



# Cambridge O Level

**COMBINED SCIENCE**

**5129/11**

Paper 1 Multiple Choice

**October/November 2022**

**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.

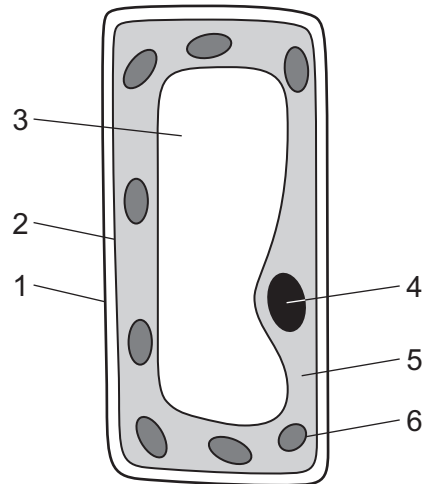
## INFORMATION

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



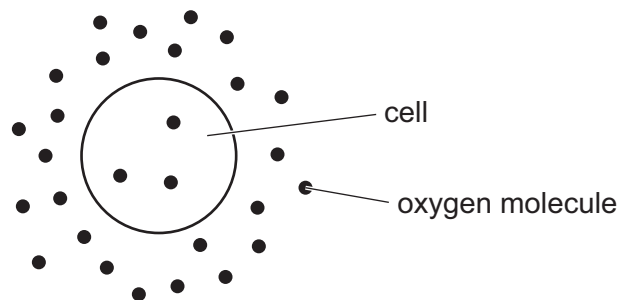
1 The diagram shows the basic structure of a cell.



Which components of this cell are only present in plant cells?

	components of cell					
	1	2	3	4	5	6
<b>A</b>	✓		✓	✓		
<b>B</b>	✓		✓			✓
<b>C</b>		✓		✓	✓	
<b>D</b>		✓			✓	✓

2 The diagram represents oxygen molecules around and inside a cell.



Which statement explains why oxygen molecules move into the cell?

- A** The oxygen molecules move from a high to a low concentration by diffusion.
- B** The oxygen molecules move from a high to a low concentration by osmosis.
- C** The oxygen molecules move from a low to a high concentration by diffusion.
- D** The oxygen molecules move from a low to a high concentration by osmosis.

- 3 The enzyme catalase speeds up the breakdown of hydrogen peroxide into oxygen and water.

A student conducts an experiment to find the temperature at which catalase works best.

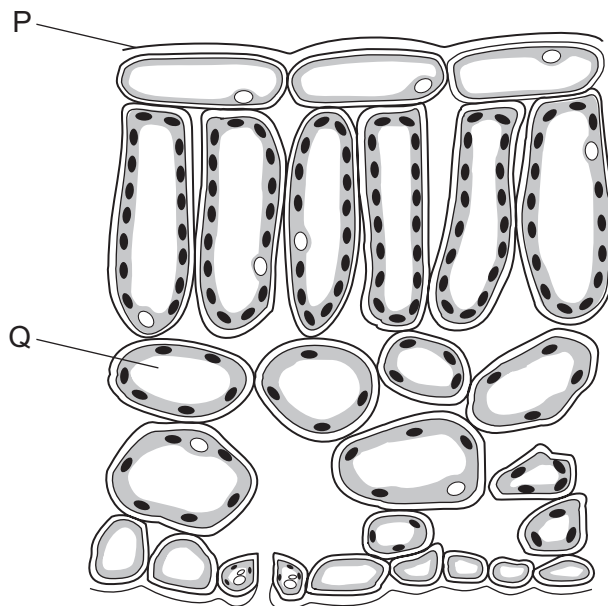
The student counted the number of oxygen bubbles produced per minute at four different temperatures.

The results are shown in the table.

temperature / °C	oxygen bubbles / minute
25	10
30	20
35	30
40	24

At which temperature does the enzyme work best?

- A 25°C      B 30°C      C 35°C      D 40°C
- 4 The diagram shows a cross-section of a leaf.

