Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/12**

Paper 1 Multiple Choice **October/November 2024**

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.

IB24 11_5129_12/3RP

1 A cube of potato is placed in coloured water.

Which combination of cube size and water temperature allows the colour in the water to reach the centre of the potato cube most quickly?

	cube size	temperature / °C
A	smaller	10
B	smaller	35
C	larger	10
D	larger	35

2 Which statements about enzymes are correct?

1 Enzymes control the rate of a cell's metabolic activities.

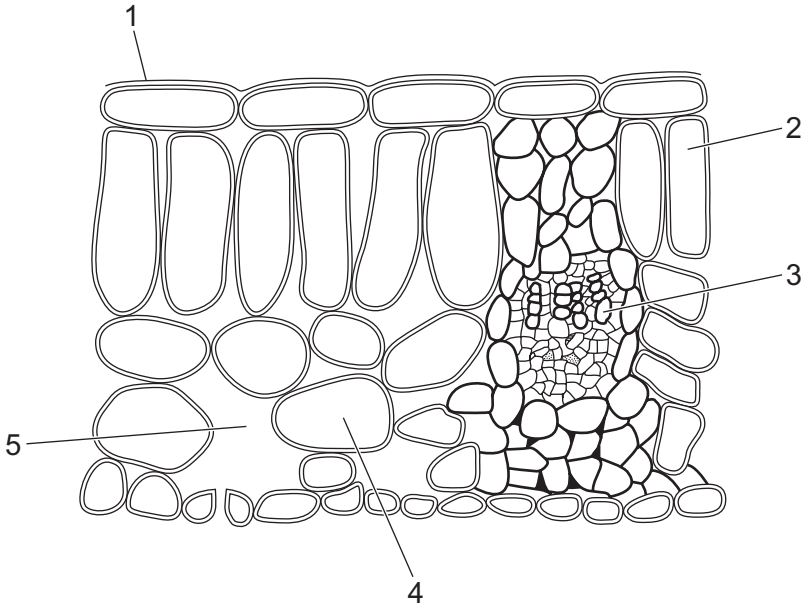
2 Enzymes are changed in reactions.

3 Enzymes are proteins.

4 Enzymes are unaffected by changes in pH.

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

3 The diagram shows a cross-section of a leaf.



Which numbers point to cells containing chloroplasts?

A 1, 3 and 5 **B** 1 and 3 only **C** 2 and 4 **D** 4 and 5

4 Which pathway is taken by water as it travels from the soil to leaves?

A root hair cells → root cortex → xylem → mesophyll cells

B root cortex → root hair cells → xylem → stomata cells

C root hair cells → xylem → root cortex → mesophyll cells

D xylem → phloem → mesophyll cells → stomata cells

5 Which blood vessel carries the nutrients absorbed from the ileum to the liver?

A hepatic artery

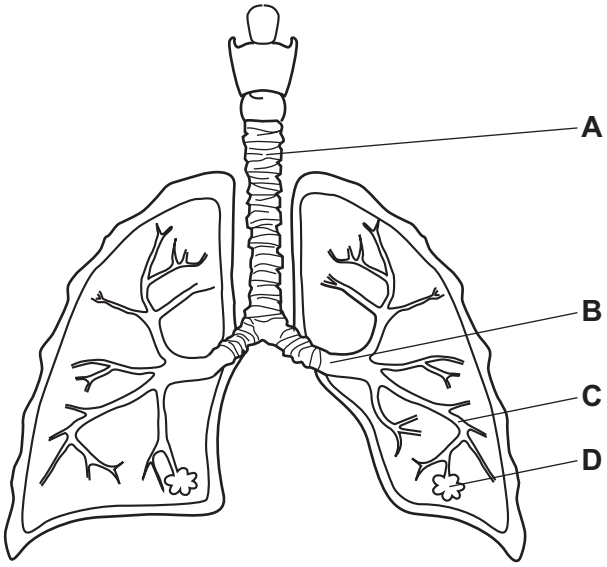
B hepatic portal vein

C pulmonary artery

D pulmonary vein

6 The diagram shows the human breathing system.

Where does diffusion of oxygen and carbon dioxide take place?



