



Cambridge O Level

COMBINED SCIENCE

5129/12

Paper 1 Multiple Choice

October/November 2023

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.

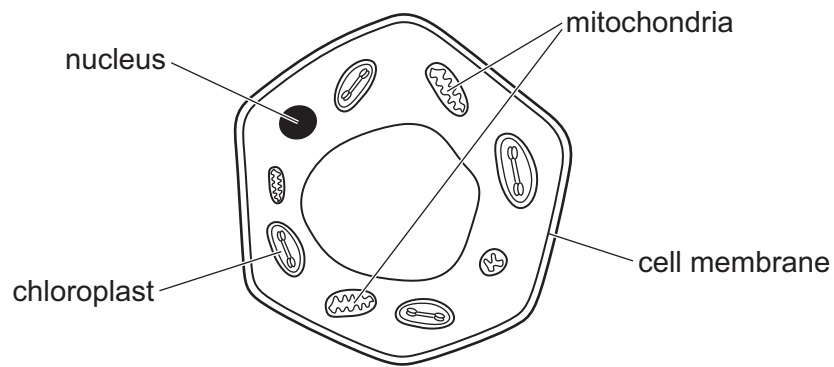
INFORMATION

- 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 The diagram shows a cell with different structures labelled.



Which label indicates a structure or structures only found in plant cells?

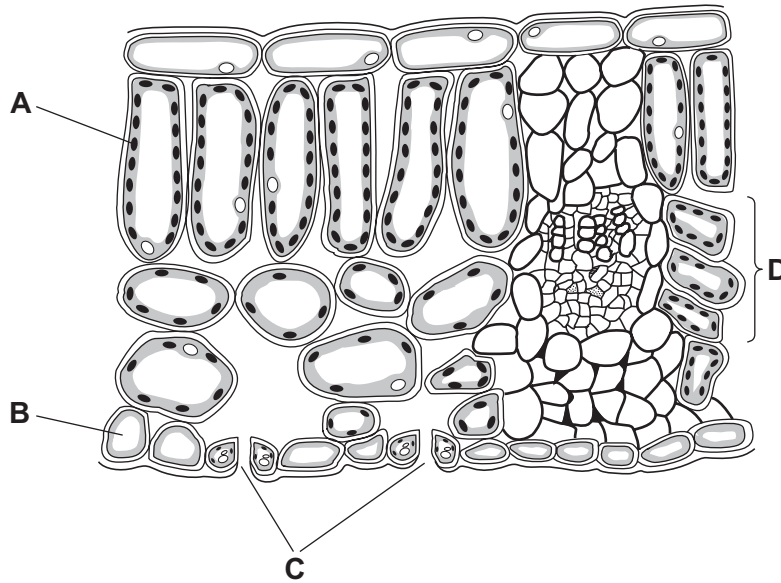
- A mitochondria
- B cell membrane
- C chloroplast
- D nucleus

2 Which statements about enzymes are correct?

- 1 All enzymes are made of protein.
- 2 Each enzyme works best at a certain pH.
- 3 Each enzyme works best at a certain temperature.

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

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



Which structure is correctly named and matched to its function?

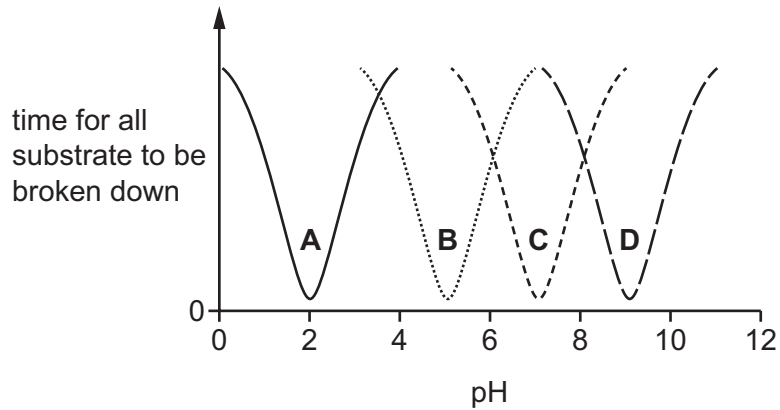
	name	function
A	palisade mesophyll	transport of water
B	spongy mesophyll	transport of water
C	stomata	gas exchange between environment and leaf
D	vascular bundle	gas exchange between environment and leaf

4 What is a role of fat in the human body?

- A** to form glycogen
- B** to form urea
- C** to provide amino acids
- D** to provide a source of energy

- 5 The diagram shows how quickly four different substrates are broken down at different pH values by the enzyme which digests them.