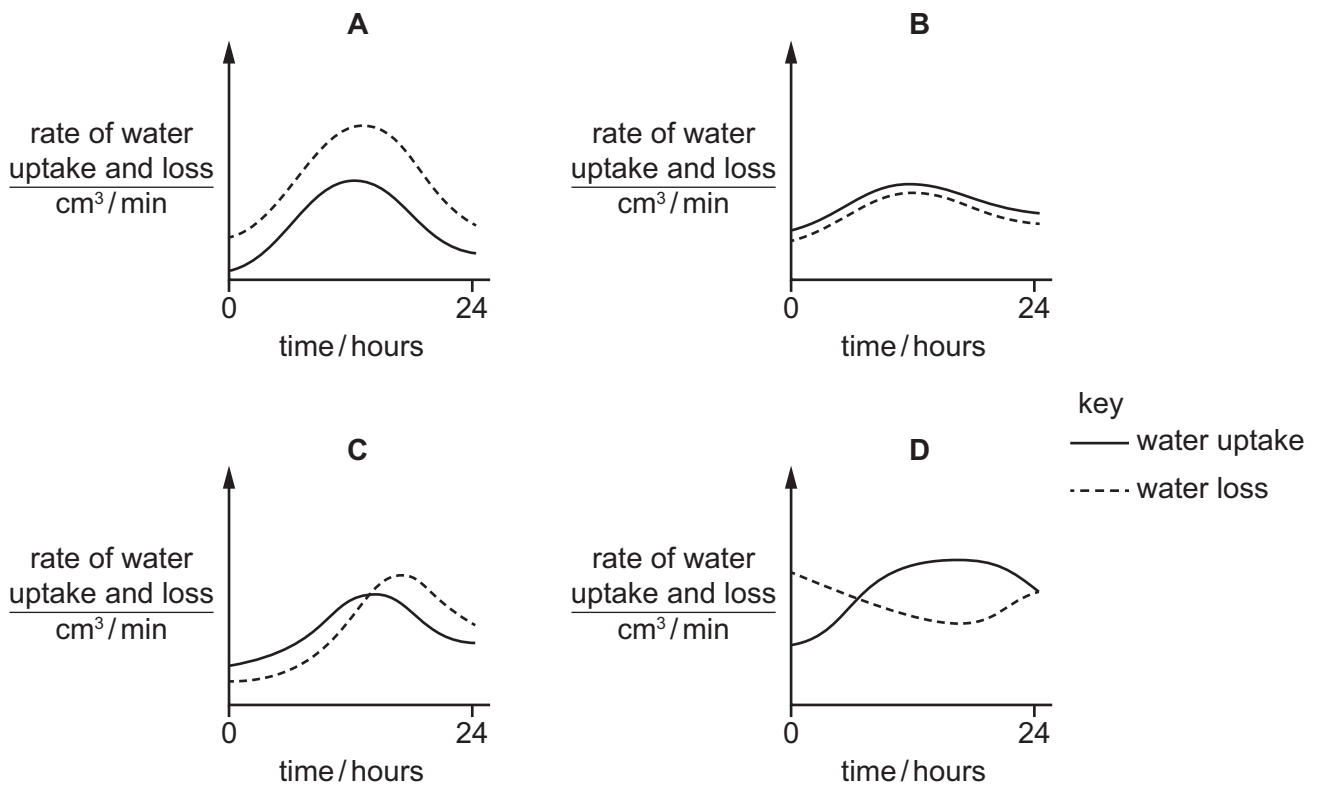


Which row identifies P and Q?

	P	Q
<b>A</b>	cuticle	stomata
<b>B</b>	cuticle	mesophyll cell
<b>C</b>	stomata	cuticle
<b>D</b>	stomata	mesophyll cell

- 5 Which statement is a description of absorption?
- A the breakdown of large molecules to simpler soluble molecules in the mouth and alimentary canal
  - B the egestion of food from the alimentary canal
  - C the metabolism of amino acids and glucose by the liver
  - D the passage of soluble products of digestion through the small intestine walls into the blood capillaries
- 6 The graphs show the rate of water uptake and rate of water loss in different plants over a 24-hour period. All the graphs have the same scale on the y-axis.

