Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/11**

Paper 1 Multiple Choice (Core) **May/June 2023**

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. Any blank pages are indicated.

[Turn over

1 What is meant by respiration?

A protein synthesis

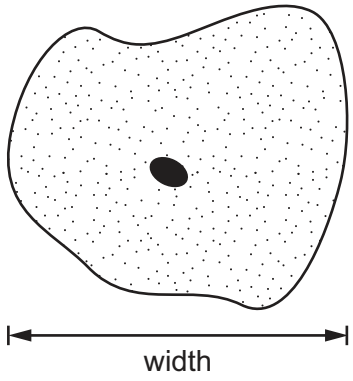
B sweating to lose heat

C the function of lungs

D the release of energy

2 The diagram shows a cell with a magnification of ×1000.

The width of the image is 45 mm.



What is the actual width of the cell?

A 45 mm **B** 4.5 mm **C** 0.45 mm **D** 0.045 mm

3 Linoleic acid is a fatty acid.

Which larger molecule may contain linoleic acid?

A glycogen

B oil

C protein

D starch

4 Which type of molecule are enzymes?

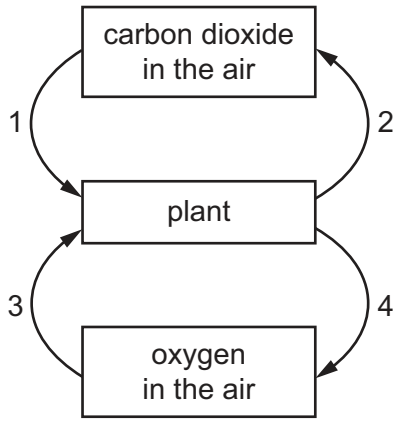
A amino acids

B carbohydrates

C fats

D proteins

5 Which two arrows represent photosynthesis?



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

6 A person has a low red blood cell count and is constipated.

Which row shows the components that may be in short supply in this person's diet?

	low red blood cell count	constipated
A	calcium	water
B	calcium	fats
C	iron	fibre
D	iron	protein

7 What is the sequence of blood vessels that a red blood cell passes through as it travels from the vena cava to the kidney?

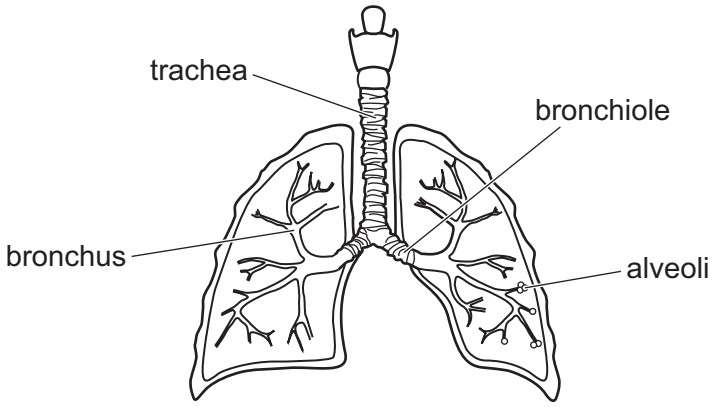
A pulmonary artery → pulmonary vein → aorta → renal artery

B pulmonary artery → pulmonary vein → aorta → renal vein

C pulmonary vein → pulmonary artery → aorta → renal artery

D pulmonary vein → pulmonary artery → aorta → renal vein

8 In the diagram of the human breathing system, which structures are correctly labelled?



A alveoli and bronchiole

B alveoli and trachea

C bronchus and bronchiole

D bronchus and trachea

9 What are the effects of adrenaline?

	breathing rate	pulse rate	pupil size
A	decrease	decrease	widens
B	decrease	increase	narrows
C	increase	decrease	narrows
D	increase	increase	widens