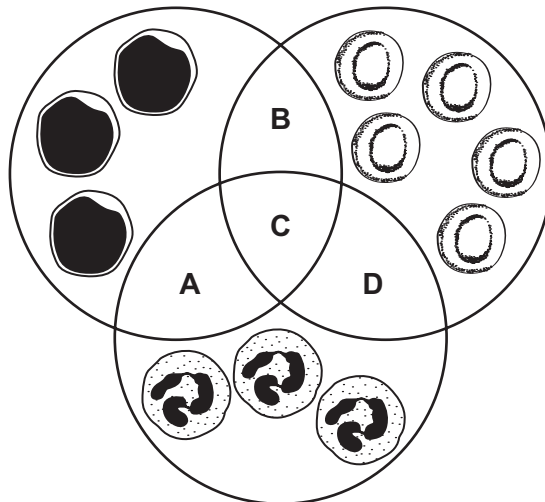
Which enzyme could be active in the stomach?



- 6 What are the products of anaerobic respiration?

- A carbon dioxide + lactic acid + water
- B carbon dioxide + water
- C lactic acid + carbon dioxide
- D lactic acid

- 7 Which labelled region of the Venn diagram shows the blood cells that are responsible for defence against pathogens?



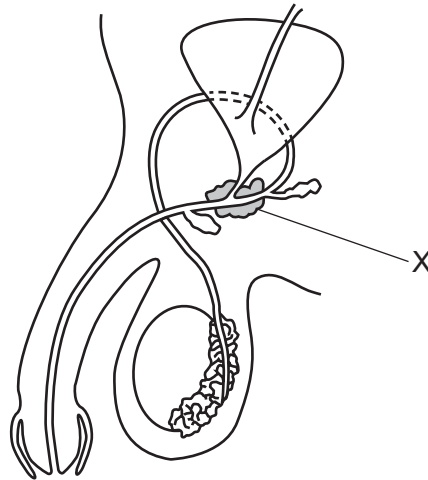
8 What is a component of tobacco smoke that can lead to lung cancer?

- A carbon dioxide
- B carbon monoxide
- C nicotine
- D tar

9 Which row is correct for the hormone insulin?

	target organ	reaction in target organ
A	liver	glucose changed to glycogen
B	kidney	glycogen changed to glucose
C	liver	glycogen changed to glucose
D	kidney	glucose changed to glycogen

10 The diagram shows the male reproductive system.



What is the function of the part labelled X?

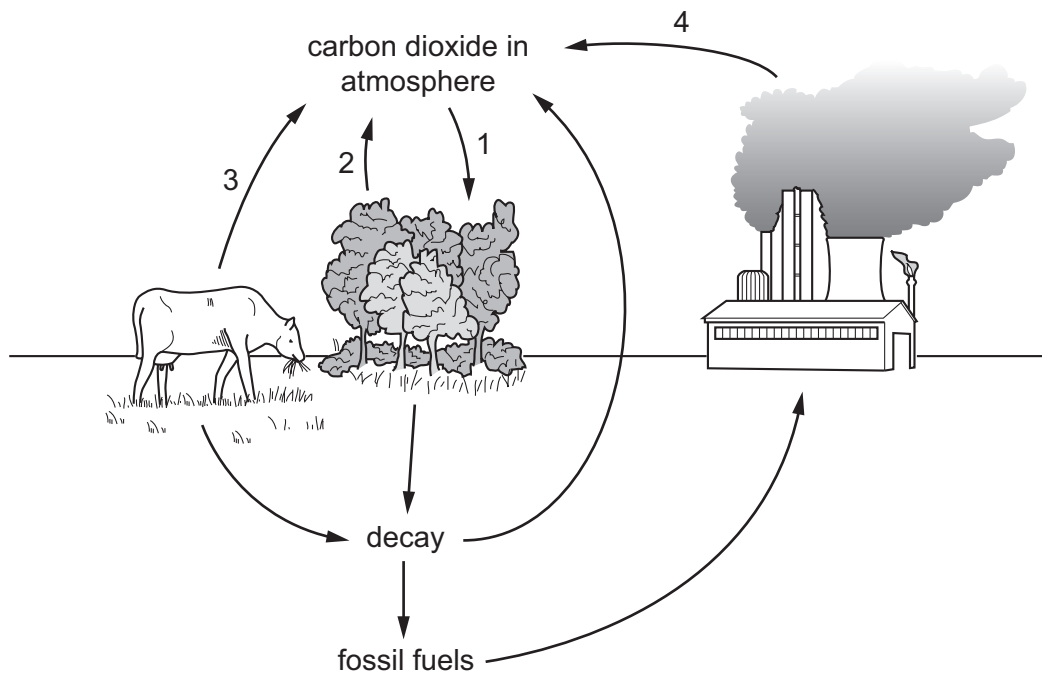
- A producing fluid for sperm to swim in
- B maintaining correct temperature for sperm production
- C producing sperm
- D transporting sperm

