



# Cambridge O Level

**COMBINED SCIENCE**

**5129/11**

Paper 1 Multiple Choice

**May/June 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

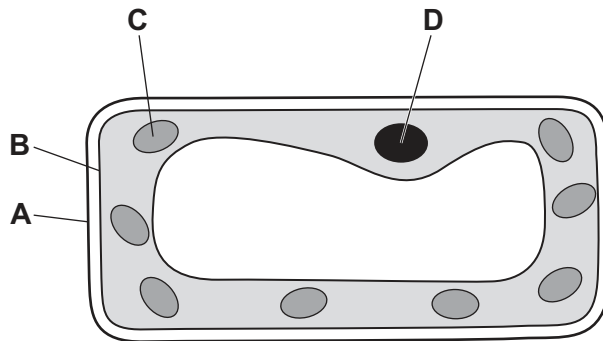
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **20** pages. Any blank pages are indicated.



1 The diagram shows a plant cell.

Which structure controls the passage of substances into and out of the cell?



2 Which statement describes osmosis?

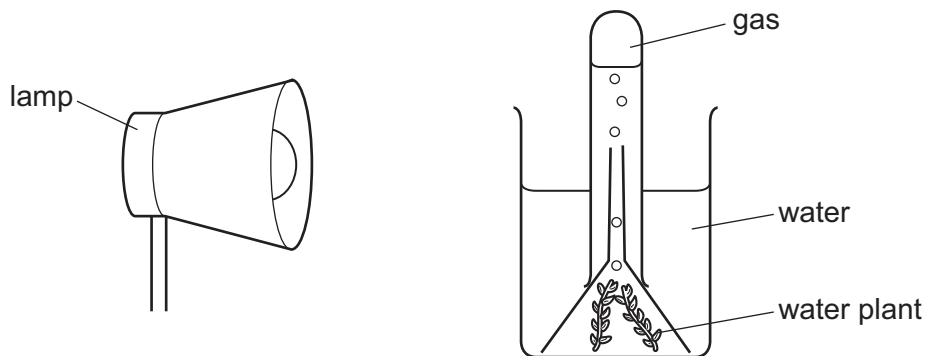
- A the passage of water molecules from a region of their higher concentration to a region of their lower concentration through a partially permeable membrane
- B the passage of water molecules from a region of their higher concentration to a region of their lower concentration through a permeable membrane
- C the passage of water molecules from a region of their lower concentration to a region of their higher concentration through a partially permeable membrane
- D the passage of water molecules from a region of their lower concentration to a region of their higher concentration through a permeable membrane

3 Why are enzymes needed for seed germination?

- A to absorb water
- B to break down starch
- C to release oxygen
- D to synthesise glucose

- 4 The diagram shows an experiment which measures the gas given off by a water plant during photosynthesis.

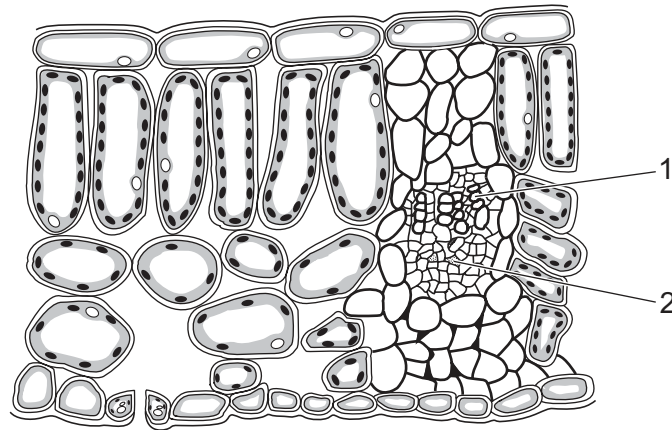
The distance between the lamp and the water plant is varied and the volume of gas given off in 30 minutes is measured.



At which distance between the lamp and the plant is the most gas collected in 30 minutes?

