Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/12**

Paper 1 Multiple Choice (Core) **October/November 2024**

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 **20** pages. Any blank pages are indicated.

1 What are two of the characteristics of all living organisms?

A breathing and respiration

B egestion and excretion

C movement and sensitivity

D nutrition and photosynthesis

2 Which statements about cell structure are correct?

1 Animal cells have cell membranes but no cell walls.

2 Animal cells have cell membranes and cell walls.

3 Plant cells have cell walls but no cell membranes.

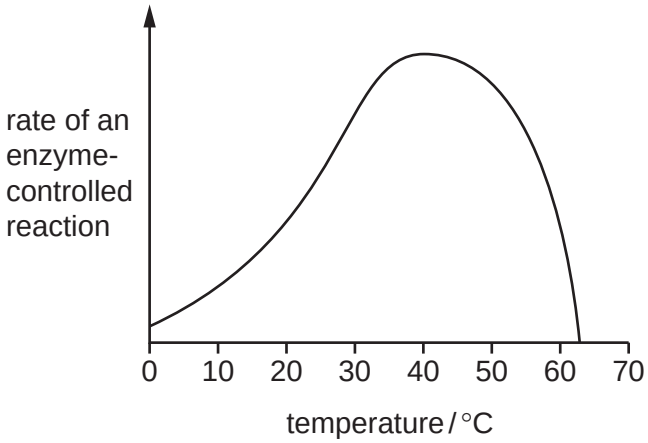
4 Plant cells have cell membranes and cell walls.

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

3 What is required to test for the presence of a reducing sugar?

	Benedict's solution	biuret solution	heat
A	✓	✗	✓
B	✗	✓	✓
C	✓	✗	✗
D	✗	✓	✗

4 The graph shows the effect of increasing temperature on the rate of an enzyme-controlled reaction.



Which statement describes what is happening between 10 °C and 30 °C on the graph?

A An increase in the rate of reaction increases the temperature of the reaction.

B An increase in temperature has no effect on the rate of a reaction.

C As the rate of reaction increases, the temperature has no effect.

D As the temperature increases, the rate of reaction also increases.

5 What are the products of photosynthesis in a green plant?

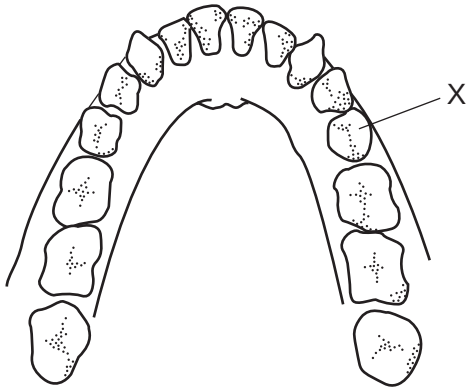
A carbon dioxide and water

B glucose and carbon dioxide

C oxygen and glucose

D oxygen and water

6 The diagram shows human teeth in the lower jaw.



Which type of tooth is X?