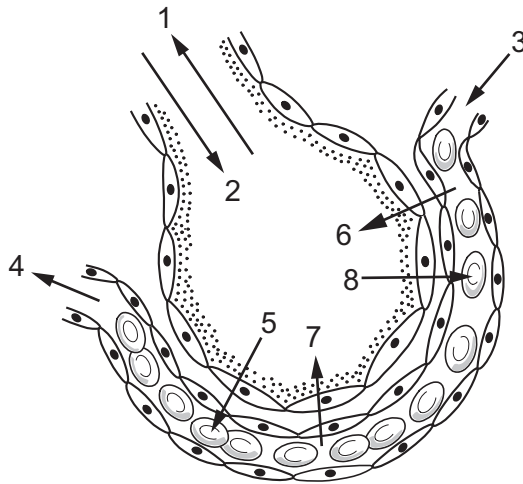
Which plant is most likely to be wilted at the end of the 24-hour period?



- 7 Which row shows correct descriptions for each of the three types of blood vessel?

	artery	capillary	vein
<b>A</b>	large lumen	thick wall	thin wall
<b>B</b>	thick wall	thin wall	valves
<b>C</b>	thick wall	valves	large lumen
<b>D</b>	valves	thin wall	small lumen

- 8 The diagram shows one alveolus and its associated capillary.



Which arrows show the direction that gases move across the surface of the alveolus?

	oxygen	carbon dioxide
<b>A</b>	1 and 5	4 and 8
<b>B</b>	2 and 7	3 and 6
<b>C</b>	4 and 6	2 and 3
<b>D</b>	5 and 8	6 and 7

- 9 The blood leaving the kidney has a different composition to the blood flowing into the kidney.

Which row describes the composition of the blood leaving the kidney compared to the composition of the blood entering the kidney?

	carbon dioxide	urea
<b>A</b>	higher	higher
<b>B</b>	higher	lower
<b>C</b>	lower	higher
<b>D</b>	lower	lower

- 10 Which row describes a hormone?

	produced by	affects	destroyed by
<b>A</b>	gland	liver	target organ
<b>B</b>	gland	target organ	liver
<b>C</b>	liver	gland	target organ
<b>D</b>	liver	target organ	gland

11 Which statements about heroin and alcohol are correct?

- 1 Alcohol and heroin are both depressant drugs.
- 2 People can become addicted to heroin but not to alcohol.
- 3 Using alcohol and heroin may increase the chance of becoming infected with HIV.

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

12 Three biological processes are listed.

- 1 excretion
- 2 photosynthesis
- 3 respiration

Which processes lead to an energy loss between trophic levels?

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

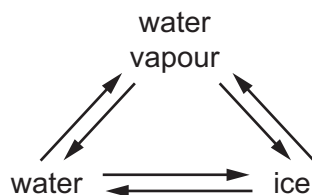
13 What is the treatment for syphilis?

- A** antibiotics
- B** correct diet
- C** using a condom
- D** sexual activity

14 Which method is used to separate the coloured dyes in a fruit drink?

- A** chromatography
- B** distillation
- C** evaporation
- D** filtration

15 In which change of state do water molecules lose energy?



- A ice → water
- B ice → water vapour
- C water vapour → ice
- D water → water vapour

16 Which row correctly compares the numbers of particles in the atoms of two isotopes of the same element?

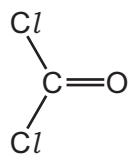
	number of electrons in each isotope	number of neutrons in each isotope	number of protons in each isotope
<b>A</b>	different	different	same
<b>B</b>	different	same	different
<b>C</b>	same	different	same
<b>D</b>	same	same	different