- A** 10 cm      **B** 25 cm      **C** 40 cm      **D** 75 cm
- 5 By which process does food pass down the oesophagus?
- A** assimilation  
**B** ingestion  
**C** peristalsis  
**D** phagocytosis

6 The diagram shows a cross-section of a dicotyledonous leaf.



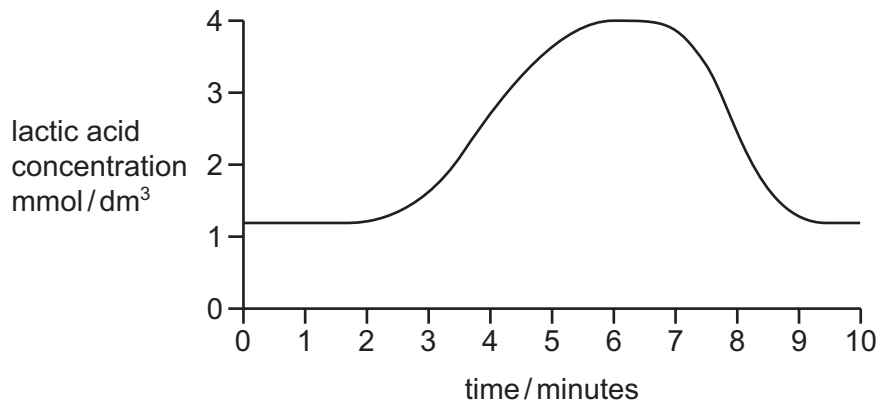
What are the functions of tissues 1 and 2 in a leaf?

	function of tissue 1	function of tissue 2
<b>A</b>	transports sugars away from a leaf	transports water and ions towards the leaf
<b>B</b>	transports sugars towards a leaf	transports water and ions away from the leaf
<b>C</b>	transports water and ions away from a leaf	transports sugars towards a leaf
<b>D</b>	transports water and ions towards a leaf	transports sugars away from a leaf

7 When a person has coronary heart disease, which blood vessels are blocked?

- A** capillaries
- B** coronary arteries
- C** coronary veins
- D** pulmonary arteries

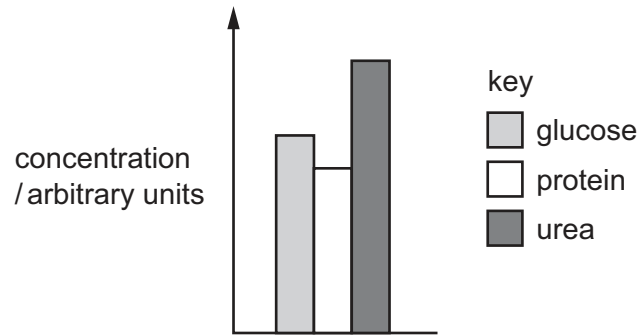
- 8 The graph shows changes in the concentration of lactic acid in the muscles of an athlete both during and after a race.