7 Which statements about aerobic respiration are correct?

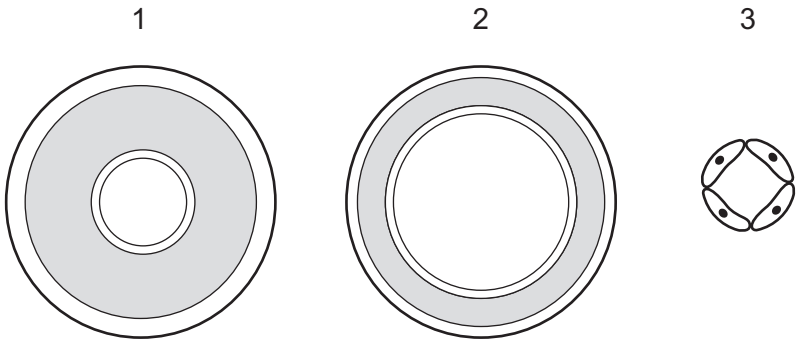
1 Aerobic respiration releases more energy per molecule of glucose than anaerobic respiration.

2 The waste products of aerobic respiration are lactic acid and carbon dioxide.

3 Aerobic respiration needs oxygen.

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

8 Which row correctly identifies blood vessels 1, 2 and 3?



	1	2	3
A	artery	capillary	vein
B	artery	vein	capillary
C	vein	artery	capillary
D	vein	capillary	artery

9 What is **not** an effect of alcohol consumption?

A addiction to alcohol

B brain damage

C liver damage

D quicker reaction time

10 Which statements about hormones are correct?

1 They are an electrical impulse.

2 They are carried by neurones.

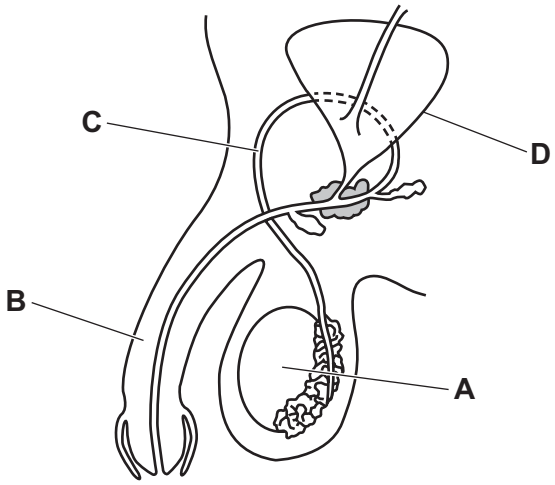
3 They are produced by glands.

4 They target specific organs.

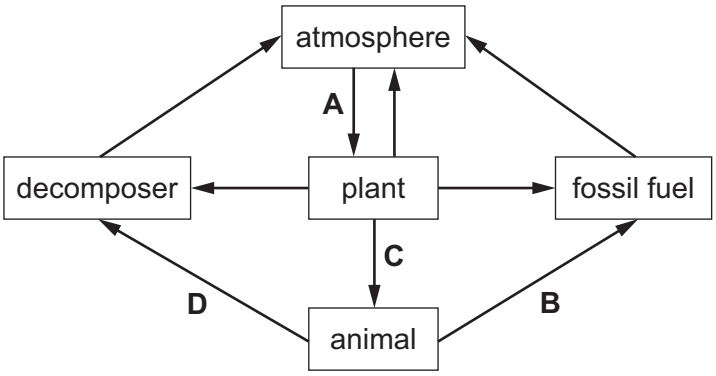
A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

11 The diagram shows the male reproductive organs.

Which structure produces a hormone?