10 In a plant, what leads to offspring that are genetically identical to the parent?

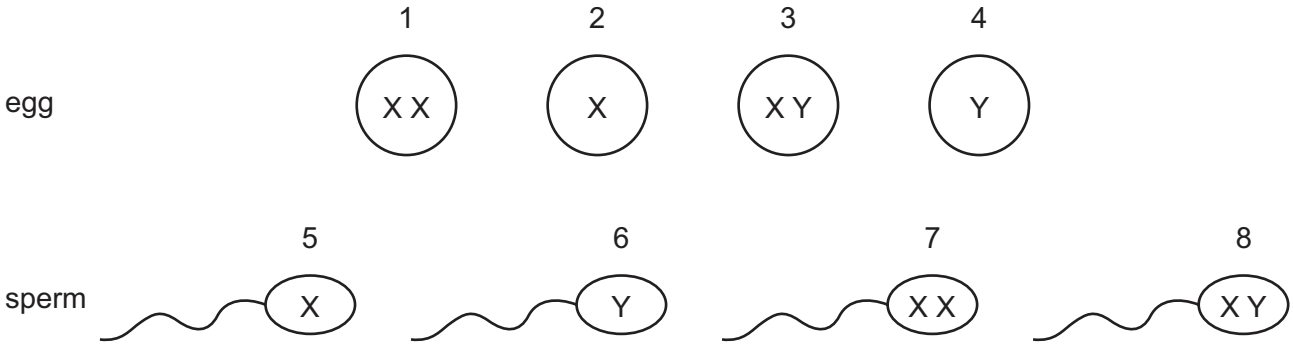
A asexual reproduction

B insect pollination

C seed germination

D sexual reproduction

11 The diagram shows eggs and sperm containing sex chromosomes.



Which row gives the correct combination of sex chromosomes for a male and female offspring?

	male offspring	female offspring
A	1 and 8	3 and 7
B	2 and 6	2 and 5
C	3 and 8	1 and 7
D	4 and 6	2 and 5

12 How do herbivores get their energy?

A by eating animals and plants

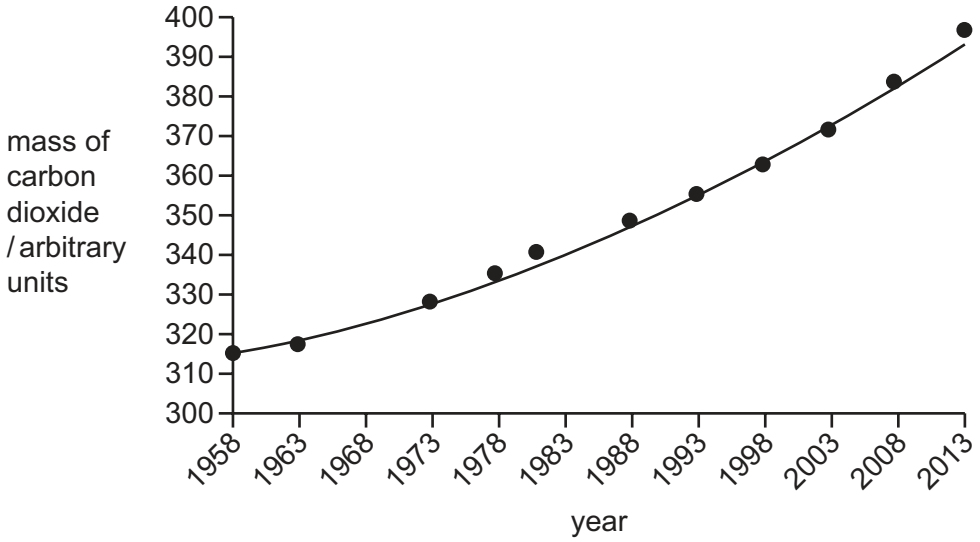
B by eating animals only

C by eating plants only

D directly from sunlight

[Turn over

13 The graph shows the change in atmospheric carbon dioxide levels over time.



A reduction of which process could cause the change in carbon dioxide shown?

A combustion

B decomposition

C photosynthesis

D respiration

14 An aqueous salt solution contains an insoluble impurity.

Which processes are used to obtain pure salt crystals?

