



# Cambridge O Level

**COMBINED SCIENCE**

**5129/11**

Paper 1 Multiple Choice

**October/November 2025**

**1 hour**

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.

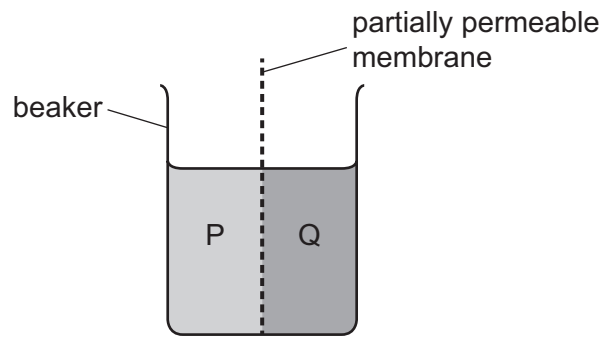
## INFORMATION

- 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.

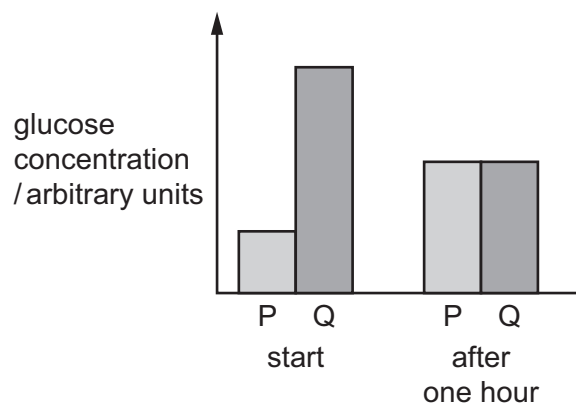
This document has **16** pages.



- 1 Two different glucose solutions, P and Q, are placed in a beaker on either side of a partially permeable membrane.



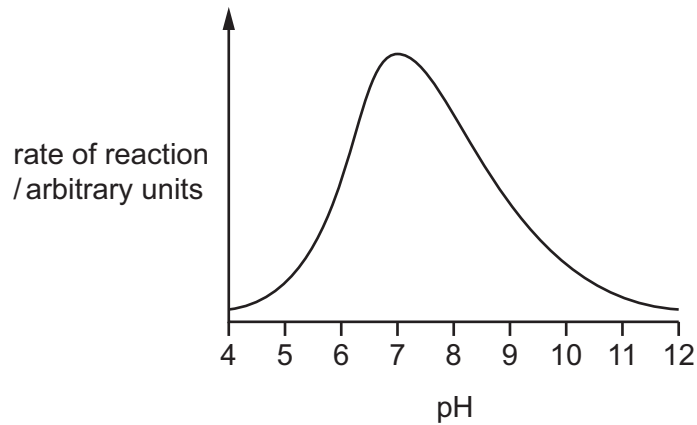
The glucose concentration of both solutions is measured at the start and after leaving the beaker to stand for one hour. The results are shown in the graph.



What explains these results?

- A Glucose has moved from P to Q through the membrane.
- B Glucose has moved from Q to P through the membrane.
- C Water has moved from P to Q through the membrane.
- D Water has moved from Q to P through the membrane.

- 2 The graph shows the activity of an enzyme at different pH values.



What is the pH value at which this enzyme works most quickly?

- A** 4                      **B** 6                      **C** 7                      **D** 9
- 3 Which statement describes transpiration?
- A** the flow of sucrose inside a stem  
**B** the loss of water vapour through stomata  
**C** the movement of mineral ions in the xylem  
**D** the release of energy in plant cells
- 4 A student tested an unknown mixture of food and recorded their results in the table shown.

test	observations
add iodine solution	yellow-orange
add Benedict's solution and heat	red
add biuret reagent	purple
add ethanol, shake, then pour into distilled water	colourless

Which foods were in the unknown mixture?

