<b>A</b>	bad conductor	bad conductor
<b>B</b>	bad conductor	good conductor
<b>C</b>	good conductor	bad conductor
<b>D</b>	good conductor	good conductor

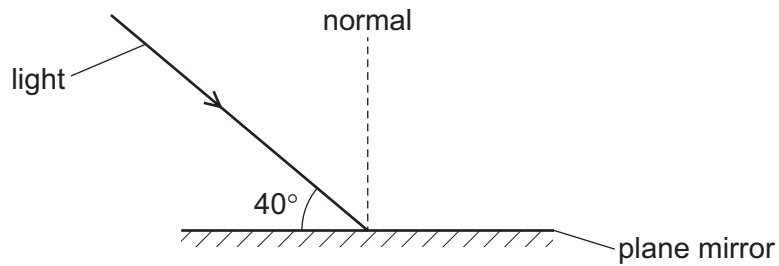
28 The diagram represents a wave.



Which labelled arrows give the amplitude and the wavelength of the wave?

	amplitude	wavelength
<b>A</b>	w	y
<b>B</b>	w	z
<b>C</b>	x	y
<b>D</b>	x	z

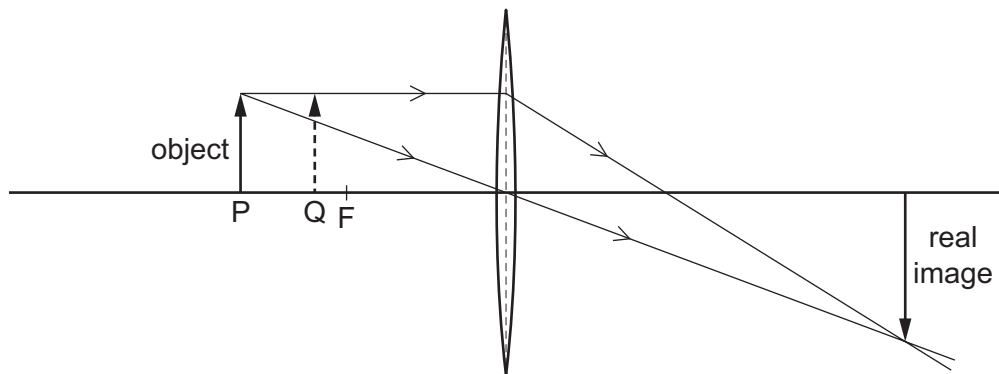
29 Light is incident on a plane mirror at an angle of  $40^\circ$  to the surface.



What is the angle of reflection of the light?

- A**  $40^\circ$       **B**  $50^\circ$       **C**  $100^\circ$       **D**  $140^\circ$

- 30 An object is placed at P, close to a converging lens. The ray diagram shows the formation of the real image. A principal focus of the lens is marked F.



The object is moved from P to Q.

Which row describes what happens to the distance between the image and the lens, and what happens to the size of the image?

	distance between image and lens	size of image
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

- 31 Which electromagnetic radiation is used to show what is inside closed suitcases in airports?

- A** infrared
- B** microwaves
- C** radio waves
- D** X-rays

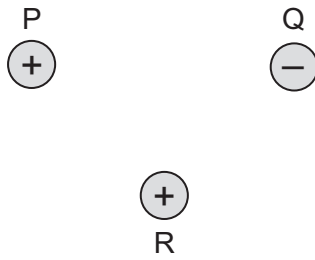
- 32 Sound of which frequency is **not** audible to a healthy human ear?

- A** 5.0 Hz
- B** 50 Hz
- C** 500 Hz
- D** 5000 Hz

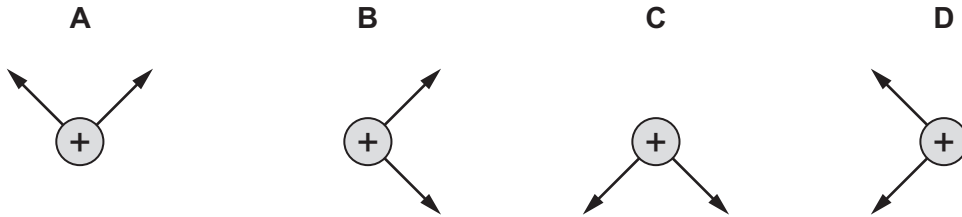
- 33 Which metal is used to make the core of an electromagnet?