A distillation then crystallisation

B distillation then chromatography

C filtration then crystallisation

D filtration then chromatography

15 The element phosphorus burns in air, as shown.

$$4P + 5O_2 \rightarrow P_4O_{10}$$

What does the formula P_4O_{10} show?

A a mixture of atoms of two elements

B a mixture of molecules of two elements

C a molecule of a compound

D an atom of a compound

16 Which row describes an atom that has the nucleon number 24?

	number of protons	number of neutrons	number of electrons
A	8	8	8
B	12	12	12
C	21	24	21
D	24	28	24

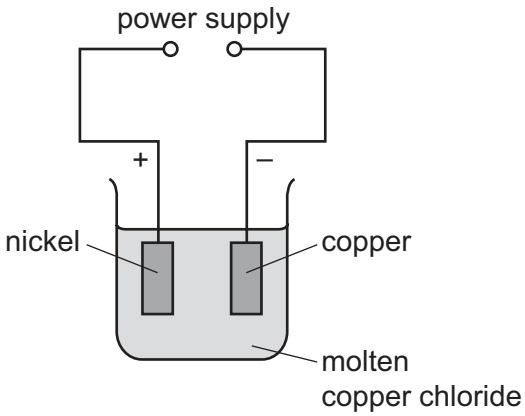
17 Lithium is in Group I and bromine is in Group VII of the Periodic Table.

What is the formula of lithium bromide?

A LiBr **B** $LiBr_2$ **C** Li_2Br **D** Li_2Br_2

18 Which diagram shows equipment used to electroplate nickel with copper?

A



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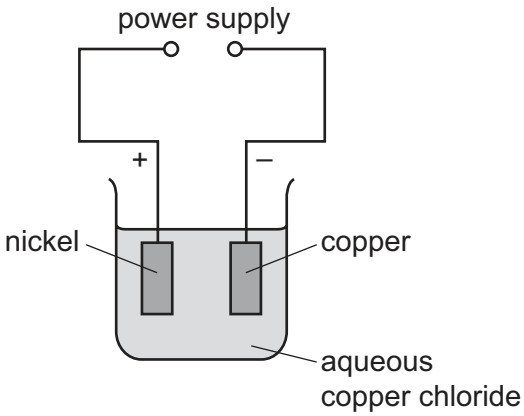

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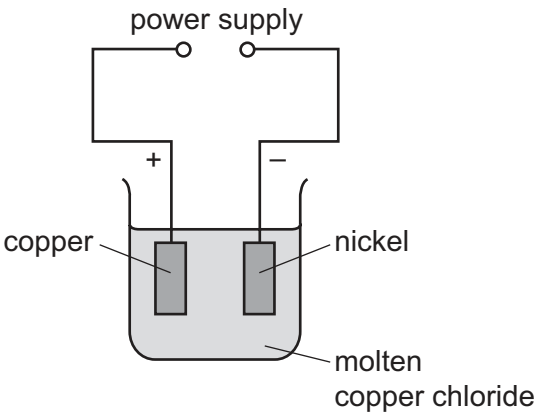

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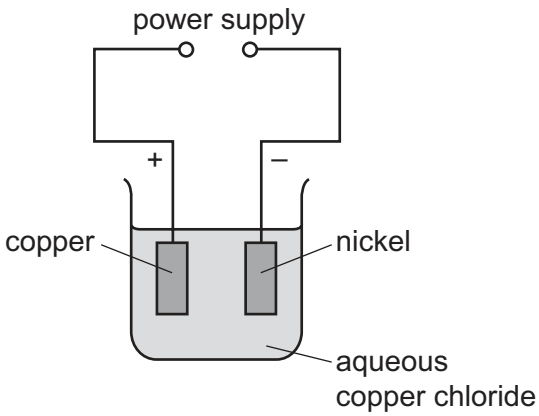


19 Which statement about exothermic and endothermic reactions is correct?

A An endothermic reaction involves heat energy being taken in by the reactants.

B An exothermic reaction involves heat energy being taken in by the products.

