



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

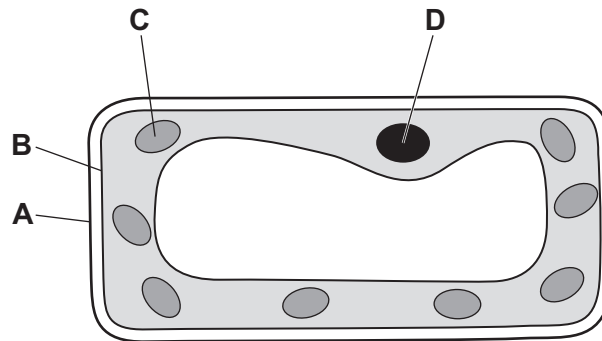
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

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?

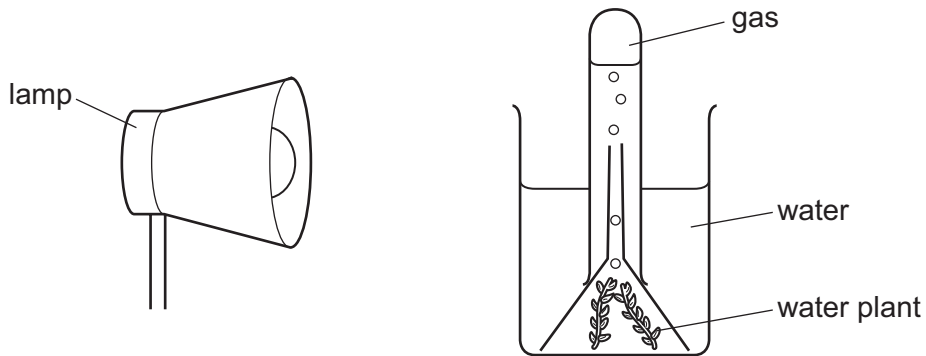
- A the passage of water molecules from a region of their higher concentration to a region of their lower concentration through a partially permeable membrane
- B the passage of water molecules from a region of their higher concentration to a region of their lower concentration through a permeable membrane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

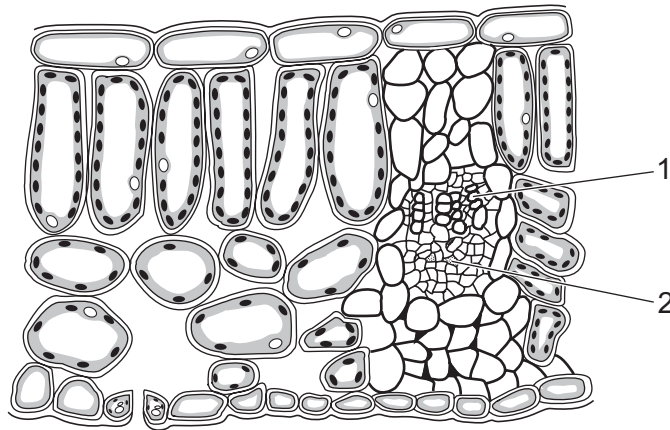


At which distance between the lamp and the plant is the most gas collected in 30 minutes?

- 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.



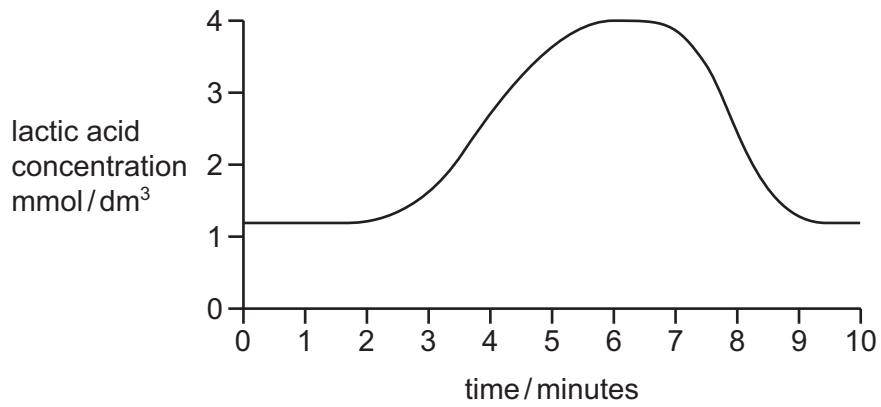
What are the functions of tissues 1 and 2 in a leaf?

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

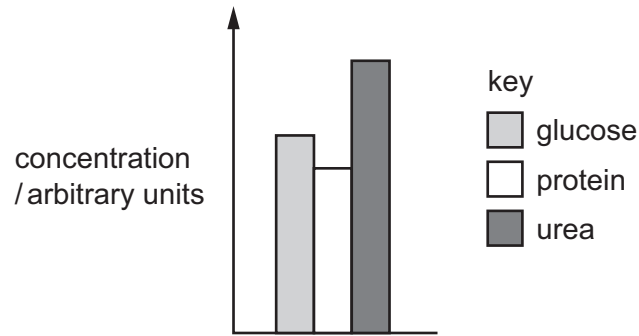
- 8 The graph shows changes in the concentration of lactic acid in the muscles of an athlete both during and after a race.