12 Which letter correctly labels the process in the carbon cycle shown?



A photosynthesis

B combustion

C decomposition

D respiration

13 What are the consequences of the deforestation of areas of tropical rainforests?

	erosion of top soil	flooding	raised carbon dioxide level in the air
A	yes	yes	no
B	yes	no	yes
C	no	yes	yes
D	yes	yes	yes

[Turn over

14 Which statements describe the particles in a gas?

1 When the pressure is increased, the particles move closer together.

2 The particles are in constant random motion.

3 The particles are vibrating around a fixed point.

4 The particles are arranged in a regular pattern.

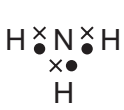
A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

15 Which row shows the properties of a proton?

	relative charge	relative mass
A	–1	1
B	0	negligible
C	+1	1
D	+1	negligible

16 Which dot-and-cross diagram for ammonia, NH_3, is correct?

A



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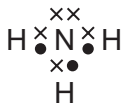

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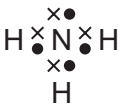

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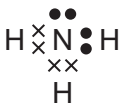


17 The equation shows the reaction between sodium and water.

$$x\text{Na} + y\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$$

What are the values of *x* and *y* for the equation to be balanced?

	x	*y*
A	1	1
B	1	2
C	2	1
D	2	2

18 The equation for the reaction between zinc and aqueous copper(II) sulfate is shown.

$$CuSO_4 + Zn \rightarrow Cu + ZnSO_4$$

What is the mass of copper displaced when 6.5 g of zinc is added to an excess of aqueous copper(II) sulfate?

A 0.64 g **B** 6.4 g **C** 64 g **D** 160 g

19 Which statement about energy changes is correct?

A Cracking of alkanes requires a very high temperature and is a strongly exothermic process.

B Complete combustion of fuels is exothermic but incomplete combustion is endothermic.

C When ammonium nitrate is dissolved in water, energy is transferred from the surroundings.

D When an acid reacts with an alkali, the temperature of the surroundings decreases.