C In an endothermic reaction, the temperature of the reaction mixture increases.

D In an exothermic reaction, the temperature of the reaction mixture decreases.

20 Which statement shows that methane, CH_4, is oxidised when it burns?

A The products of the reaction are gaseous.

B The products of the reaction are water and carbon dioxide.

C The reaction is exothermic.

D The total number of oxygen atoms has increased during the reaction.

21 Magnesium chloride is prepared by reacting an excess of insoluble magnesium oxide with dilute hydrochloric acid.

Which processes are used to obtain pure crystals of magnesium chloride from the reaction mixture?

1 distillation

2 evaporation

3 filtration

A 1 followed by 2

B 3 followed by 2

C 3 followed by 1

D 1 followed by 3, followed by 2

22 The properties of some substances are listed.

1 form acidic oxides

2 have high melting points

3 act as catalysts

4 form coloured compounds

What are the properties of transition metals?

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

23 Which statement describes a chemical test for water?

A Add blue cobalt(II) chloride.

B Add blue copper(II) sulfate.

C Measure the boiling point.

D Use universal indicator.

24 Which statement about sulfur is correct?

A It is a metallic element.

B It is used to make sulfuric acid.

C It is in Group VII of the Periodic Table.

D An atom of sulfur contains 32 electrons.

25 Which statements about limestone are correct?

1 Its main constituent is calcium oxide.

2 It can be used to manufacture lime.

3 It thermally decomposes to release carbon dioxide.

4 It is used to neutralise alkaline soils.

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.

Information about uses of some fractions and positions in the fractionating column where they are collected is shown.

	fraction	use	position
1	gasoline	making roads	below refinery gas
2	bitumen	petrol for car engines	bottom of column
3	naphtha	making chemicals	below gasoline
4	refinery gas	heating and cooking	top of column

Which rows are correct?

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

27 Which process forms ethanol?

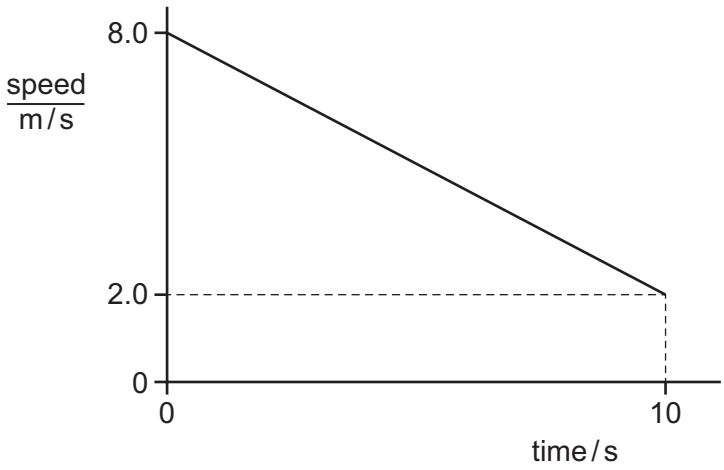
A combustion

B cracking

C distillation

D fermentation

28 The graph shows how the speed of an object varies with time.



What is the distance moved by the object between time 0 s and time 10 s?

A 30 m **B** 40 m **C** 50 m **D** 80 m

29 The weight of an object of mass *m* is given by the expression *mg*.

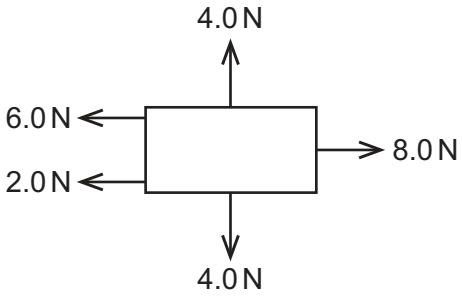
Which row gives the units for weight and *g*?

	weight	*g*
A	kg	kg / N
B	kg	N / kg
C	N	kg / N
D	N	N / kg

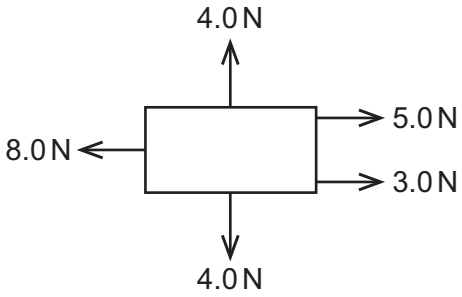
30 The diagrams show all the forces acting on each of four objects.