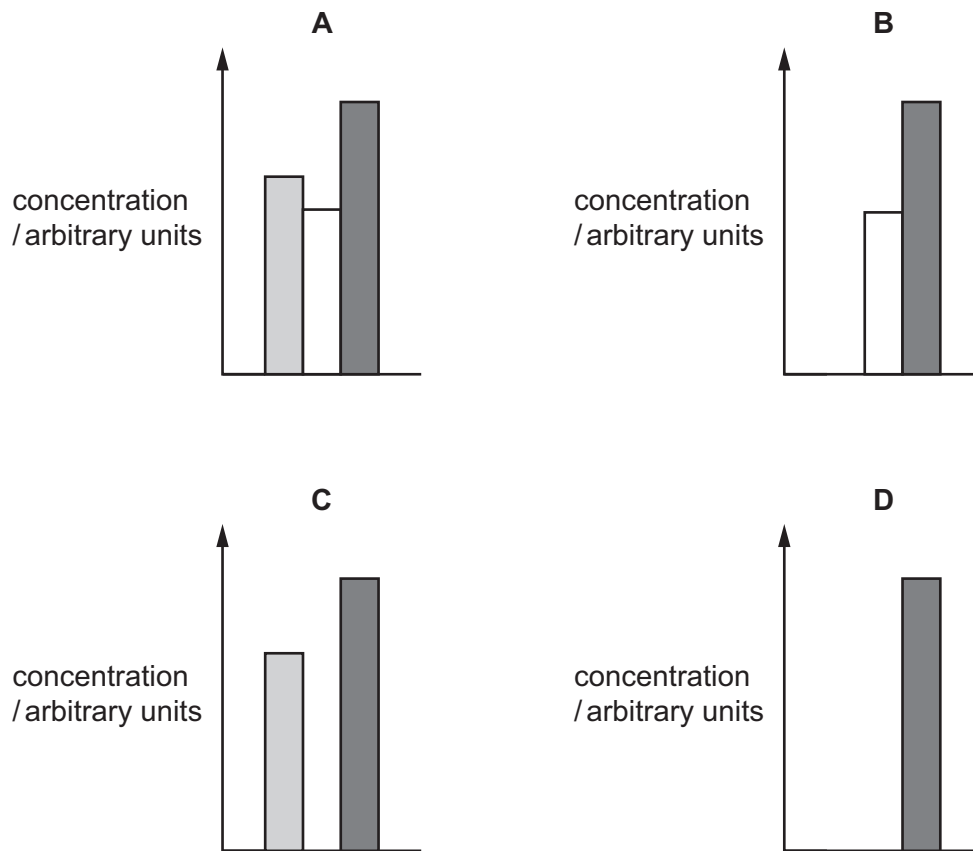
At which time does the athlete finish the race?

- 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?

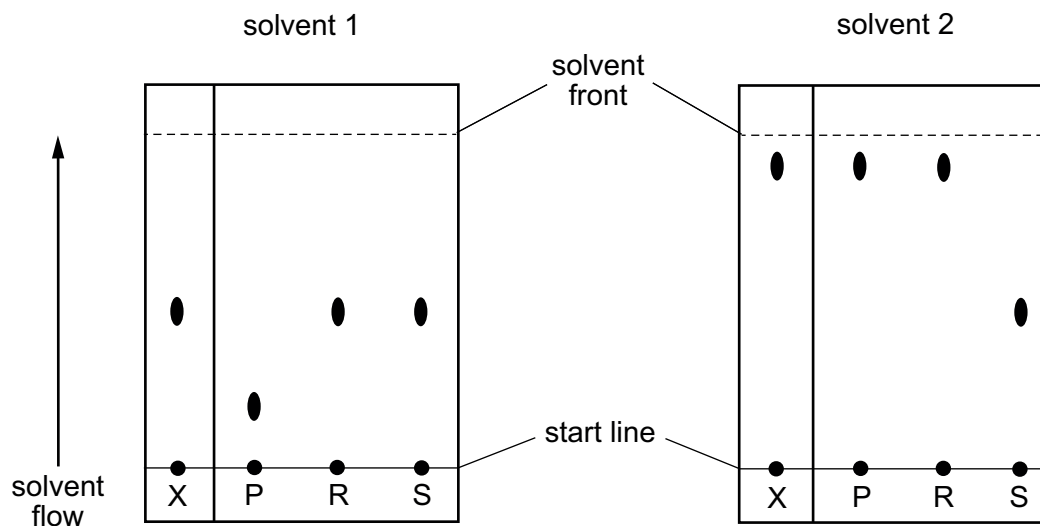
	structure detecting brightness of light	structure causing change in the size of the pupil
A	lens	ciliary muscles
B	retina	iris muscles
C	retina	ciliary muscles
D	lens	iris muscles

- 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.