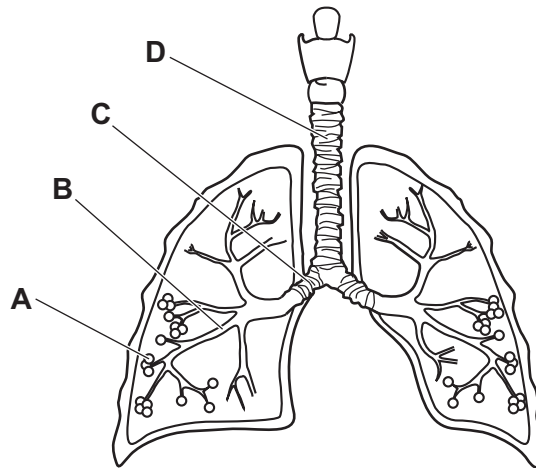
- A** glucose and lipid  
**B** glucose and protein  
**C** lipid and protein  
**D** starch and glucose

5 In which organ of the body is urea formed?

- A duodenum
- B ileum
- C kidney
- D liver

6 The diagram shows the structure of the lungs.

Where does gaseous exchange take place?



7 In a 10km race, an athlete runs steadily for most of the distance to keep up with the other athletes. In the final 400 m, the athlete runs as fast as possible to win the race.

Which substances are produced by respiration in the athlete's muscles during this race?

- A carbon dioxide and water only
- B lactic acid only
- C lactic acid and carbon dioxide only
- D water, carbon dioxide and lactic acid

8 Which two chambers contract at the same time to pump blood **out** of the heart?

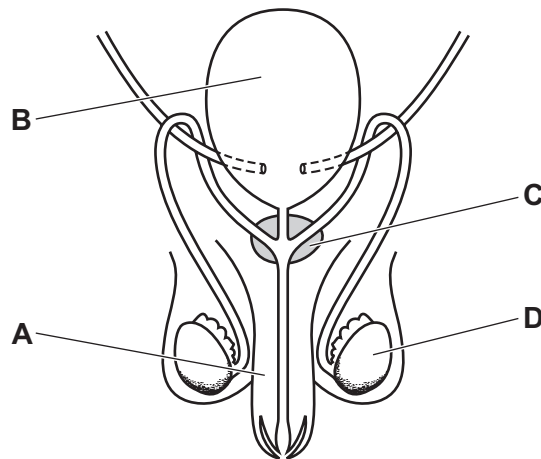
- A left atrium and left ventricle
- B right atrium and left atrium
- C right atrium and right ventricle
- D right ventricle and left ventricle

9 What is the function of meiosis?

- A growth
- B production of gametes
- C repair of damaged tissues
- D replacement of dying cells

10 The diagram shows the human male reproductive system.

Which labelled part is the prostate gland?



11 In which part of the menstrual cycle is an egg fertilised?

- A when the lining of the uterus is thinnest
- B while the egg is developing in the ovary
- C while the egg is in the oviduct
- D while the lining of the uterus is breaking down

12 Which statement about the flow of energy along a food chain is correct?

- A It decreases.
- B It increases.
- C It increases then decreases.
- D It remains the same.

13 What are effects of deforestation?

- 1 reduction in biodiversity
- 2 soil erosion and flooding
- 3 extinction of some species
- 4 decreasing carbon dioxide in the atmosphere

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

14 Which statements about particles in substances are correct?

- 1 When the temperature of a gas is increased, the particles move more slowly.
- 2 In liquids, the particles are closer together than in solids.
- 3 In solids, the particles vibrate about a fixed point.
- 4 In gases and liquids, the particles move randomly.

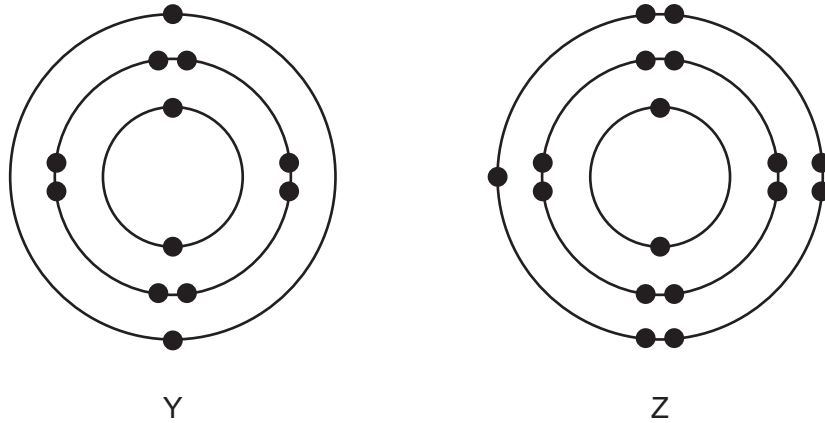
**A** 1 and 2      **B** 1 and 3      **C** 2 and 4      **D** 3 and 4