17 Magnesium chloride,  $MgCl_2$ , is an ionic compound.

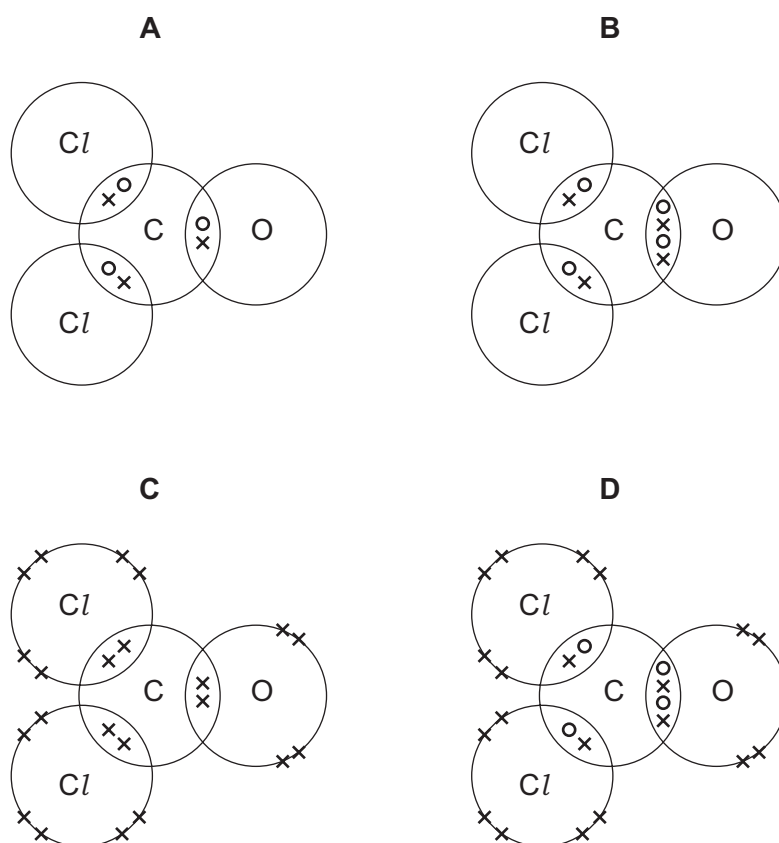
Which statement describes the formation of the ionic bonds in this compound?

- A A magnesium atom gains two electrons and two chlorine atoms each gain an electron.
- B A magnesium atom gains two electrons and two chlorine atoms each lose an electron.
- C A magnesium atom loses two electrons and two chlorine atoms each gain an electron.
- D A magnesium atom loses two electrons and two chlorine atoms each lose an electron.

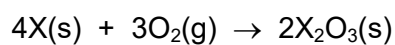
18 The diagram shows the structure of carbonyl dichloride (phosgene).



Which dot-and-cross diagram shows the arrangement of the outer electrons in a molecule of carbonyl dichloride?



19 The equation shows the reaction of element X with oxygen.



The relative molecular mass,  $M_r$ , of the product is 152.

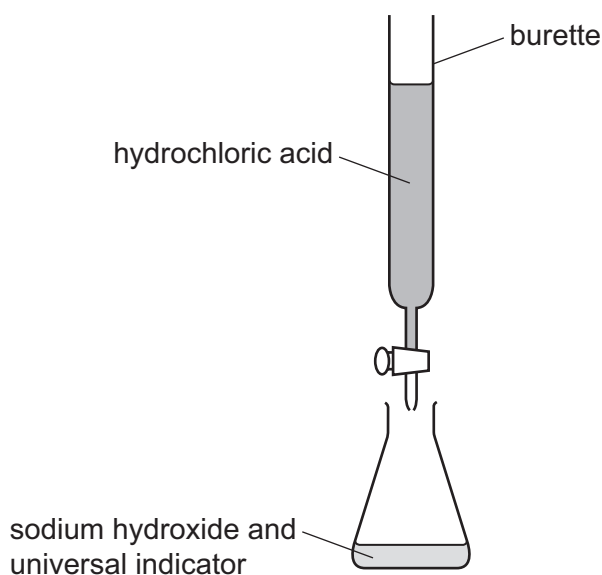
What is the relative atomic mass,  $A_r$ , of element X?