20 Which processes are physical changes?

1 condensing

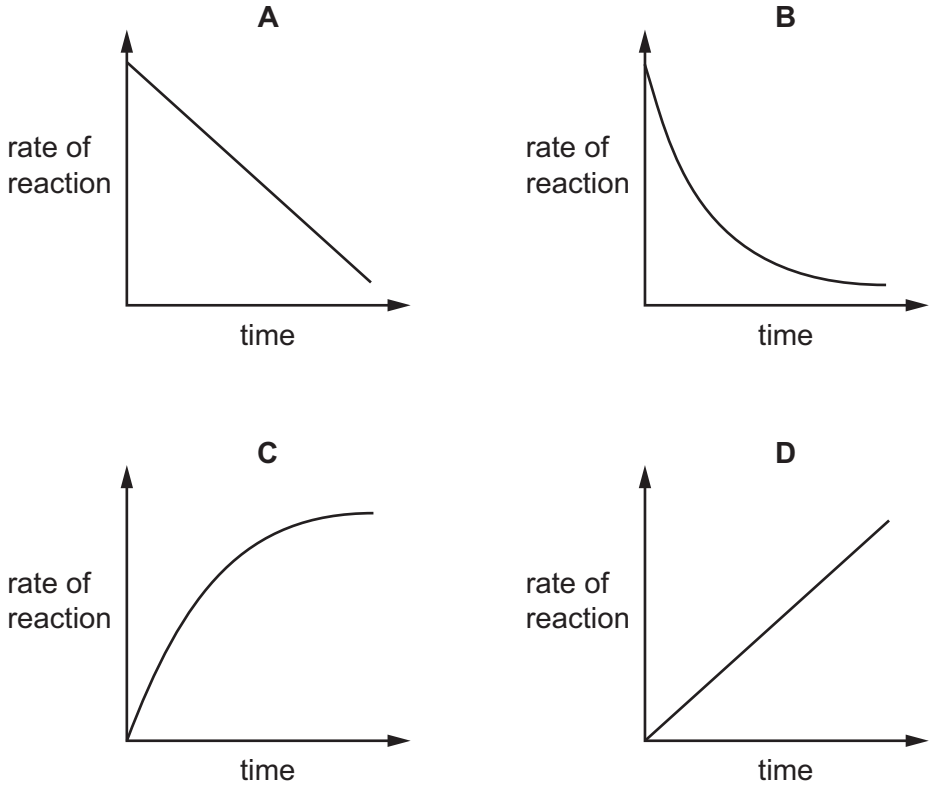
2 evaporating

3 cracking

4 neutralising

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

21 Which graph shows how the rate of the reaction between magnesium and an excess of dilute hydrochloric acid changes with time?



22 What is the test for hydrogen?

A Hydrogen extinguishes a lighted splint.

B Hydrogen pops with a glowing splint.

C Hydrogen pops with a lighted splint.

D Hydrogen relights a glowing splint.

23 X, Y and Z are elements in Group I of the Periodic Table.

Y has a higher melting point than X.

Z reacts less violently with water than Y.

Which row identifies elements X, Y and Z?

	X	Y	Z
A	potassium	sodium	lithium
B	potassium	lithium	sodium
C	lithium	sodium	potassium
D	sodium	potassium	lithium

24 A more reactive metal displaces a less reactive metal from an aqueous solution of its ions.

Four unknown metals W, X, Y and Z react as shown.

$W(s) + X^{2+}(aq) \rightarrow$ no reaction

$X(s) + Y^{3+}(aq) \rightarrow$ a reaction

$Z(s) + W^{+}(aq) \rightarrow$ a reaction

$X(s) + Z^{2+}(aq) \rightarrow$ a reaction

$Z(s) + Y^{3+}(aq) \rightarrow$ no reaction

What is the order of reactivity, putting the most reactive first?

A $W \rightarrow X \rightarrow Y \rightarrow Z$

B $X \rightarrow W \rightarrow Z \rightarrow Y$

C $X \rightarrow Y \rightarrow Z \rightarrow W$

D $Z \rightarrow X \rightarrow W \rightarrow Y$

25 Why is chlorine used in the treatment of domestic water supplies?

A It kills microbes in the water.

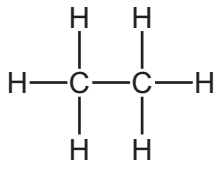
B It neutralises any acidity in the water.

C It removes solids from the water.

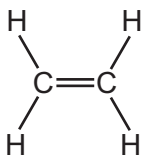
D It removes tastes and smells.

26 Which structure represents propene?

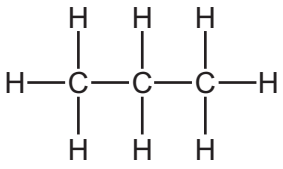
A



B



C



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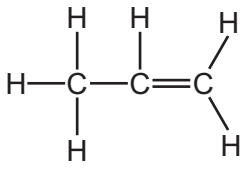


27 Which substances can be produced by cracking alkanes?

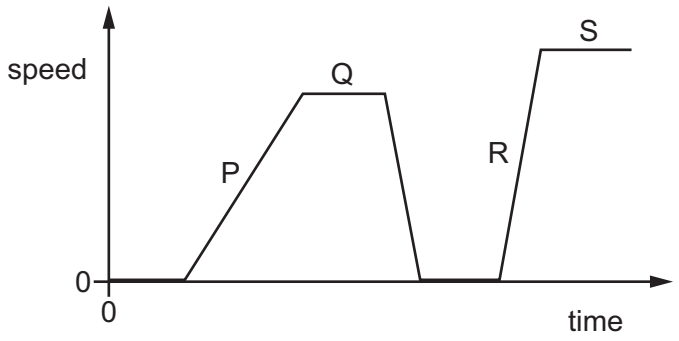
1 water

2 hydrogen

3 ethene

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

28 The diagram shows a speed–time graph for a bus.



Which statement about the motion of the bus is correct?