- A** aluminium
- B** copper
- C** iron
- D** steel

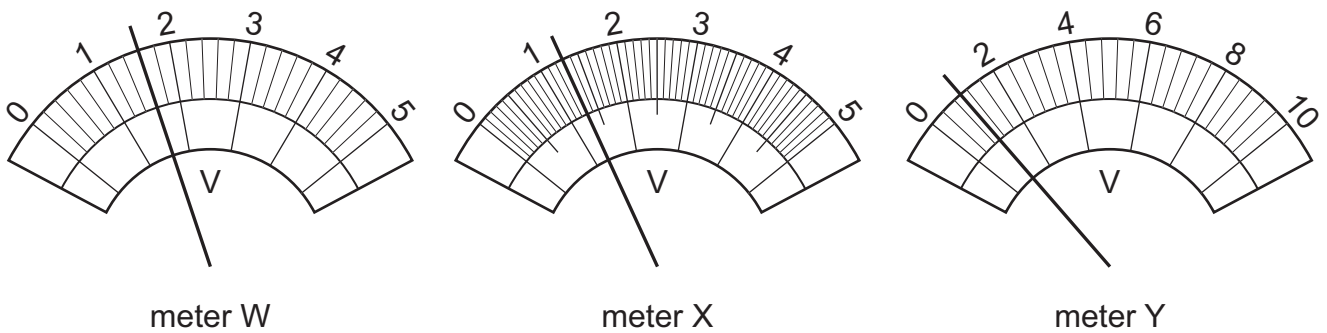
34 The diagram shows the charges on three objects, P, Q and R.



Which diagram shows the directions of the forces that act on object R?



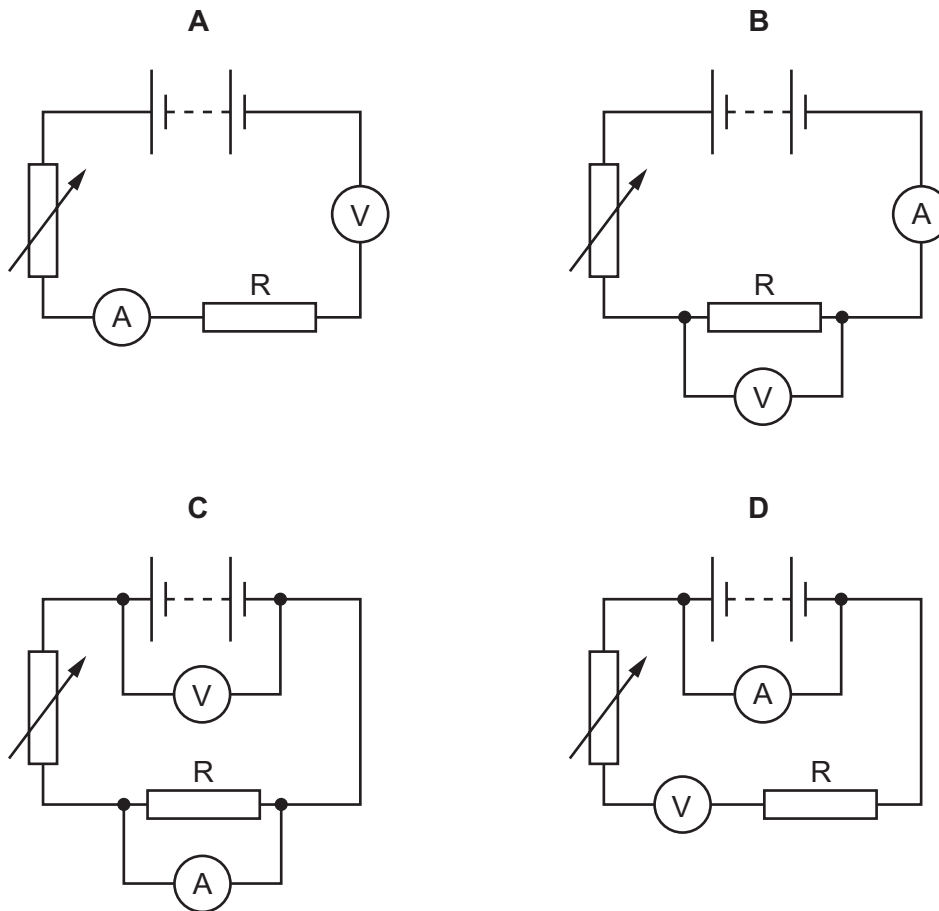
35 The diagrams show the readings on three voltmeters.



Which meters show a reading of 1.6 V?

- A** W only      **B** X only      **C** Y only      **D** W and Y

36 Which circuit is used when determining the resistance of the resistor R?



37 What is the benefit of earthing the metal case of an electric kettle?

- A It prevents an electric shock if the live wire touches the metal case.
- B It prevents the insulation of the cable from becoming damaged.
- C It prevents overheating of the cable.
- D It prevents overheating of the kettle.

38 Two different isotopes have the same number of protons in their nuclei.

Which statement describes these isotopes?

- A They are different elements with a different number of neutrons in their nuclei.
- B They are different elements with the same number of neutrons in their nuclei.
- C They are the same element with a different number of neutrons in their nuclei.
- D They are the same element with the same number of neutrons in their nuclei.

39 What is an alpha-particle?

- A an electron
- B electromagnetic radiation
- C four protons
- D two protons and two neutrons

40 A sample of an isotope of bromine contains  $9.6 \times 10^{24}$  atoms. The half-life of this isotope is 2.4 hours.

How many atoms of the isotope are present in the sample after 7.2 hours?

- A  $1.2 \times 10^3$       B  $3.2 \times 10^8$       C  $1.2 \times 10^{24}$       D  $3.2 \times 10^{24}$

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## The Periodic Table of Elements

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

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

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