- A** 28                      **B** 52                      **C** 64                      **D** 128



20 A small quantity of aqueous sodium hydroxide and universal indicator is placed in a conical flask.

An excess of hydrochloric acid is added to a burette.



Which row describes the change in indicator colour and the change in pH when all the acid is added to the flask?

	change in indicator colour	change in pH
<b>A</b>	blue to red	increase
<b>B</b>	blue to red	decrease
<b>C</b>	red to blue	increase
<b>D</b>	red to blue	decrease

21 P, Q, R and S are four elements in Period 3 of the Periodic Table.

P forms a basic oxide.

Atoms of Q have six electrons in their outer shell.

R forms compounds containing the  $R^-$  ion.

S is in Group II of the Periodic Table.

Which elements are metals?

- A** P and Q      **B** P and S      **C** Q and R      **D** R and S

22 Which row describes the electrical conductivity of a metal when solid and when molten?

	electrical conductivity when solid	electrical conductivity when molten
<b>A</b>	conductor	conductor
<b>B</b>	conductor	insulator
<b>C</b>	insulator	conductor
<b>D</b>	insulator	insulator

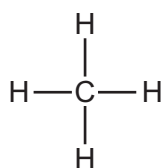
23 Which metals are used to make brass?

- A** copper and aluminium
- B** copper and iron
- C** copper and tin
- D** copper and zinc

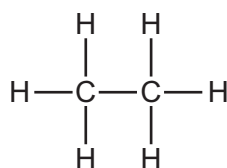
24 What is the second most abundant gas in clean, dry air?

- A** argon
- B** carbon dioxide
- C** nitrogen
- D** oxygen

25 The names and molecular structures of two alkanes are shown.



methane



ethane

What is the next alkane in the homologous series?

	name	formula
<b>A</b>	propene	$\text{C}_3\text{H}_6$
<b>B</b>	propene	$\text{C}_3\text{H}_8$
<b>C</b>	propane	$\text{C}_3\text{H}_6$
<b>D</b>	propane	$\text{C}_3\text{H}_8$

26 A liquid mixture containing five different hydrocarbons is separated in a fractionating tower.

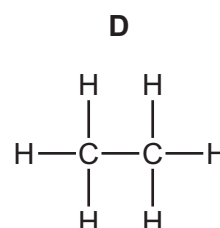
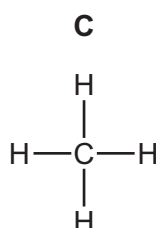
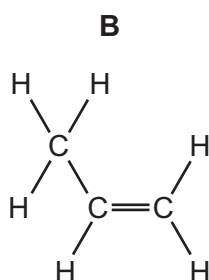
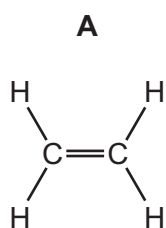
The boiling points of the five different hydrocarbons are 197 °C, 118 °C, 80 °C, 150 °C and 118 °C.

Which row shows the number of fractions obtained, and the boiling point of the hydrocarbon that condenses nearest to the top of the tower?

	number of fractions	boiling point of hydrocarbon condensing nearest top of tower / °C
<b>A</b>	5	80
<b>B</b>	4	80
<b>C</b>	5	197
<b>D</b>	4	197

27 Ethane gas is heated to produce hydrogen gas and another gas, Y, which decolourises aqueous bromine.

What is the structural formula of Y?