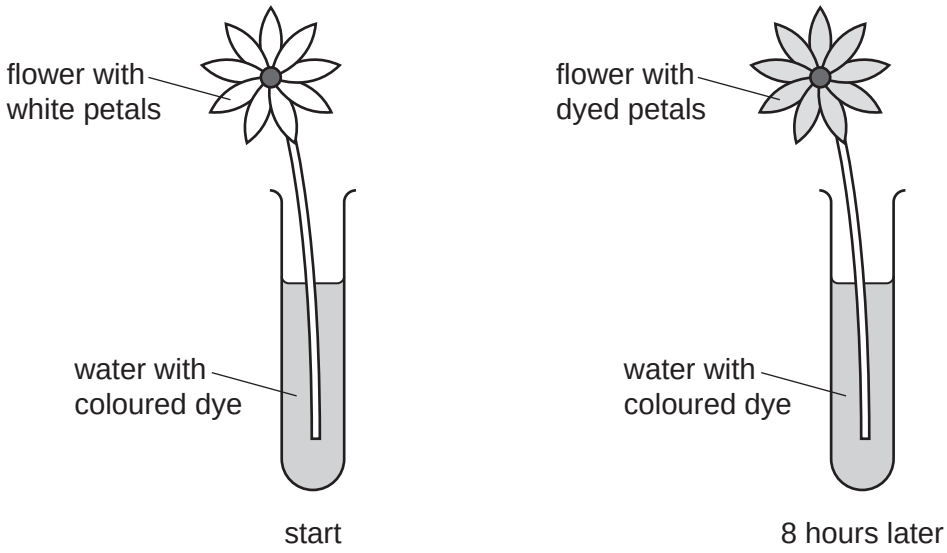
A canine

B incisor

C molar

D premolar

7 The diagram shows an investigation into water transport in plants.



Which part of the stem transports the coloured dye from the test-tube to the petals of the flower?

A mesophyll cells

B phloem

C root hair cells

D xylem

8 Which row shows the changes that occur during exercise?

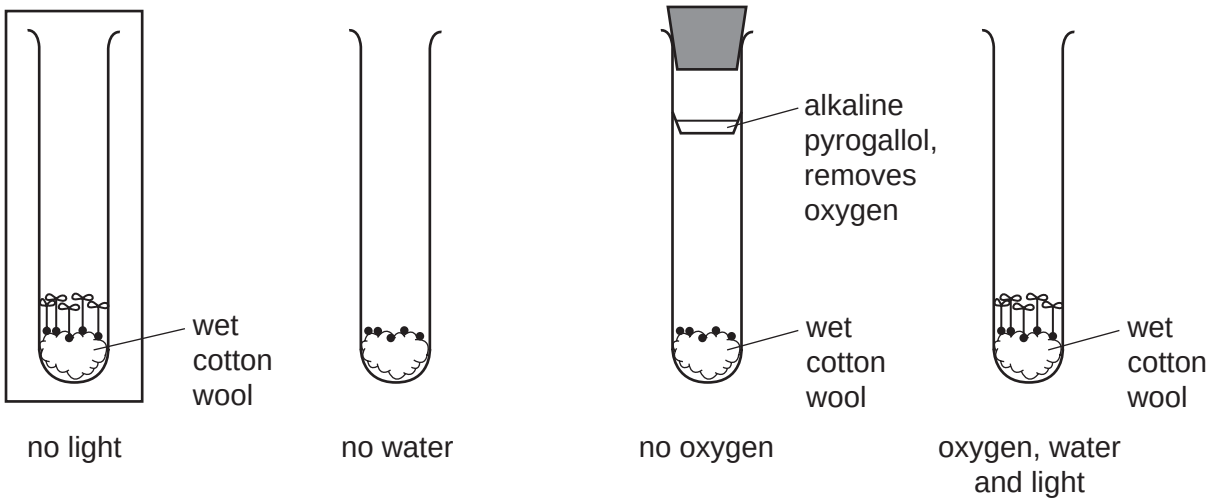
	breathing rate	depth of breathing
A	increases	increases
B	increases	stays the same
C	stays the same	increases
D	stays the same	stays the same

9 Which activities increase the secretion of adrenaline in the human body?

	running to catch a bus	relaxing in the sun	watching a frightening horror film
A	✓	✗	✓
B	✗	✓	✓
C	✓	✗	✗
D	✗	✓	✗

10 The roles of oxygen, water and light in seed germination are investigated.

The results of the experiment are shown.



Which factors are shown to be needed for germination?

A light and water only

B light and oxygen only

C oxygen and water only

D oxygen, water and light

11 In a plant, the allele for red flowers is dominant to the allele for yellow flowers. A heterozygous red-flowered plant is crossed with a homozygous yellow-flowered plant.

Which statement about the offspring is correct?

A 25% will have red flowers and 75% will have yellow flowers.

B 50% will have red flowers and 50% will have yellow flowers.

C 75% will have red flowers and 25% will have yellow flowers.

D 100% will have red flowers and 0% will have yellow flowers.