11 Which statements about genetic modification are correct?

- 1 Bacteria are genetically modified because there are no ethical concerns about their use.
- 2 Crop plants can be genetically modified so that they produce additional vitamins.
- 3 Genetically modified bacteria can be used to produce insulin.

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

12 The diagram shows the carbon cycle.



Which arrows represent the process of respiration?

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

13 What are possible harmful effects of deforestation?

	increased carbon dioxide in atmosphere	increased oxygen in atmosphere
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = correct

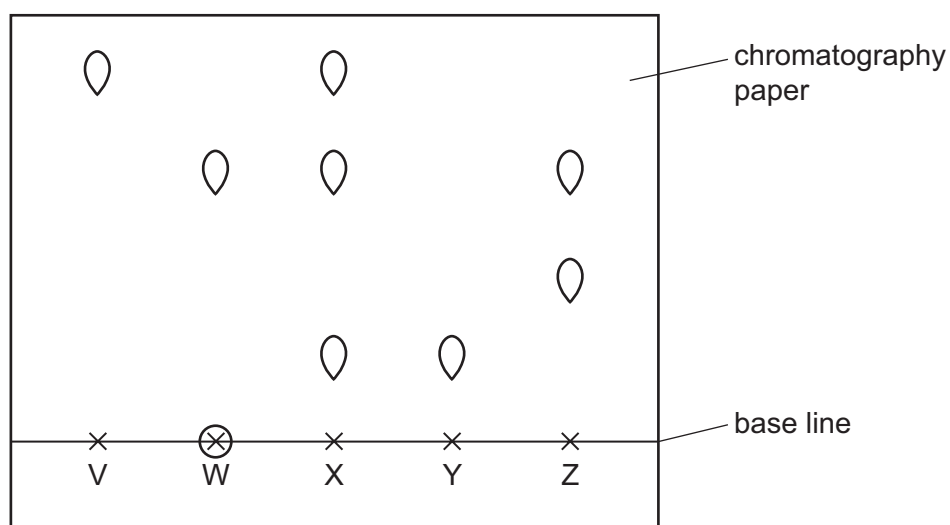
x = not correct

14 Which process causes particles in a substance to become closer together?

- A boiling
- B condensing
- C evaporating
- D melting

15 Five different coloured inks, V, W, X, Y and Z, are analysed using chromatography.

The chromatogram obtained is shown.



Which statements about the inks are correct?

- 1 Ink W contains a substance that is not soluble in the solvent used.
- 2 Ink X is a mixture of three substances.
- 3 Ink X contains inks V, Y and Z.
- 4 Ink V is a pure substance.