A The acceleration is greater in section P than in section R.

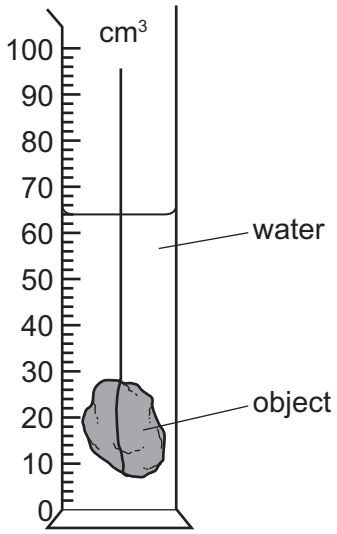
B The acceleration is not constant in section P or in section R.

C The bus is at rest in section Q and in section S.

D The speed is constant in section Q and in section S.

29 An object has a mass of 28 g and a density of 1.4 g / cm^3.

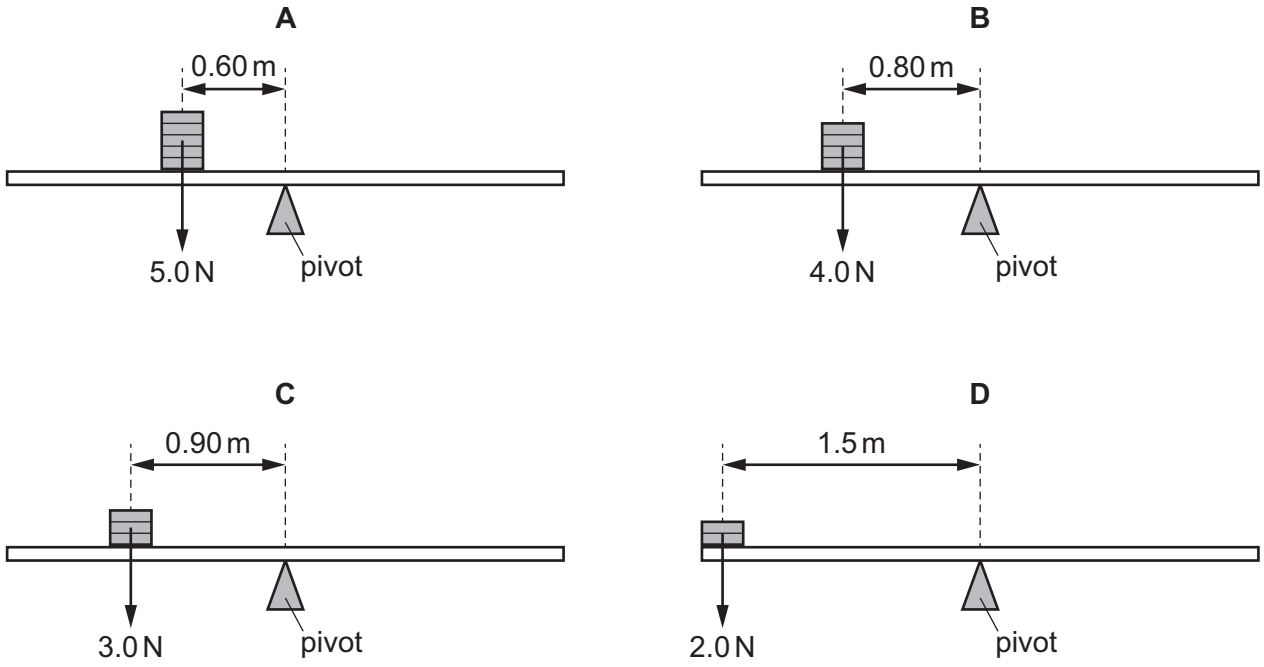
It is lowered into a measuring cylinder containing a volume of water as shown in the diagram.