12 Which definition is correctly matched to a type of organism?

	organism	definition
A	producer	an organism that gets its energy by feeding on other organisms
B	consumer	an organism that gets its energy from dead or waste organic matter
C	decomposer	an animal that gets its energy by eating other animals
D	herbivore	an animal that gets its energy by eating plants

13 Which row about a process in the carbon cycle is correct?

	process	effect on level of atmospheric carbon dioxide
A	combustion	decreases
B	decomposition	increases
C	fossilisation	increases
D	respiration	decreases

14 Calcium carbonate reacts with dilute hydrochloric acid in a flask. The reaction releases carbon dioxide gas.

The decrease in the mass of the flask and its contents is measured over time.

Which pieces of apparatus must be used?

1 balance

2 pipette

3 thermometer

4 stop-clock

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

15 Which process involves a chemical change?

A burning a wooden splint

B dissolving sodium chloride in water

C evaporating water

D distilling petroleum

16 Which formula contains the most elements?

A NaOH **B** Rb_2S **C** $SiCl_4$ **D** SnO_2

17 What are the products of the electrolysis of dilute sulfuric acid using inert electrodes?

A hydrogen and sulfur dioxide

B oxygen and hydrogen

C oxygen and sulfur

D oxygen and sulfur dioxide

18 Some observations about two reactions are shown.

In reaction 1, heat is taken in from the surroundings.

In reaction 2, heat is released to the surroundings.

Which row describes each reaction?

	reaction 1	reaction 2
A	endothermic	endothermic
B	endothermic	exothermic
C	exothermic	exothermic
D	exothermic	endothermic

19 Four beakers each contain 50 cm^3 dilute hydrochloric acid of equal concentration.

50 cm^3 of water is added to two of the beakers.

4.0 g magnesium carbonate is then added to each beaker. The particle sizes of the magnesium carbonate added to some of the beakers are different.

Which experiment has the lowest rate of reaction?

	volume of dilute hydrochloric acid / cm^3	volume of water / cm^3	mass of magnesium carbonate / g	size of pieces of magnesium carbonate
A	50	50	4.0	small
B	50	0	4.0	small
C	50	50	4.0	large
D	50	0	4.0	large

20 A piece of magnesium ribbon is placed in dilute hydrochloric acid.

The magnesium reacts and bubbles of a colourless gas are formed.

What is the word equation for this reaction?

A magnesium + hydrochloric acid → magnesium chloride + hydrogen

B magnesium + hydrochloric acid → magnesium chloride + carbon dioxide + water

C magnesium + hydrochloric acid → magnesium chloride + carbon dioxide

D magnesium + hydrochloric acid → magnesium chloride + hydrogen + water

21 Which chemical test does **not** produce a precipitate?

A carbon dioxide and limewater

B carbonate ions and dilute hydrochloric acid

C chloride ions and aqueous silver nitrate

D copper(II) ions and aqueous sodium hydroxide

22 Which statement about the halogens is correct?

A They become lighter in colour down the group.

B They are all gases at room temperature.

C They are members of the same period of the Periodic Table.

D They exist as diatomic molecules.

23 How is iron oxide converted to iron?

A oxidation using water

B reaction with hydrochloric acid

C reaction with sodium hydroxide

D reduction using carbon

24 Which volume of clean air contains 10.5 cm^3 of oxygen?

A 21 cm^3 **B** 42 cm^3 **C** 50 cm^3 **D** 100 cm^3

25 What are two uses of limestone?

1 as a fertiliser

2 to decrease the pH of soil

3 making lime

4 neutralising some industrial waste products

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

26 Petroleum is separated into fractions by fractional distillation.

Which row shows a use for the named fraction?

	fraction	use
A	bitumen	feedstock for making chemicals
B	diesel oil / gas oil	road surfaces
C	naphtha	fuel in car engines
D	refinery gas	cooking and heating

27 Which statement about addition polymerisation is correct?

A Large monomer units join to form small polymer molecules.

B Large polymer molecules join to form small monomer units.

C Small monomer units join to form large polymer molecules.

D Small polymer molecules join to form large monomer units.

