



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice (Core)

May/June 2021

45 minutes

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 What is respiration?
- A breakdown of food by enzymes in the alimentary canal
 - B breathing to supply oxygen to cells
 - C release of carbon dioxide from the lungs
 - D release of energy for body activities
- 2 The photograph shows a bumble bee at a magnification of $\times 6$. The line shows the length of the bumble bee.



What is the actual length of the bumble bee?

- A 0.05 mm B 20 mm C 126 mm D 720 mm
- 3 Three food tests are carried out on a sample of food. The results are shown in the table.

food test	final colour
Benedict's	blue
biuret	blue
iodine	blue-black

From these results, which nutrient is in the food?

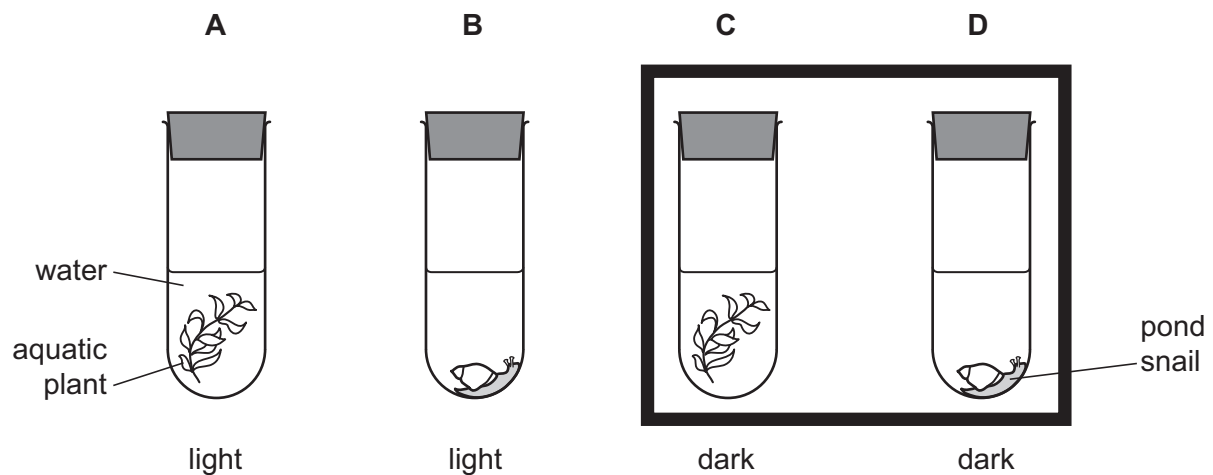
- A reducing sugar
- B protein
- C starch
- D vitamin C

4 What is an enzyme?

- A a carbohydrate that speeds up the rate of a reaction
- B a carbohydrate that alters the activity of a target organ
- C a protein that alters the activity of a target organ
- D a protein that speeds up the rate of a reaction