What is the volume of the water in the measuring cylinder?

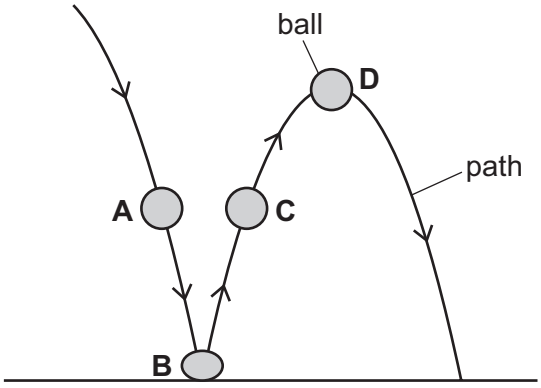
A 20 cm^3 **B** 36 cm^3 **C** 44 cm^3 **D** 64 cm^3

30 In which diagram does the force produce the largest moment about the pivot?



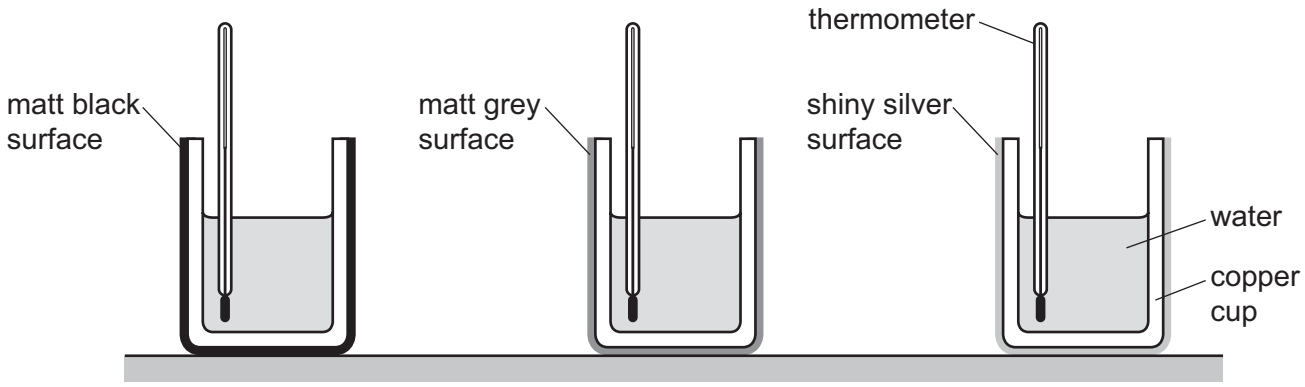
31 The diagram shows the path followed by a bouncing ball.

At which point is kinetic energy being transferred to gravitational potential energy?



32 The diagram shows three identical copper cups, each containing an identical thermometer. Each cup also contains 50 cm^3 of water, initially at 80 °C.

Each cup has a different surface as shown.



What is the experiment designed to distinguish between?