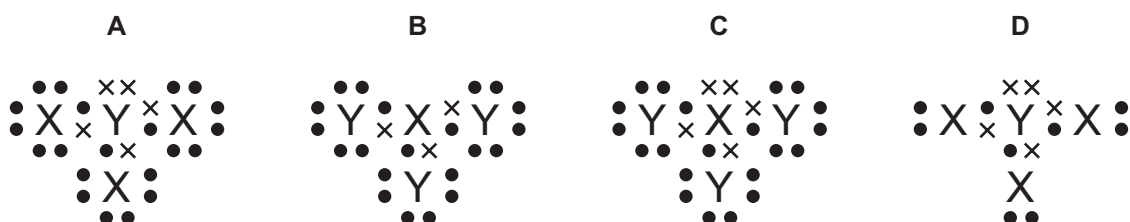
- A** 1, 2 and 3 **B** 1, 2 and 4 **C** 2 and 3 only **D** 3 and 4 only

16 Which statement about noble gases is correct?

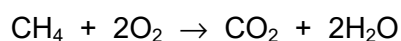
- A They are reactive diatomic gases.
- B They are reactive monatomic gases.
- C They are unreactive diatomic gases.
- D They are unreactive monatomic gases.

17 X is an element in Group III and Y is an element in Group VII of the Periodic Table.

Which diagram shows the outer electron arrangement of the covalent compound formed between X and Y?



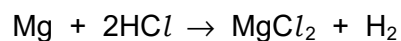
18 The equation for the combustion of methane is shown.



Which mass of water is formed when 160 g of methane is burned in excess oxygen?

- A 90 g B 180 g C 320 g D 360 g

19 The equation for the reaction between solid magnesium and dilute hydrochloric acid is shown.



Which statement explains why the rate of reaction decreases as the reaction occurs?

- A The temperature decreases because the reaction is exothermic.
 B The surface area of the magnesium increases because the pieces of magnesium get smaller.
 C The concentration of the hydrochloric acid is decreasing.
 D The magnesium chloride acts as a catalyst.

20 Which gas is identified by relighting a glowing splint?

- A carbon dioxide
 B hydrogen
 C nitrogen
 D oxygen

21 The pH values of three solutions are shown.

	pH
ethanoic acid	6
hydrochloric acid	1
iron(III) chloride	3

What is the order of acidity of these solutions, from most acidic to least acidic?

- A ethanoic acid, hydrochloric acid, iron(III) chloride
- B ethanoic acid, iron(III) chloride, hydrochloric acid
- C hydrochloric acid, ethanoic acid, iron(III) chloride
- D hydrochloric acid, iron(III) chloride, ethanoic acid

22 A soluble salt is prepared by adding excess insoluble base to a dilute acid.

After the insoluble base neutralises the acid, the mixture is filtered.

The1..... remains in the filter paper and the2..... passes through the filter paper.

Which words complete gaps 1 and 2?

	1	2
A	residue	filtrate
B	residue	insoluble base
C	solvent	filtrate
D	solvent	insoluble base

23 X and Y are two elements in the same period of the Periodic Table.

Y is to the right of X in the period.

Which statement is correct?

- A X and Y have similar properties.
- B X has a greater atomic (proton) number than Y.
- C X has more electron shells than Y.
- D X has more metallic character than Y.

24 An element X has an atomic (proton) number of 3.

Which statement about X is correct?

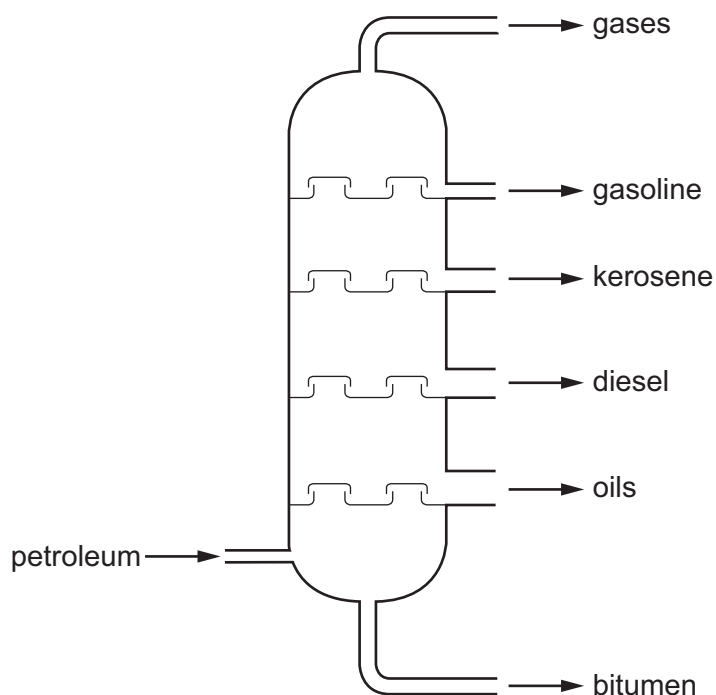
- A** It forms ions by gaining electrons.
- B** It is a gas at room temperature and pressure.
- C** It is in Group III of the Periodic Table.
- D** It reacts with cold water.