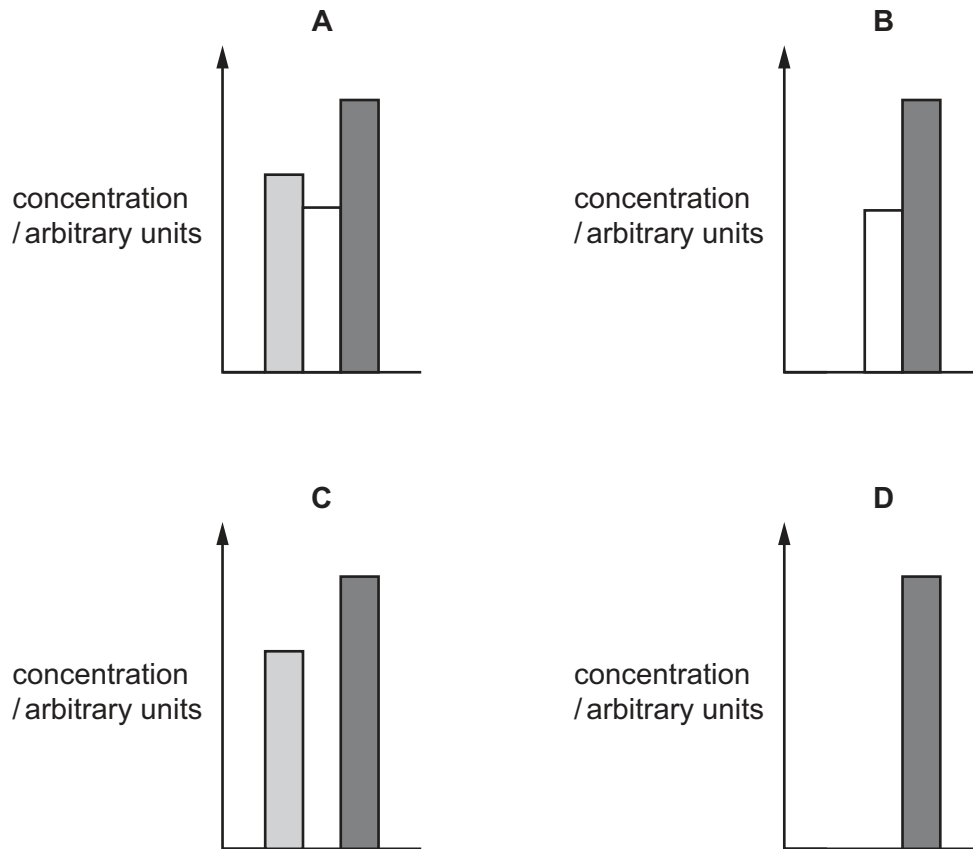
At which time does the athlete finish the race?

- A 1 minute
- B 3 minutes
- C 7 minutes
- D 10 minutes

- 9 The graph shows the concentration of glucose, protein and urea in the blood of a healthy person.



Which graph shows the concentration of these substances in the urine of the same person?



- 10 Which structure in the eye detects the changes in the brightness of light and which structure causes the change in the size of the pupil?

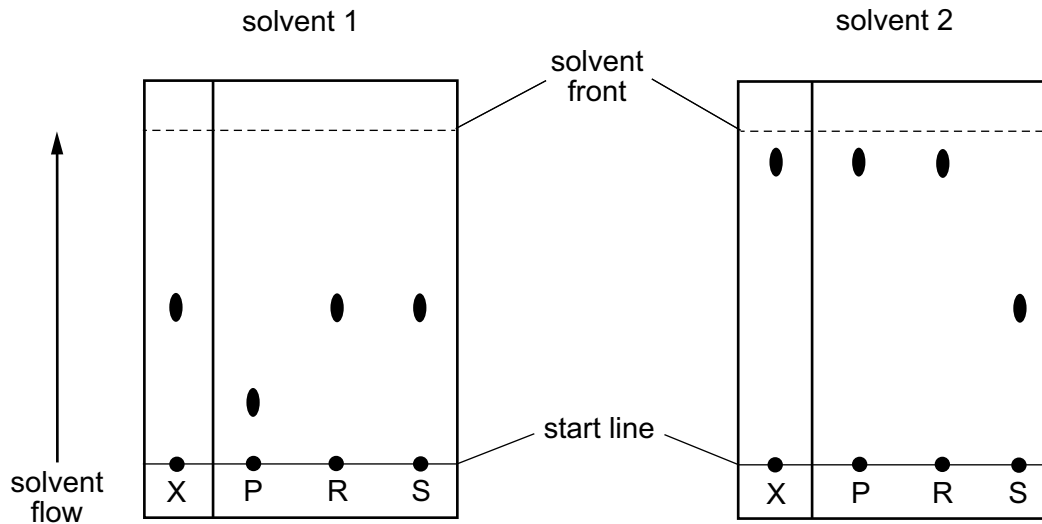
	structure detecting brightness of light	structure causing change in the size of the pupil
<b>A</b>	lens	ciliary muscles
<b>B</b>	retina	iris muscles
<b>C</b>	retina	ciliary muscles
<b>D</b>	lens	iris muscles