A accurate and inaccurate thermometers

B good and bad absorbers of infrared radiation

C good and bad conductors of thermal energy

D good and bad emitters of infrared radiation

33 Which pair of wave terms can be measured in millimetres?

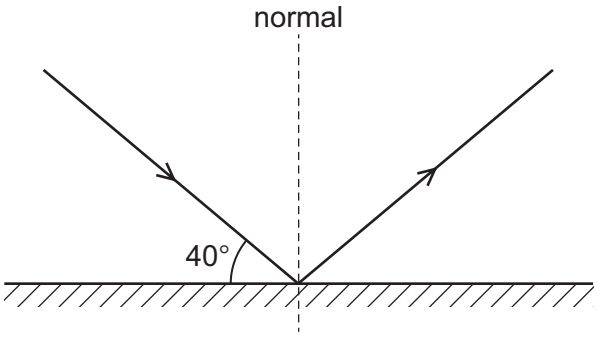
A amplitude and wavelength

B frequency and speed

C speed and amplitude

D wavelength and frequency

34 The diagram shows a light ray reflected by a plane mirror.

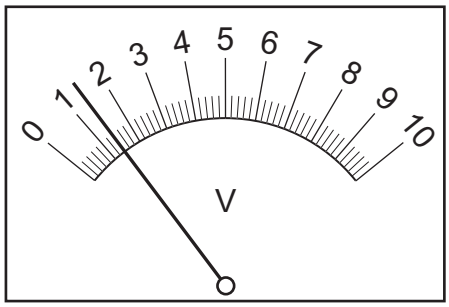


What is the angle between the incident and reflected rays?

A 40° **B** 50° **C** 80° **D** 100°

35 A voltmeter is connected across a 2.0 Ω resistor. There is a current in the resistor.

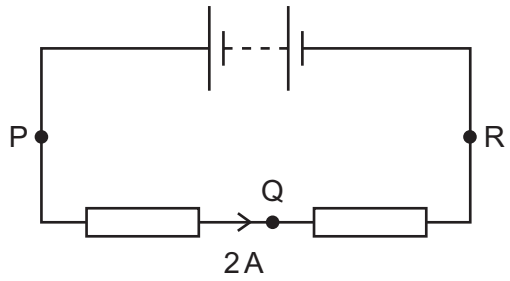
The diagram shows the reading on the voltmeter.



What is the current in the resistor?

A 0.60 A **B** 0.70 A **C** 1.4 A **D** 2.8 A

36 The circuit diagram shows two resistors connected to a battery.



The current at position Q is 2 A.

What is the current at position P and at position R?

	current at P	current at R
A	equal to 2 A	equal to 2 A
B	equal to 2 A	less than 2 A
C	greater than 2 A	equal to 2 A
D	greater than 2 A	less than 2 A

37 Which electrical appliance is designed to make use of the heating effect of an electric current?

A drill

B fan

C kettle

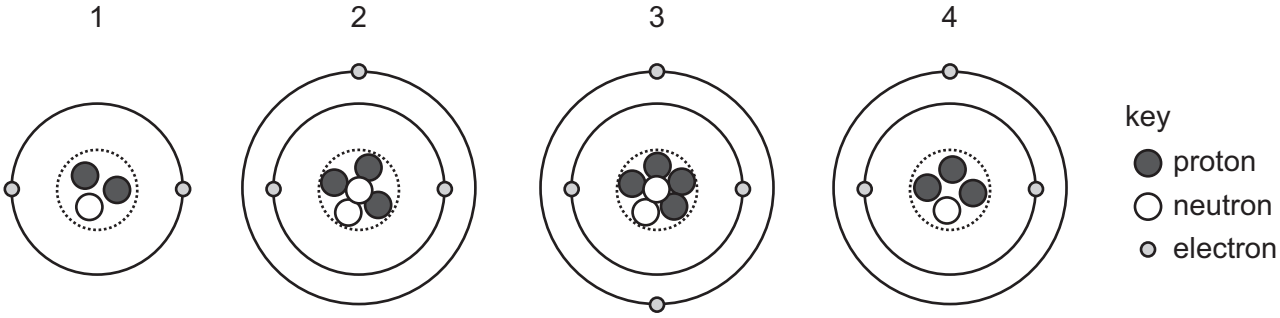
D modern television

38 A 2.0 kW electric heater is connected to a 240 V supply.

What is the current in the heater?

A 0.12 A **B** 8.3 A **C** 120 A **D** 480 A

39 The diagrams represent four different atoms.



Which two atoms are isotopes of the same element?

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

40 Which type of radiation has the greatest ionising effect?

A alpha-particle radiation

B beta-particle radiation

C gamma radiation

D ultraviolet radiation

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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.).