15 An atom of chlorine has an atomic number of 17 and a nucleon number of 37.

Which row shows the number of protons, neutrons and electrons in this atom?

	protons	neutrons	electrons
<b>A</b>	17	20	17
<b>B</b>	17	20	20
<b>C</b>	17	37	17
<b>D</b>	37	17	17

16 The electronic structures of two atoms, Y and Z, are shown.

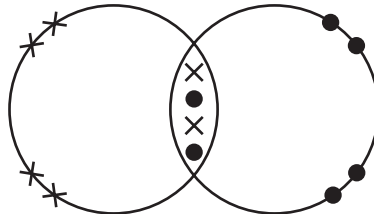


Y and Z react to form a compound.

Which row shows a type of bonding and a formula of the compound?

	bonding	formula
<b>A</b>	covalent	$YZ_2$
<b>B</b>	covalent	$Y_2Z$
<b>C</b>	ionic	$YZ_2$
<b>D</b>	ionic	$Y_2Z$

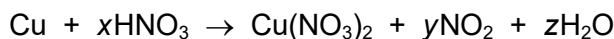
17 The dot-and-cross diagram of molecule Q is shown.



What is Q?

- A** chlorine
- B** hydrogen
- C** hydrogen chloride
- D** oxygen

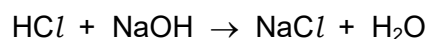
- 18 The equation for the reaction between copper and concentrated nitric acid is shown.



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

	$x$	$y$	$z$
<b>A</b>	2	4	2
<b>B</b>	2	4	4
<b>C</b>	4	2	2
<b>D</b>	4	4	2

- 19 The equation for the reaction between sodium hydroxide and dilute hydrochloric acid is shown.



Which mass of sodium hydroxide is needed to neutralise  $100\text{ cm}^3$  of hydrochloric acid with a concentration of  $3.65\text{ g/dm}^3$ ?

- A** 0.365g      **B** 0.400g      **C** 4.00g      **D** 40.0g

- 20 Which row describes the transfer of thermal energy during an exothermic reaction and gives an example of an exothermic reaction?

	transfer of thermal energy	example
<b>A</b>	from the surroundings	cracking
<b>B</b>	from the surroundings	neutralisation
<b>C</b>	to the surroundings	cracking
<b>D</b>	to the surroundings	neutralisation

- 21 The oxide of element X is warmed with solid ammonium chloride.

A gas is produced that turns damp red litmus paper blue.

Which row describes element X and the oxide of element X?

	element X	oxide of element X
<b>A</b>	metal	acid
<b>B</b>	non-metal	acid
<b>C</b>	metal	base
<b>D</b>	non-metal	base

22 Which statements describe a change that will cause the rate of a chemical reaction to increase?

- 1 adding a catalyst
- 2 decreasing the concentration of a reactant
- 3 using large pieces of solid instead of a powder
- 4 increasing the temperature

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

23 Which row describes the trends shown by the elements going down Group I and Group VII?

	trend in reactivity of Group I	trend in melting point of Group VII
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

24 Which flame colour shows the presence of potassium cations?

- A** green
- B** lilac
- C** red
- D** yellow

25 Which row shows why copper is used for electrical wiring?

	melting point	conductivity	reactivity
<b>A</b>	high	high	low
<b>B</b>	high	low	high
<b>C</b>	low	high	high
<b>D</b>	low	low	low

26 River water is treated to make it safe to drink.

Which row about the processes and the reason for the process is correct?

	process 1	reason for process 1	process 2	reason for process 2
<b>A</b>	add chlorine	to kill bacteria	add carbon	to make the water pure
<b>B</b>	filtration	to remove bacteria	add chlorine	to make the water pure
<b>C</b>	filtration	to remove solids	add chlorine	to kill bacteria
<b>D</b>	filtration	to remove solids	add carbon	to kill bacteria

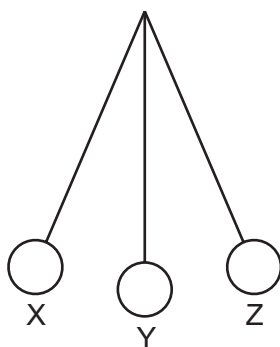
27 An alkene can be made by heating an alkane in the presence of a catalyst.