- 11 What is the name of a substance which is externally administered and modifies chemical reactions in the body?
- A drug
  - B enzyme
  - C hormone
  - D toxin
- 12 In a biological system, what is the principal source of energy input?
- A a consumer
  - B a producer
  - C the Earth
  - D the Sun
- 13 Which statements are correct for asexual and sexual reproduction?
- 1 Asexual reproduction involves two parents.
  - 2 Sexual reproduction involves making zygotes.
  - 3 Sexual reproduction produces offspring that are genetically dissimilar.
- A 1, 2 and 3    B 1 and 3 only    C 2 and 3 only    D 3 only

- 14 Solution X contains one or more of three substances, P, R and S.

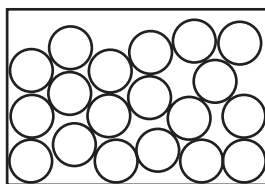
Two different solvents are used to produce two chromatograms comparing solution X with the three substances.

The results are shown.

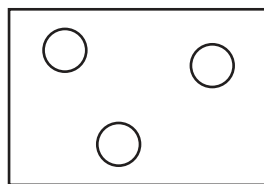


What does X contain?

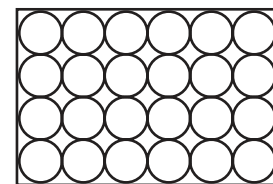
- A** P only      **B** R only      **C** P and R      **D** R and S
- 15 The arrangements of particles of a substance in three different physical states are shown.



state 1



state 2



state 3

Which statement is correct?

- A** State 1 changes to state 3 by evaporation.  
**B** State 2 changes to state 1 by freezing.  
**C** State 1 changes to state 2 by condensing.  
**D** State 3 changes to state 1 by melting.



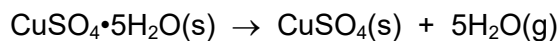
- 16 Element Q has a proton number of 11.

The element immediately before Q in the Periodic Table is element R.

R and Q are not the chemical symbols of the elements.

Which statement about element R is correct?

- A It has one less electron than element Q in its outer shell.
  - B It has one less electron shell than element Q.
  - C It is in the same group of the Periodic Table as element Q.
  - D It is in the same period of the Periodic Table as element Q.
- 17 Which element forms an ion by gaining two electrons?
- A chlorine
  - B magnesium
  - C oxygen
  - D sodium
- 18 25.0 g of hydrated copper(II) sulfate crystals are heated to produce anhydrous copper(II) sulfate and water vapour.



What is the mass of anhydrous copper(II) sulfate formed?

- A 9.0 g                      B 16.0 g                      C 22.5 g                      D 25.0 g

19 The table shows information about three oxides, X, Y and Z.

oxide	reaction with dilute hydrochloric acid	reaction with sodium hydroxide solution
X	dissolves to produce a salt	no reaction
Y	no reaction	dissolves to produce a salt
Z	dissolves to produce a salt	dissolves to produce a salt

Which row describes oxides X, Y and Z?

	X	Y	Z
<b>A</b>	acidic	basic	amphoteric
<b>B</b>	amphoteric	acidic	basic
<b>C</b>	amphoteric	basic	acidic
<b>D</b>	basic	acidic	amphoteric

20 Which statement describes a trend shown by elements going from left to right across Period 2 of the Periodic Table?

- A** They change from gases to solids.
- B** They change from metal to non-metal.
- C** They have a decreasing number of electrons.
- D** They have increasingly basic oxides.

21 A grey solid with a melting point of 1500 °C is a good electrical conductor.

It is easily hammered into shape.

Which type of substance is the grey solid?

- A** covalent compound
- B** ionic compound
- C** metallic element
- D** non-metallic element

22 Q, R, S and T are four metals.

T reacts slowly with hydrochloric acid.

Q does not react with acid.