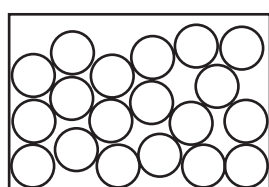
Two different solvents are used to produce two chromatograms comparing solution X with the three substances.

The results are shown.

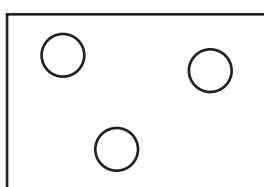


What does X contain?

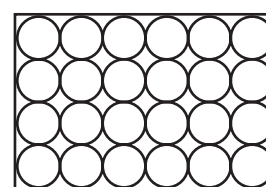
- A** P only **B** R only **C** P and R **D** R and S
- 15 The arrangements of particles of a substance in three different physical states are shown.



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.

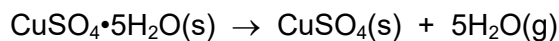
Which statement about element R is correct?

- 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
A	acidic	basic	amphoteric
B	amphoteric	acidic	basic
C	amphoteric	basic	acidic
D	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?

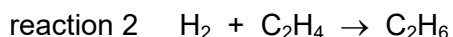
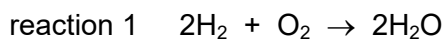
A carbon dioxide and sodium chloride

B carbon dioxide and water

C oxygen and sodium chloride

D oxygen and water

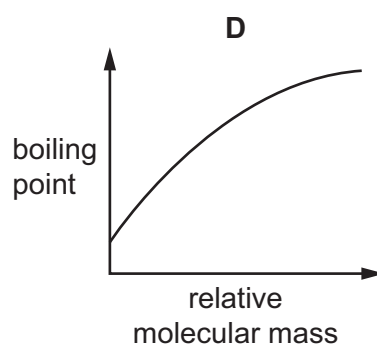
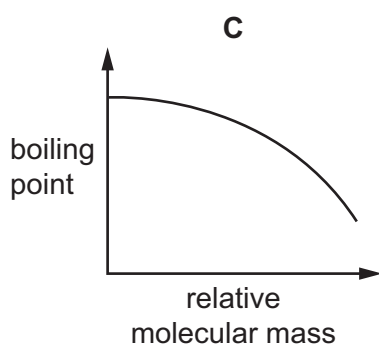
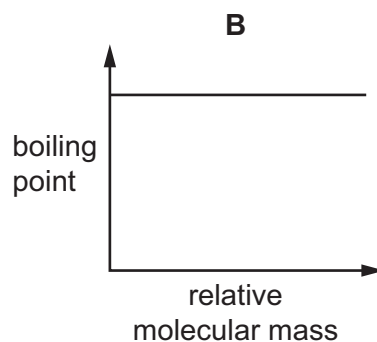
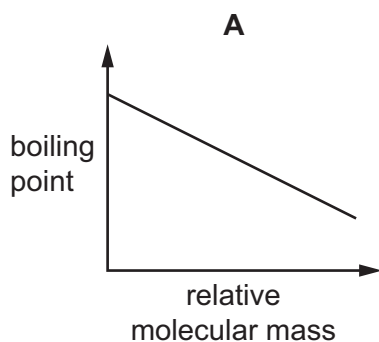
25 Two reactions of hydrogen are shown.



Which row describes the two reactions?

	reaction 1	reaction 2
A	combustion of H_2	combustion of C_2H_4
B	combustion of H_2	oxidation of C_2H_4
C	oxidation of H_2	reduction of C_2H_4
D	reduction of H_2	oxidation of C_2H_4

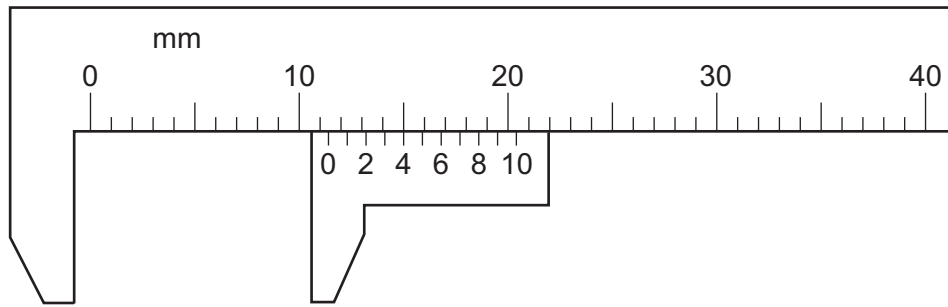
26 Which graph represents the change in boiling point of the alkanes as their relative molecular mass increases?