What is the name of this process?

- A** cracking
- B** crystallisation
- C** distillation
- D** polymerisation

28 A pendulum repeatedly swings from X through Y to Z and back again to X.

It takes 1 s to swing from X to Y.



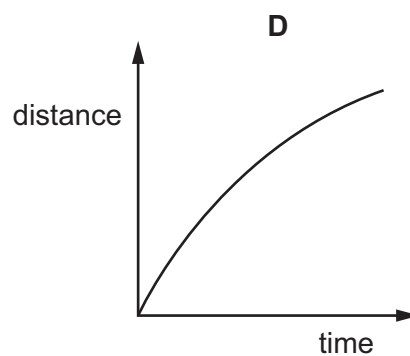
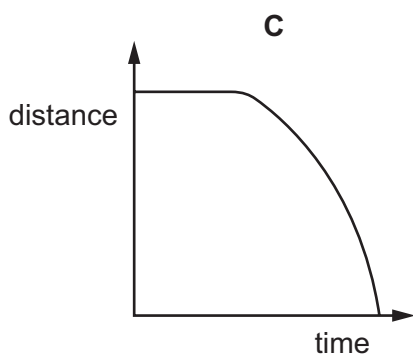
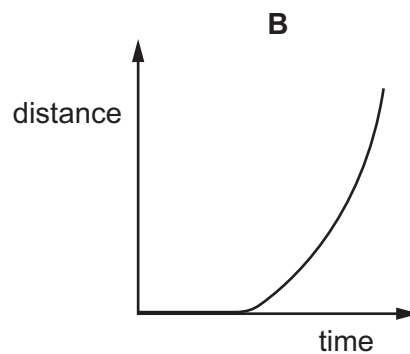
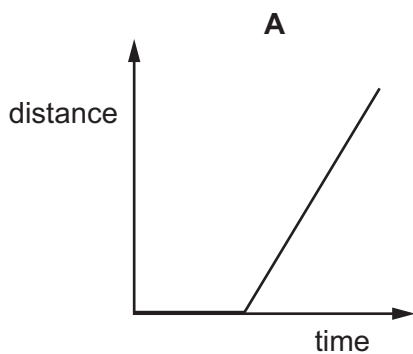
How many periods of the pendulum are completed in 60 s?

- A** 15
- B** 20
- C** 30
- D** 60

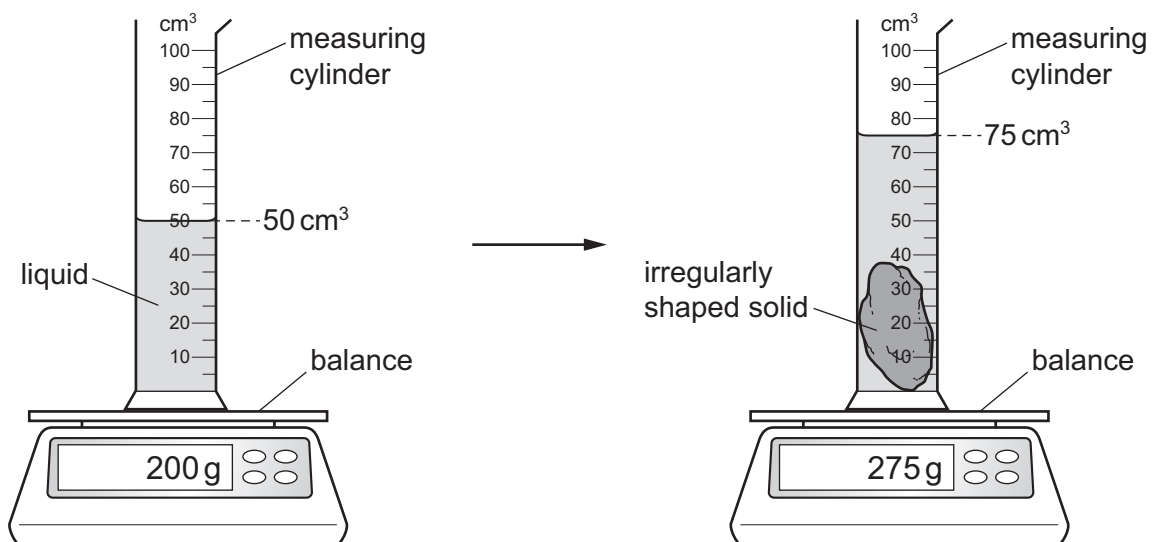
29 The distance–time graph for an object is shown.