28 An object has a weight of 2.0 N.

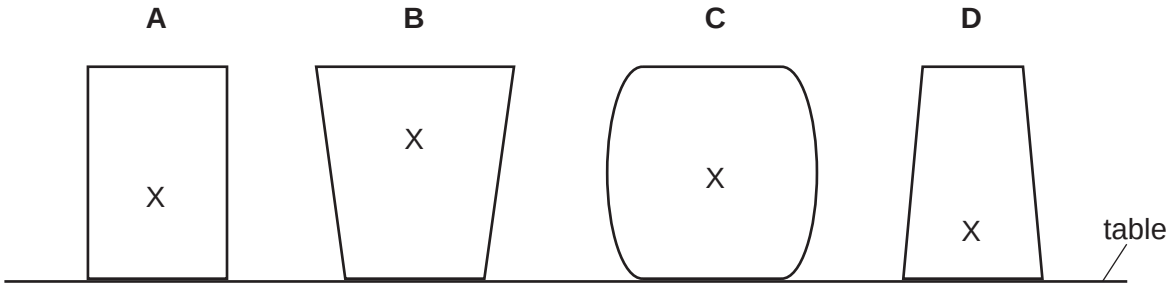
The gravitational field strength *g* is 10 N / kg.

What is the mass of the object?

A 0.020 kg **B** 0.20 kg **C** 2.0 kg **D** 20 kg

29 The diagram shows four containers resting on a table. The containers have equal masses and square bases of equal areas. The centre of mass of each container is labelled X.

Which container is the most stable?



30 A worker exerts a force on a box to move it across a horizontal surface.

Which of the two quantities in the table affect the amount of work done by the force?

	magnitude of the force	distance moved by the box
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = affects the work done

✗ = does **not** affect the work done

31 What is the useful energy transfer in a wind turbine?

A electrical energy to thermal energy

B gravitational potential energy to kinetic energy

C kinetic energy to electrical energy

D thermal energy to gravitational potential energy

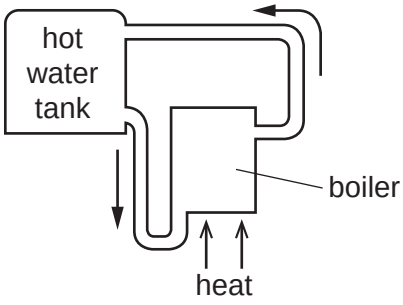
32 What are the names for the changes of state between solids, liquids and gases?

	solid to liquid	liquid to gas
A	melting	condensation
B	melting	evaporation
C	solidification	condensation
D	solidification	evaporation

33 The diagrams show part of a water-heating system which is working by convection.

Which diagram shows the flow of water in the system?

A



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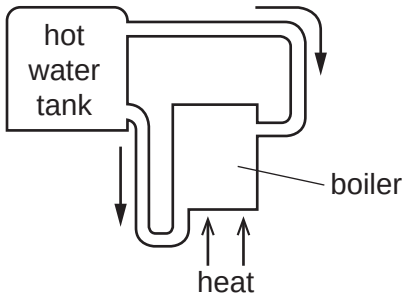

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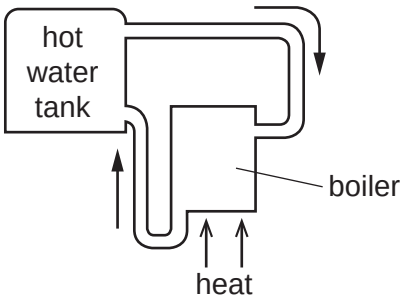
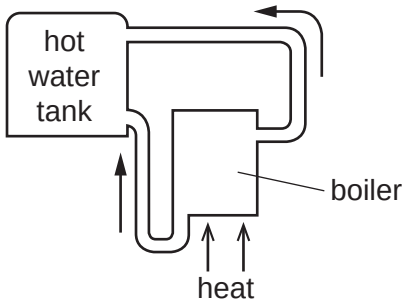
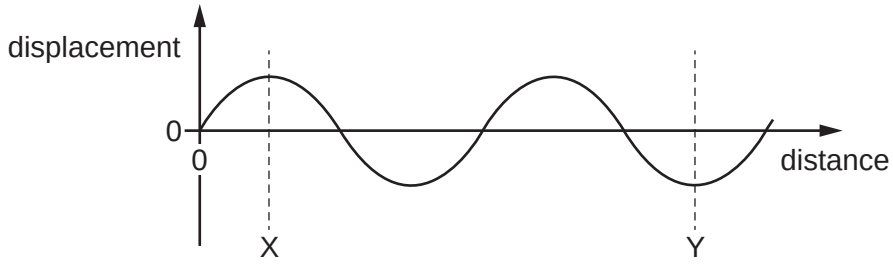