R reacts with steam but not with cold water.

S reacts violently with cold water.

What is the order of reactivity of the four metals, most reactive first?

A Q → T → R → S

B Q → R → T → S

C S → T → R → Q

D S → R → T → Q

23 Cuprite is an ore of copper containing copper oxide.

Haematite is an ore of iron containing iron oxide.

Which statement about the extraction of these metals is correct?

A It is easier to extract copper from its ore because copper is less reactive than iron.

B It is easier to extract copper from its ore because copper oxide is less reactive than iron oxide.

C It is easier to extract iron from its ore because iron is more reactive than copper.

D It is easier to extract iron from its ore because iron oxide is more reactive than copper oxide.

24 Which two substances are essential for iron to rust?

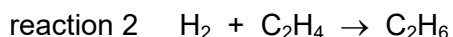
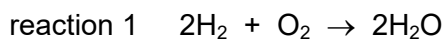
A carbon dioxide and sodium chloride

B carbon dioxide and water

C oxygen and sodium chloride

D oxygen and water

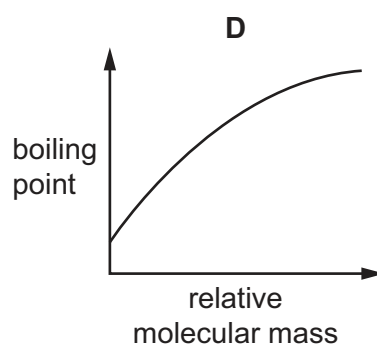
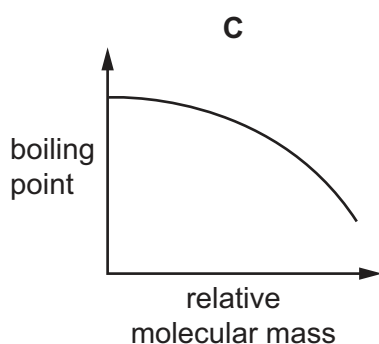
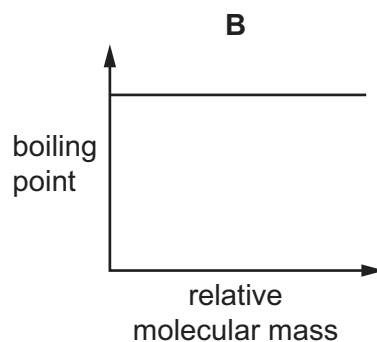
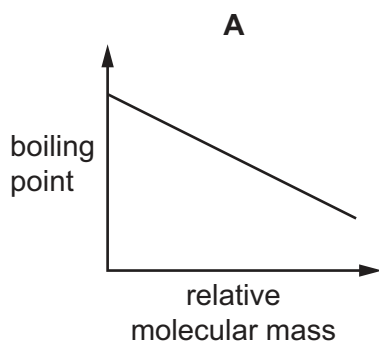
25 Two reactions of hydrogen are shown.



Which row describes the two reactions?

	reaction 1	reaction 2
<b>A</b>	combustion of $\text{H}_2$	combustion of $\text{C}_2\text{H}_4$
<b>B</b>	combustion of $\text{H}_2$	oxidation of $\text{C}_2\text{H}_4$
<b>C</b>	oxidation of $\text{H}_2$	reduction of $\text{C}_2\text{H}_4$
<b>D</b>	reduction of $\text{H}_2$	oxidation of $\text{C}_2\text{H}_4$

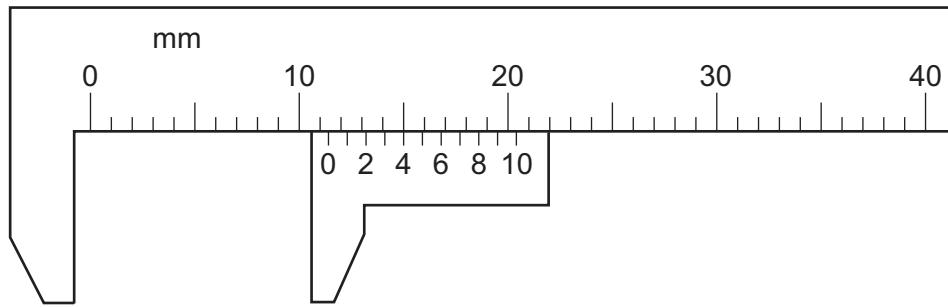
26 Which graph represents the change in boiling point of the alkanes as their relative molecular mass increases?