The object decelerates for part of the time.

Which distance–time graph is correct?



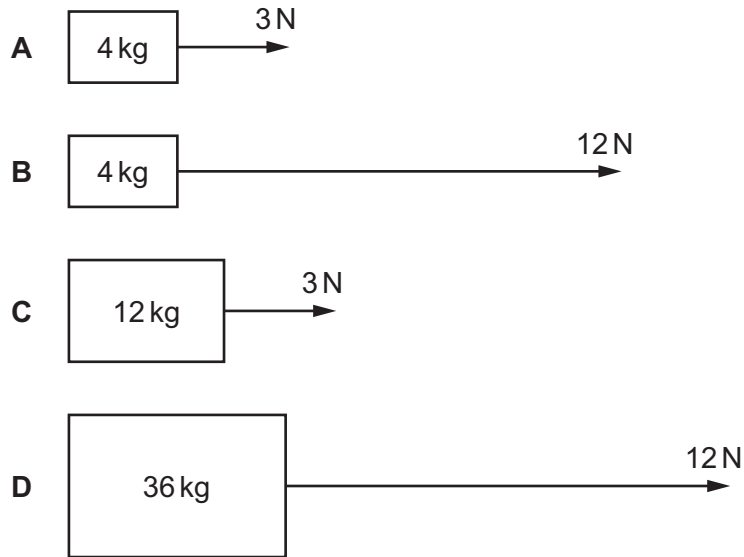
30 A student measures the density of an irregularly shaped solid using the apparatus shown.



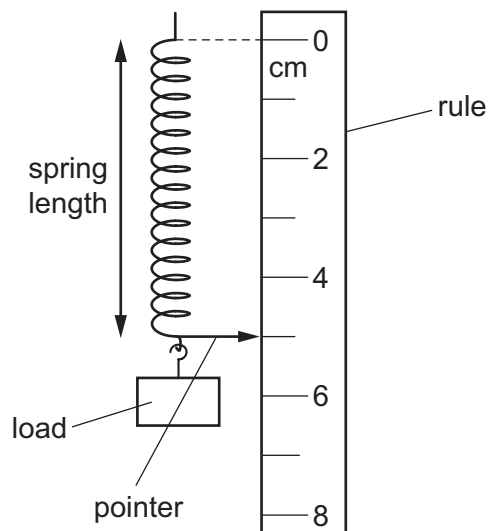
What is the density of the solid?

- A**  $1.0\text{g/cm}^3$     **B**  $3.0\text{g/cm}^3$     **C**  $4.0\text{g/cm}^3$     **D**  $11\text{g/cm}^3$

31 Which diagram shows an object accelerating at  $3 \text{ m/s}^2$ ?



32 The diagram shows the apparatus a student uses to investigate the extension of a spring.



She is asked to plot an extension–load graph for the spring.

She writes down the steps she will follow.

Which step is **not** correct?

- A The load is increased, in stages, on the lower end of the spring.
- B The reading of the pointer against the scale is recorded for each load.
- C The load is reduced, in stages, and the pointer reading recorded.
- D The average pointer reading, at each stage, is plotted against the load.