25 Which statements about atmospheric pollutants are correct?

- 1 Carbon dioxide is a toxic gas produced by the incomplete combustion of fossil fuels.
- 2 Particulates can cause cancer and are produced by the incomplete combustion of fossil fuels.
- 3 Methane can cause increased global warming and is produced by the decomposition of vegetation.
- 4 Carbon monoxide is a toxic gas produced by digestion in animals.

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

26 The fractional distillation of petroleum is shown.



The gases have small molecules, the lowest boiling temperature and burn most easily.

Bitumen has large molecules, the highest boiling temperature and burns least easily.

Which statement is correct?

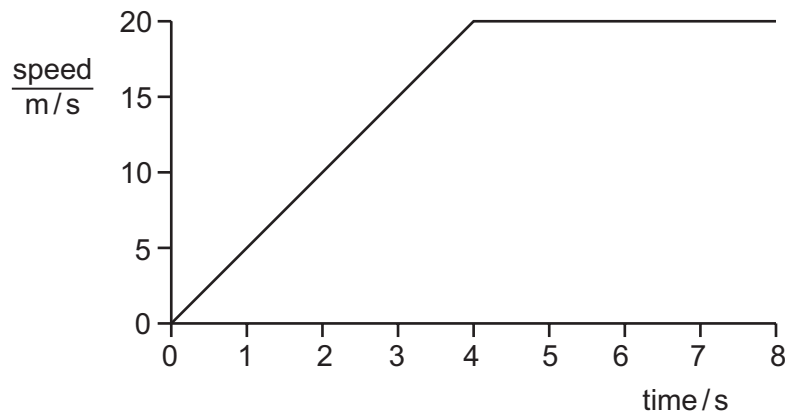
- A All of the molecules in any one fraction are the same.
 - B Gasoline molecules are larger than diesel oil molecules.
 - C The oils fraction burns less well than kerosene.
 - D The oils fraction has a lower boiling temperature than kerosene.
- 27 In which reaction is hydrogen produced from long chain hydrocarbons?
- A addition
 - B combustion
 - C cracking
 - D reduction

28 A toy car moves across a bench.

Which instruments are needed to take the measurements used to calculate the speed of the car?

- A a balance and a measuring cylinder
- B a measuring cylinder and a ruler
- C a measuring cylinder and a stopwatch
- D a ruler and a stopwatch

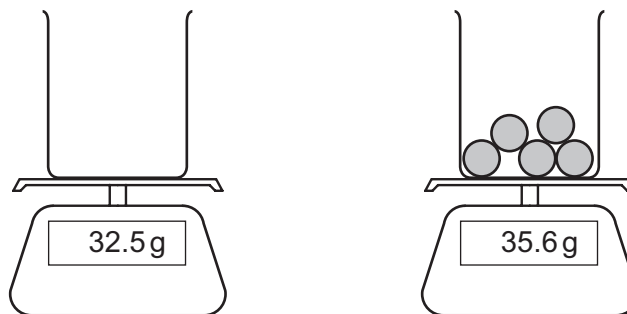
29 A speed–time graph for a car starting from rest is shown.



What is the acceleration of the car between 4 s and 8 s?

- A 0 m/s^2
- B 2.5 m/s^2
- C 5 m/s^2
- D 10 m/s^2

30 A student measures the mass of an empty beaker and then measures the mass of the beaker with five identical plastic spheres in it.



What is the mass of one sphere?

- A 0.62 g
- B 3.10 g
- C 7.12 g
- D 15.5 g

31 When electrical power is generated, energy is transferred between stores.

Which method of generating electrical power transfers gravitational potential energy to kinetic energy?