Which object is **not** in equilibrium?

A



B



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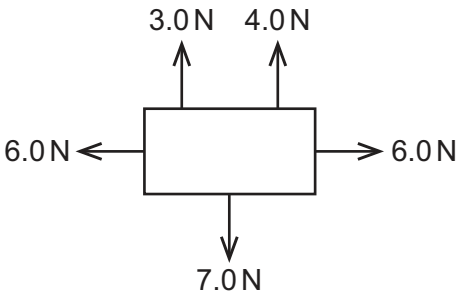
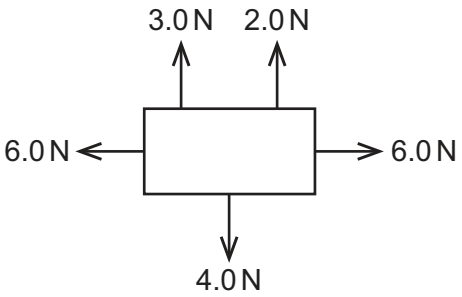
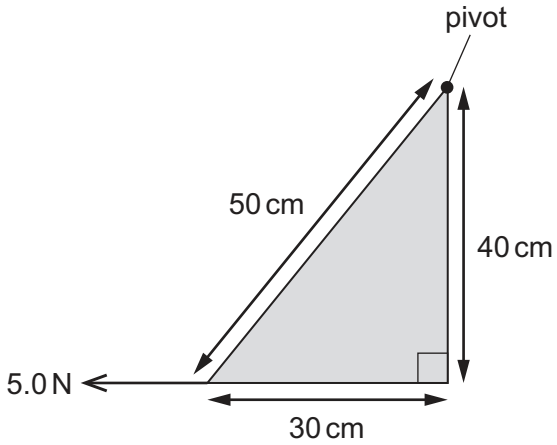


D



31 The diagram shows a triangular sheet of metal with sides of length 50 cm, 40 cm and 30 cm. The sheet is free to move about a pivot at the top corner, as shown.

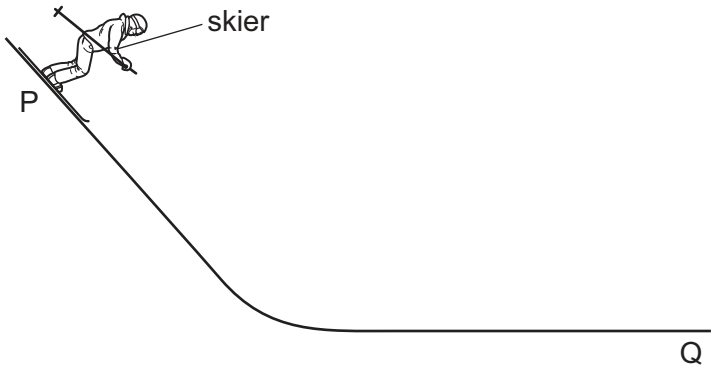


A cord is attached to the bottom left corner of the sheet and pulled with a horizontal force of 5.0 N to the left.

What is the moment of the 5.0 N force about the pivot?

A 150 N cm **B** 200 N cm **C** 250 N cm **D** 600 N cm

32 A skier starts from rest at P, accelerates down a slope and then comes to rest at Q.



Which series of energy transfers takes place?

A elastic potential (strain) energy → kinetic energy → thermal energy

B gravitational potential energy → kinetic energy → thermal energy

C kinetic energy → elastic potential (strain) energy → thermal energy

D kinetic energy → gravitational potential energy → thermal energy

33 Which term describes a gas changing into a liquid?

A boiling

B condensation

C evaporation

D melting

34 A man stands 420 m away from a high wall. He bangs a drum once and starts a stop-watch at the same time. When he hears an echo from the wall, the stop-watch reads 2.4 s.