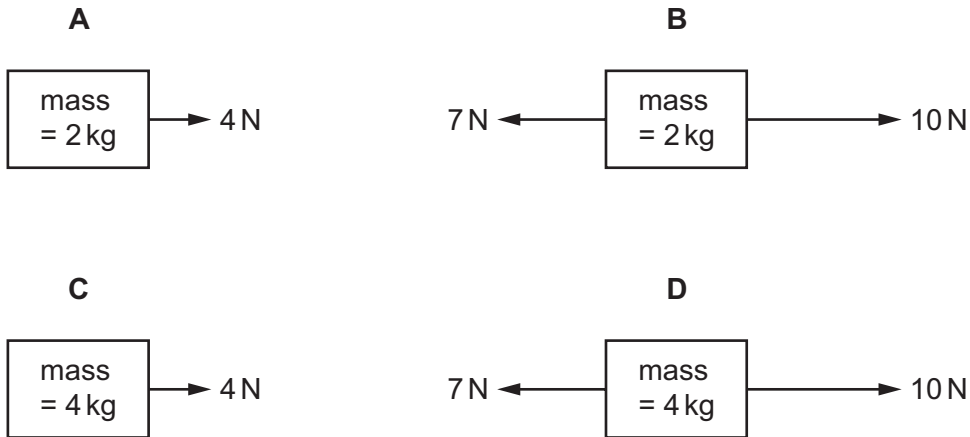
28 What is the best instrument to measure a thickness of 0.25 mm?

- A** metre rule
- B** micrometer
- C** newton meter
- D** 30 cm ruler

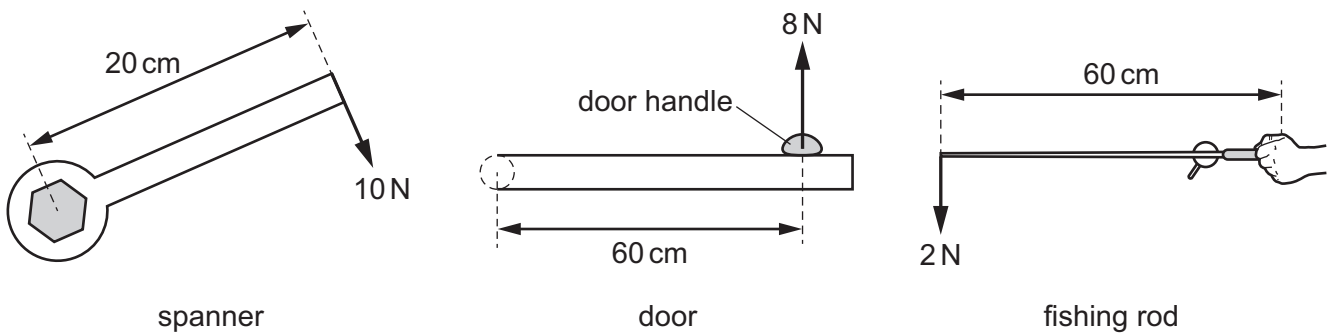
29 The diagrams show the forces acting on four moving objects and their masses.

Each object is moving towards the right.

Which diagram shows the object with the greatest acceleration?



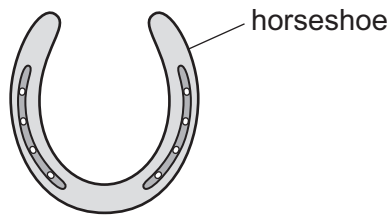
30 The diagrams show objects that have different forces applied to them to cause a moment.



What is the correct order for the size of the moment produced by each force?

	smallest moment	→	largest moment
<b>A</b>	door	fishing rod	spanner
<b>B</b>	door	spanner	fishing rod
<b>C</b>	fishing rod	door	spanner
<b>D</b>	fishing rod	spanner	door

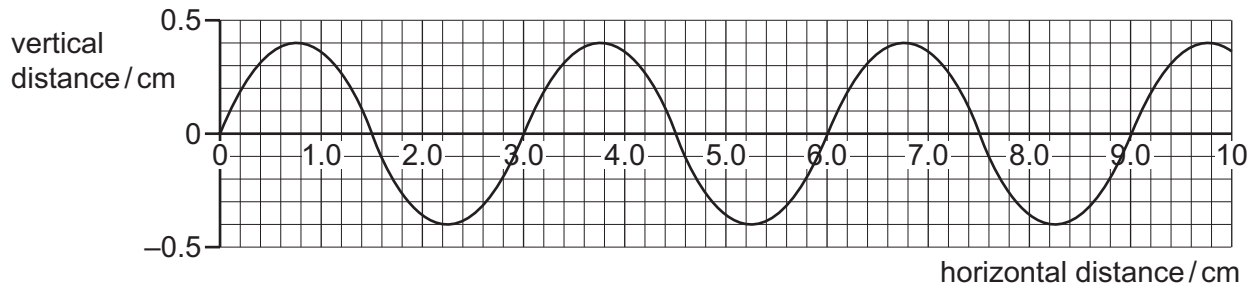
- 31 A horseshoe can be made from a piece of metal by first heating it and then hitting it with a hammer to apply a force.