27 Which statement about natural gas is correct?

- A** An exothermic reaction occurs when natural gas burns.
- B** Natural gas is obtained by the fractional distillation of petroleum.
- C** Natural gas is an unsaturated hydrocarbon.
- D** The main constituent of natural gas is ethane.

28 What is the reading on the vernier callipers?



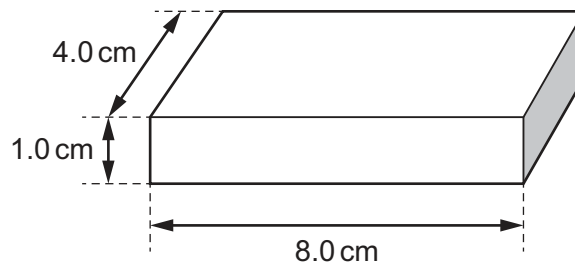
- A** 10.4 mm      **B** 11.4 mm      **C** 15.0 mm      **D** 15.4 mm

29 The velocity of a moving car is constant during part of a journey.

What is the acceleration during this time?

- A** decreasing all the time  
**B** increasing all the time  
**C** increasing, then decreasing to zero  
**D** zero all the time

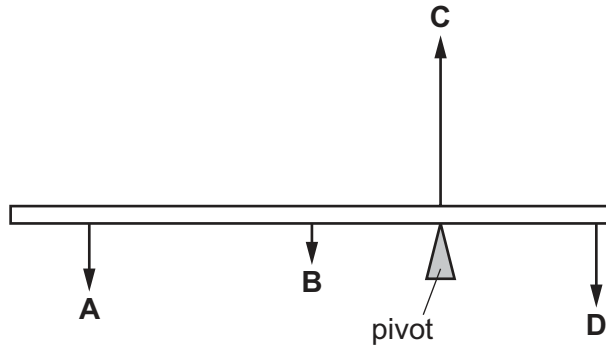
30 A rectangular block of wood has the dimensions shown and a mass of 24.0 g.



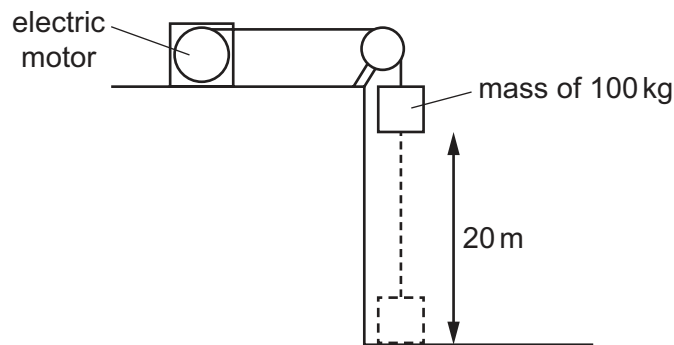
What is the density of the wood?

- A**  $0.75 \text{ g/cm}^3$       **B**  $1.33 \text{ g/cm}^3$       **C**  $1.85 \text{ g/cm}^3$       **D**  $3.00 \text{ g/cm}^3$

- 31 The diagram shows a uniform beam resting on a pivot.  
The beam is in equilibrium with four forces acting on it.  
Which force has a moment of zero about the pivot?



- 32 An electric motor lifts a mass of 100 kg through a vertical distance of 20 m.  
Gravitational field strength is 10 N/kg.



How much work is done by the motor to lift the mass?