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?



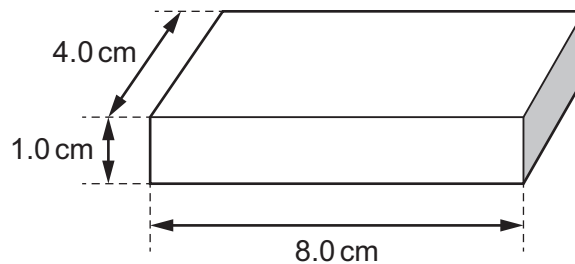
- A 10.4 mm B 11.4 mm C 15.0 mm D 15.4 mm

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.



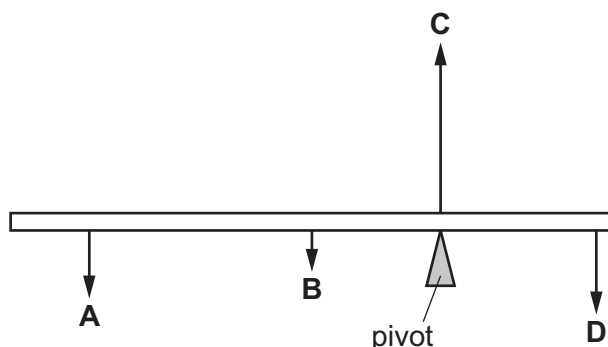
What is the density of the wood?

- A 0.75 g/cm^3 B 1.33 g/cm^3 C 1.85 g/cm^3 D 3.00 g/cm^3

31 The diagram shows a uniform beam resting on a pivot.

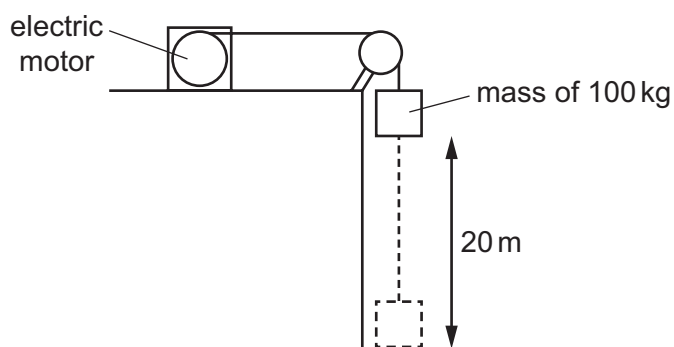
The beam is in equilibrium with four forces acting on it.

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.

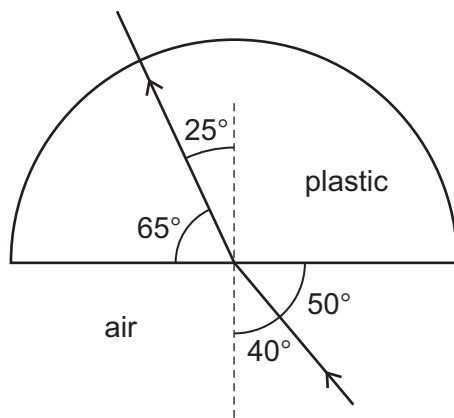
What is the order of the statements which explains how all of the water in the kettle is heated?

- 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			
		1 H hydrogen 1					2 He helium 4			
3 Li lithium 7	4 Be beryllium 9	Key atomic number atomic symbol name relative atomic mass					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			
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			
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			
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —			
			29 Cu copper 64	30 Zn zinc 65	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64			
			50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131			
			82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —			
			80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —			
			112 Cn copernicium —	111 Rg roentgenium —	110 Ds darmstadtium —	109 Mt meitnerium —	108 Hs hassium —			
			66 Dy dysprosium 163	65 Tb terbium 159	64 Gd gadolinium 157	63 Eu europium 152	62 Sm samarium 150			
			68 Er erbium 167	67 Ho holmium 165	66 Gd gadolinium 157	65 Eu europium 152	64 Sm samarium 150			
			100 Fm fermium —	99 Es einsteinium —	98 Cf californium —	97 Bk berkelium —	96 Pu plutonium 238			
			102 No nobelium —	101 Md mendelevium —	100 Fm fermium —	99 Es einsteinium —	98 Cf californium —			
			70 Yb ytterbium 173	69 Tm thulium 169	68 Er erbium 167	67 Ho holmium 165	66 Dy dysprosium 163			
			103 Lr lawrencium —	102 No nobelium —	101 Md mendelevium —	100 Fm fermium —	99 Es einsteinium —			
			71 Lu lutetium 175	70 Yb ytterbium 173	69 Tm thulium 169	68 Er erbium 167	67 Ho holmium 165			

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).