33 A ball is thrown upwards.

Which row describes the change to the gravitational potential energy store and to the kinetic energy store as the ball moves upwards?

	gravitational potential energy store	kinetic energy store
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

34 Which statement correctly compares fossil fuels and biofuels?

- A** Fossil fuels are non-renewable and produce carbon dioxide when burned; biofuels are renewable and do **not** produce carbon dioxide when burned.
- B** Fossil fuels are non-renewable and produce carbon dioxide when burned; biofuels are renewable and also produce carbon dioxide when burned.
- C** Fossil fuels are renewable and produce carbon dioxide when burned; biofuels are non-renewable and do **not** produce carbon dioxide when burned.
- D** Fossil fuels are renewable and produce carbon dioxide when burned; biofuels are non-renewable and also produce carbon dioxide when burned.

35 Electrical power can be generated by the transfer of energy from a gravitational potential energy store to a kinetic energy store.

Which energy resource uses this transfer?

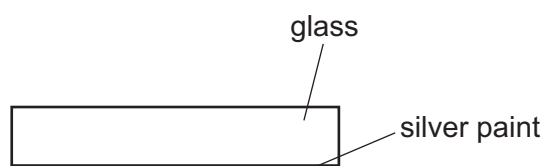
- A** fossil fuel
- B** geothermal
- C** hydroelectric
- D** wind

36 The regions of the electromagnetic spectrum are placed in order of increasing wavelength.

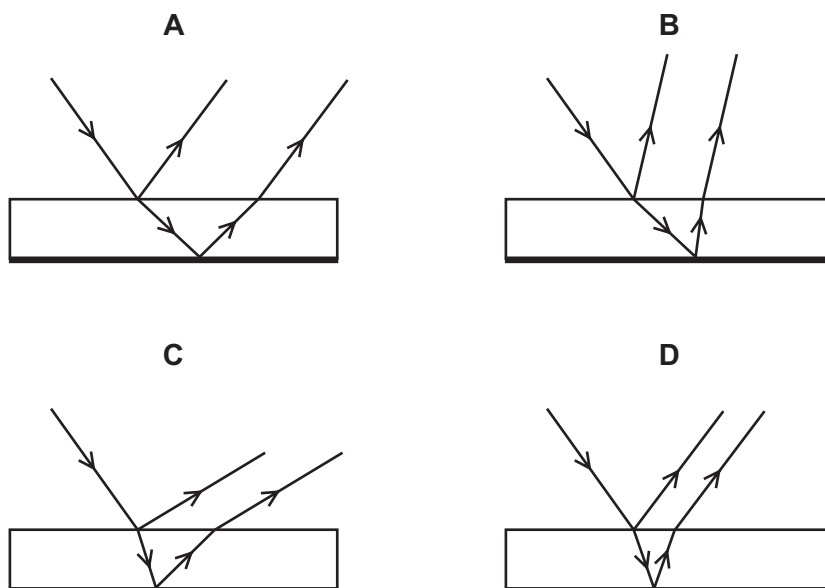
How many regions are there between infrared and ultraviolet?

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

- 37 A plane mirror consists of a sheet of glass with silver paint on the back surface. The diagram shows a cross-section through the mirror.



Which diagram correctly shows what happens when a ray of light is incident on the surface of the glass?



- 38 Which statement about electromagnetic waves is **not** correct?

- A They travel at the same speed in a vacuum.
- B They transfer energy.
- C They do **not** require a medium to travel through.
- D They are longitudinal.

- 39 The battery in a simple series circuit produces a current of 0.6 A for a time of two minutes.

The current is reduced to 0.2 A for a further one minute.

What is the total charge that passes through the battery in these three minutes?

- A 1.2 C
- B 1.4 C
- C 72 C
- D 84 C

40 The power of an electric heater is 2000 W.

The cost of using the heater for six hours is 480 cents.

What is the cost of 1 kWh of electrical energy?

- A 1.4 cents
- B 40 cents
- C 160 cents
- D 1400 cents

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The Periodic Table of Elements

		Group													
I	II	III	IV	V	VI	VII	VIII								
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	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	<p><b>Key</b></p> <p>atomic number</p> <p>atomic symbol</p> <p>name</p> <p>relative atomic mass</p>													
19 K potassium 39	20 Ca calcium 40	26 Fe iron 56	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	44 Ru ruthenium 101	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	76 Os osmium 190	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 —	108 Hs hassium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —					
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
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
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 —
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 —

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
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 —

actinoids

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