Which property of the metal changes during the hammering action?

- A density
  - B mass
  - C shape
  - D volume
- 32 A man does work by pulling a suitcase across rough ground.  
How can he do twice as much work?
- A by pulling with the same force for half the distance
  - B by pulling with the same force for twice the distance
  - C by pulling with twice the force for half the distance
  - D by pulling with twice the force for twice the distance
- 33 To mark a temperature scale on a thermometer, the temperatures of two fixed points are needed.  
What are these fixed points?
- A room temperature and body temperature
  - B the highest and lowest temperatures that can be found in a laboratory
  - C the temperatures at which mercury under standard conditions freezes and boils
  - D the temperatures at which water under standard conditions freezes and boils

34 The diagram shows a graph of a wave.



Which row gives the wavelength and amplitude of this wave?

	wavelength/cm	amplitude/cm
<b>A</b>	1.5	0.4
<b>B</b>	1.5	0.8
<b>C</b>	3.0	0.4
<b>D</b>	3.0	0.8

35 Which component of the electromagnetic spectrum has a frequency between the frequencies of gamma-rays and ultraviolet?

- A** infrared
- B** microwaves
- C** visible light
- D** X-rays

36 What is the unit of potential difference?

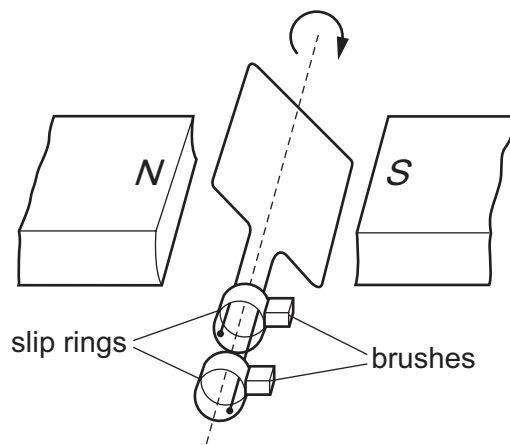
- A** joule
- B** ohm
- C** volt
- D** watt

37 An electric kettle uses a current of 8 A. The circuit is protected by a fuse in the mains plug.

Which row gives the value of a suitable fuse and the wire to which the fuse is connected?

	fuse value / A	wire
<b>A</b>	5	earth
<b>B</b>	5	live
<b>C</b>	13	earth
<b>D</b>	13	live

38 The simple generator shown contains brushes and slip rings.



Which material is used for the brushes and what is the output from the generator?

	brush material	output from the generator
<b>A</b>	carbon	a.c.
<b>B</b>	carbon	d.c.
<b>C</b>	glass	a.c.
<b>D</b>	glass	d.c.

39 A nuclide can be represented by the symbol shown.



A particular nuclide has 15 protons and 16 neutrons.

Which row gives the values of A and Z for this nuclide?

	A	Z
<b>A</b>	16	15
<b>B</b>	16	31
<b>C</b>	31	15
<b>D</b>	31	16

40 How is an alpha-particle different from a beta-particle?

- A** An alpha-particle causes less ionisation than a beta-particle in air.
- B** An alpha-particle has a positive charge and a beta-particle has a negative charge.
- C** An alpha-particle has less mass than a beta-particle.
- D** An alpha-particle travels further than a beta-particle in air.







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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	11 Na sodium 23	12 Mg magnesium 24	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	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 Ac actinium —	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 —								
		<b>Key</b> atomic number atomic symbol name relative atomic mass		1 H hydrogen 1																		

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.).