What is the speed of sound, calculated from this information?

A 87.5 m / s **B** 175 m / s **C** 330 m / s **D** 350 m / s

35 A student stands in front of a plane mirror on a wall.

Which statement about the image of the student is **not** correct?

A The image is laterally inverted (left to right).

B The image is smaller than the student.

C The image is upright.

D The student and the image are equal distances from the mirror.

36 Two insulators are charged by rubbing them with a cloth.

After this, the charged insulators repel each other.

Which statement is a possible description of how the insulators become charged?

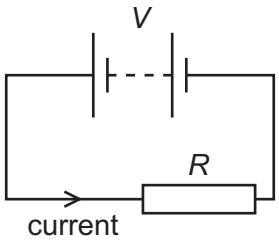
A One gained electrons and the other gained protons.

B One gained electrons and the other lost electrons.

C They both lost electrons.

D They both lost protons.

37 A battery of e.m.f. *V* is connected across a resistor of resistance *R*. There is a current in the resistor.



Which row shows two changes that **both** increase the current in the resistor?

	change 1	change 2
A	decrease *V*	decrease *R*
B	decrease *V*	increase *R*
C	increase *V*	decrease *R*
D	increase *V*	increase *R*

38 Fuses are used in domestic electric circuits.

Which statement about fuses is correct?

A A fuse is connected in the live wire.

B A fuse is connected in the neutral wire.

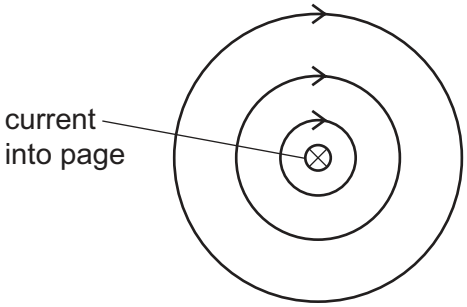
C A 3.0 A fuse produces a current of exactly 3.0 A in the circuit.

D A 3.0 A fuse produces a minimum current of 3.0 A in the circuit.

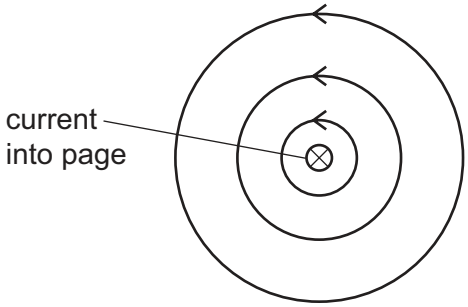
39 A straight wire carries a current into the page.

Which diagram shows the pattern and direction of the magnetic field around the wire due to the current?

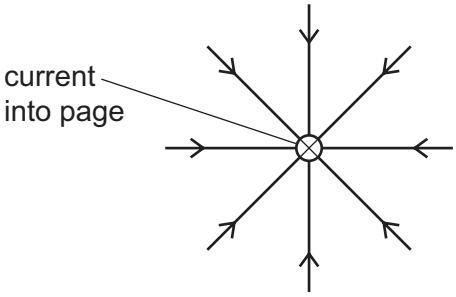
A



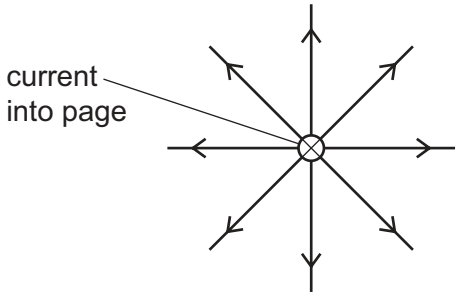
B



C



D



40 A radioactive isotope has a half-life of 3.0 days. A sample contains 4000 atoms of this isotope.

How many atoms of the isotope remain after 6.0 days?

A 0 **B** 500 **C** 1000 **D** 2000

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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.).