D



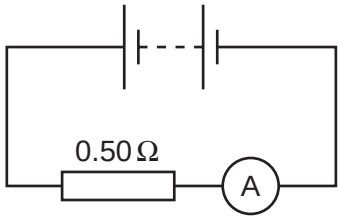
34 The diagram represents a wave.



How many wavelengths are there between X and Y?

A $\frac{2}{3}$ **B** 1 **C** $1\frac{1}{2}$ **D** 3

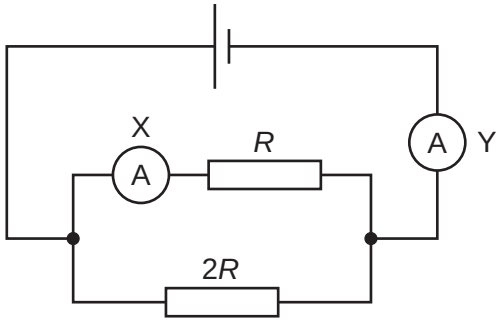
35 The diagram shows a battery connected to a 0.50 Ω resistor and an ammeter. The reading on the ammeter is 0.20 A.



What is the potential difference (p.d.) across the resistor?

A 0.10 V **B** 0.40 V **C** 0.70 V **D** 2.5 V

36 The diagram shows a circuit containing two resistors of resistance *R* and 2*R* and two ammeters X and Y.



Which ammeter shows the larger reading and what is the combined resistance of the two resistors?

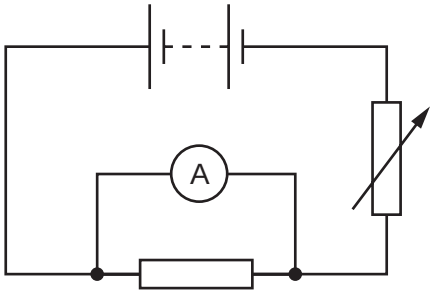
	ammeter with larger reading	combined resistance
A	X	less than *R*
B	X	more than 2*R*
C	Y	less than *R*
D	Y	more than 2*R*

37 An electrician has a box of identical fuses that do not have their rating marked on them.

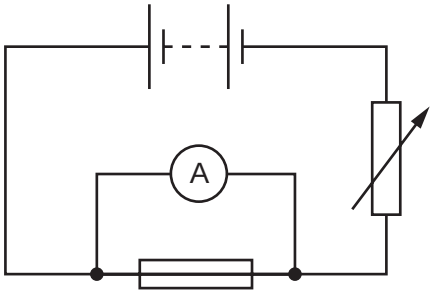
They decide to test one of the fuses to determine its rating by gradually increasing the current in the fuse until it blows.

Which diagram shows a fuse connected in a suitable circuit?