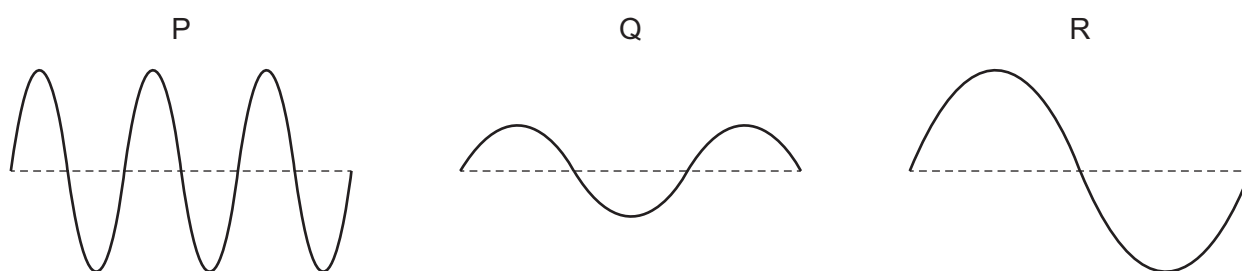
- A burning fuel in a power station
- B generating hydroelectric power
- C generating nuclear power
- D generating geothermal power

32 A train is pulled a distance of 30 km with a steady force of 15 kN.

How much work is done on the train?

- A 2.0 kJ B 450 kJ C 2.0 MJ D 450 MJ

33 The diagram shows three waves, P, Q and R, drawn to the same scale. They all travel at the same speed.



A student writes three statements about these waves.

- 1 Wave P has the shortest wavelength.
- 2 Wave Q has the smallest amplitude.
- 3 Wave R has the highest frequency.

Which statements are correct?

- A 1 and 2 B 1 and 3 C 1 only D 2 and 3

34 A wave generator produces a water wave with a frequency of 12 Hz and a wavelength of 2.0 cm.

What is the speed of the wave?

- A 0.060 m/s B 0.24 m/s C 6.0 m/s D 24 m/s

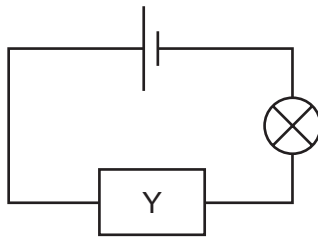
- 35 Three components of the electromagnetic spectrum are arranged in order from the lowest frequency to the highest frequency.

Which order is correct?

- A microwaves → visible light → radio waves
 - B microwaves → X-rays → visible light
 - C radio waves → microwaves → X-rays
 - D X-rays → visible light → radio waves
- 36 A charge of 30 C passes a point in a circuit in a time of 2.0 minutes.

What is the current in the circuit?

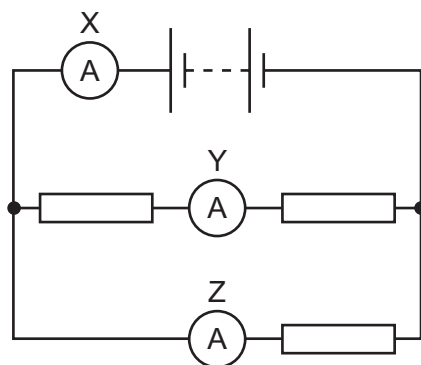
- A 0.25 A
 - B 15 A
 - C 60 A
 - D 3600 A
- 37 In the circuit shown, component Y can be used to gradually change the brightness of the lamp.



What is component Y?

- A a battery
- B a resistor
- C a switch
- D a variable resistor

- 38 The circuit shows a battery, three identical resistors and three ammeters, X, Y and Z.



Which row shows a possible set of readings for the ammeters?

	X/A	Y/A	Z/A
A	6	3	3
B	6	4	2
C	12	4	8
D	12	6	12

- 39 The use of electricity in the home must be safe.

Which list contains only safety features?

- A** double insulation, fuses, earth wire
 - B** double insulation, fuses, live wire
 - C** fuses, earth wire, neutral wire
 - D** fuses, live wire, neutral wire
- 40 An amateur scientist keeps some samples of radioactive rocks in a paper envelope.

Which emissions **cannot** get through the paper of the envelope?

- A** alpha-particles and beta-particles
- B** alpha-particles only
- C** beta-particles and gamma-rays
- D** gamma-rays only

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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	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 dm³ at room temperature and pressure (r.t.p.).