- A** 5 J                      **B** 50 J                      **C** 2000 J                      **D** 20000 J
- 33 The following statements can be used to explain how an electrical element heats all of the water in a kettle.
- 1 The density of the heated water decreases.
  - 2 Cooler water sinks to replace the rising heated water.
  - 3 Water molecules gain kinetic energy from the heat supplied.
  - 4 The heated water rises.

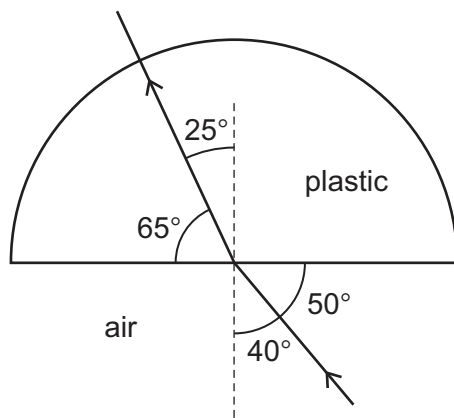
What is the order of the statements which explains how all of the water in the kettle is heated?

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

34 Which wave terms are measured in millimetres?

- A amplitude and speed
- B amplitude and wavelength
- C frequency and speed
- D frequency and wavelength

35 The diagram shows a ray of light passing into a semi-circular block of plastic.



What is the refractive index of the plastic?

- A 1.5
- B 1.6
- C 1.8
- D 2.0

36 Radio waves, visible light and X-rays are all components of the electromagnetic spectrum.

What is the order of increasing wavelength?

	shortest wavelength	→	longest wavelength
A	visible light	radio waves	X-rays
B	visible light	X-rays	radio waves
C	X-rays	radio waves	visible light
D	X-rays	visible light	radio waves

37 Which statement about the e.m.f. of a cell or battery is correct?

- A The e.m.f. is measured in volts per coulomb.
- B The e.m.f. is a gravitational force.
- C The e.m.f. is the amount of charge dissipated from a battery.
- D The e.m.f. is the energy dissipated in driving unit charge round a complete circuit.

38 An electric iron of power 800 W is used with a mains supply voltage of 240 V.

Which fuse value should be used in the mains plug?

- A 1 A                      B 3 A                      C 5 A                      D 13 A

39 What is an example of induced magnetism?

- A a magnetised compass needle pointing north  
B a north pole attracting iron filings  
C a north pole repelling a north pole  
D a negatively charged balloon attracting small pieces of paper

40 Which pair of nuclides both contain six neutrons?

- A  ${}^1_5\text{B}$  and  ${}^{12}_6\text{C}$     B  ${}^{11}_5\text{B}$  and  ${}^{14}_7\text{N}$     C  ${}^{12}_6\text{C}$  and  ${}^{14}_7\text{N}$     D  ${}^{14}_7\text{N}$  and  ${}^{16}_8\text{O}$







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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										
55 Cs caesium 133	88 Ba barium 137	89 La lanthanoids	90 Ce cerium 140	91 Pr praseodymium 141	92 Nd neodymium 144	93 Pm promethium	94 Sm samarium 150	95 Eu europium 152	96 Gd gadolinium 157	97 Tb terbium 159	98 Dy dysprosium 163	99 Ho holmium 165	100 Er erbium 167	101 Tm thulium 169	102 Yb ytterbium 173	103 Lu lutetium 175	104 Hf hafnium 178	105 Ta tantalum 181	106 W tungsten 184	107 Re rhenium 186	108 Os osmium 190	109 Ir iridium 192	110 Pt platinum 195	111 Au gold 197	112 Hg mercury 201	113 Tl thallium 204	114 Pb lead 207	115 Bi bismuth 209	116 Po polonium	117 At astatine	118 Rn radon
87 Fr francium	88 Ra radium	89 Ac actinoids	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	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 Lv livermorium	116 Ts tennessine	117 Og oganeson	118 Uue unbinilium

## Key

atomic number  
atomic symbol  
name  
relative atomic mass

1

H

hydrogen

1

lanthanoids

actinoids

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