A



B



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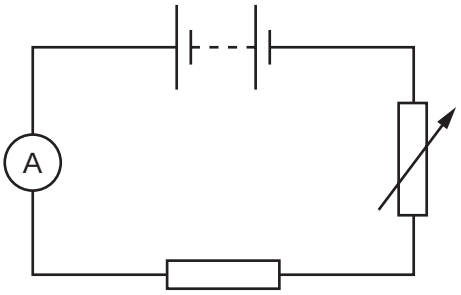

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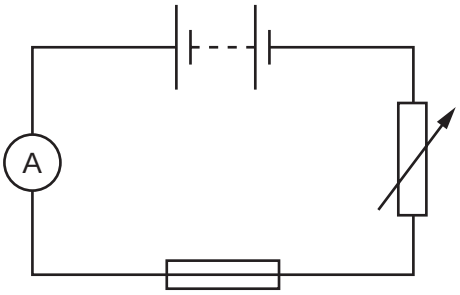
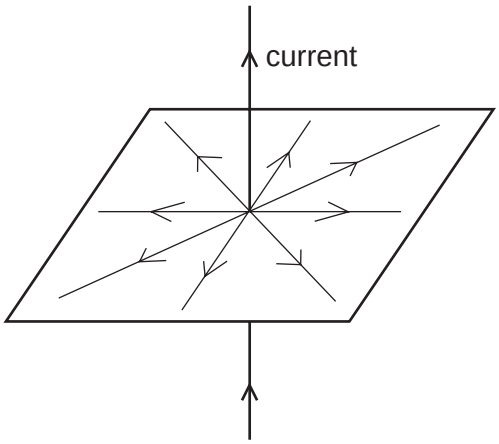


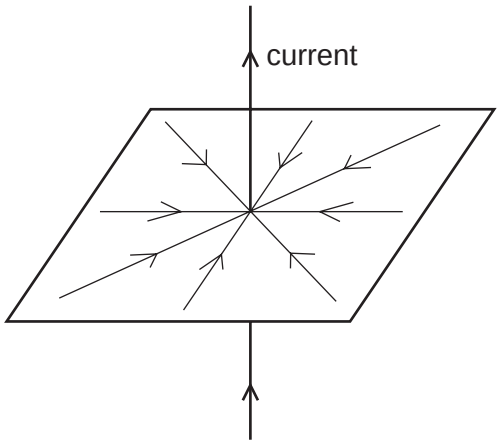
38 The diagrams show patterns around a wire that is carrying a current in the direction shown.

Which diagram shows the pattern and the direction of the magnetic field caused by the current?

A



B



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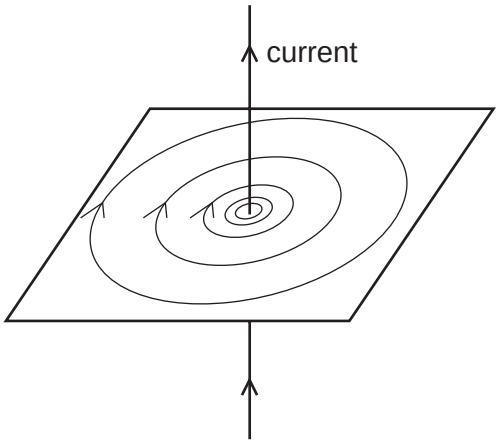

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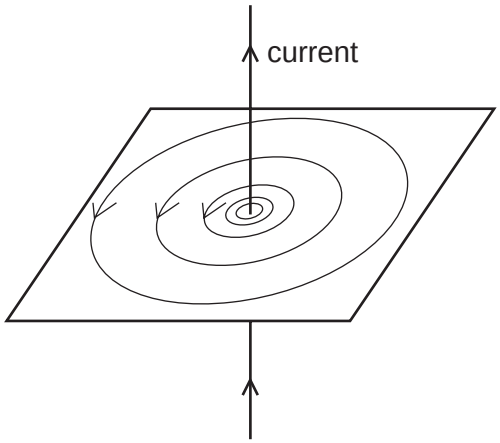

39 A nucleus has atomic number Z and mass number A.

What is equal to the value of $A - Z$?

A the number of electrons orbiting the nucleus

B the number of neutrons in the nucleus

C the number of nucleons in the nucleus

D the number of protons in the nucleus

40 A radioactive isotope emits only alpha (α)-particles.

A sample of the isotope emits 2000 α-particles per second.

After 30 minutes, the sample emits 250 α-particles per second.

What is the half-life of the isotope?

A 7.5 minutes

B 10 minutes

C 15 minutes

D 30 minutes

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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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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.).