5 Four test-tubes were set up as shown.

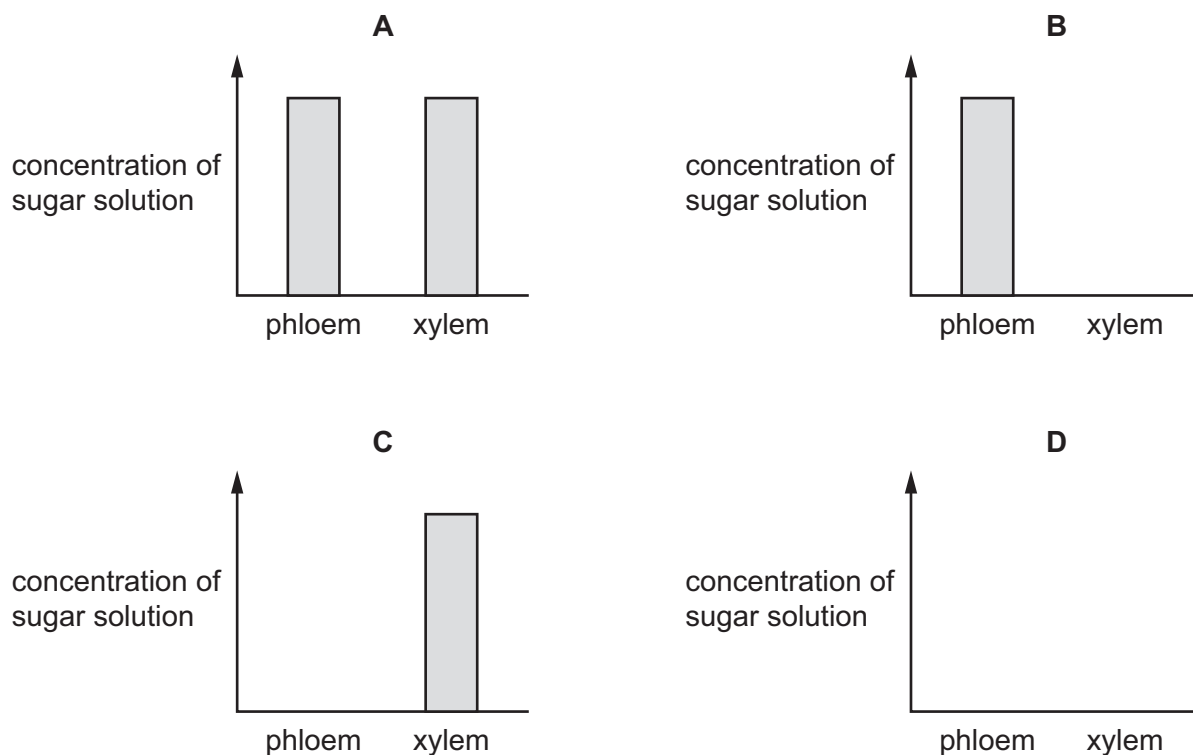
Which test-tube will contain the most dissolved oxygen after 24 hours?



6 Which term is defined as the movement of digested food molecules into the cells of the body where they are used?

- A assimilation
- B absorption
- C egestion
- D ingestion

7 Which graph shows the concentration of sugar solution found in phloem and xylem?



8 A child blows into a rubber balloon.

What is the percentage of oxygen inside the balloon?

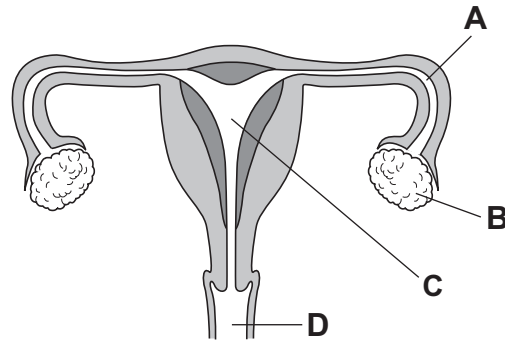
- A** 0% **B** 4% **C** 16% **D** 21%

9 What is homeostasis?

- A** keeping internal conditions constant
- B** keeping the body at the same temperature as the environment
- C** sweating to keep the body warm
- D** vasoconstriction of arterioles to increase heat loss

- 10 The diagram shows the female reproductive system.

Where does fertilisation usually occur?



- 11 Cystic fibrosis is an inherited condition caused by a recessive allele.

A man and woman have a child who has cystic fibrosis. Neither parent has the condition.

What is the probability of their next child also having cystic fibrosis?

- A 0% B 25% C 50% D 75%

- 12 Dung beetles lay their eggs in the faeces of plant-eating mammals like buffalo. Both the adult beetles and their young stages eat the **undigested** food in the faeces.

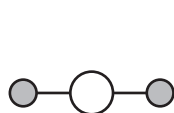
Which diagram shows this food relationship?

- A buffalo → dung beetles
buffalo → grass
- B dung beetles → grass → buffalo
- C grass → dung beetles → buffalo
- D grass → buffalo
grass → dung beetles

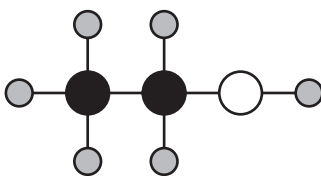
- 13 What does **not** contribute to the carbon cycle?

- A combustion
B deforestation
C transpiration
D photosynthesis

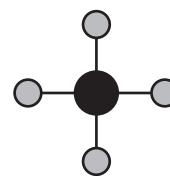
14 The structures of some substances are shown.



water



ethanol



methane

Which row shows the total number of different elements and the total number of atoms in the three structures?

	total number of different elements	total number of atoms
A	3	9
B	3	17
C	7	9
D	7	17

15 Pure substance X has a melting point of 110 °C.

The melting point ranges of four impure samples of substance X are measured.

What is the melting point range of the most impure sample of substance X?

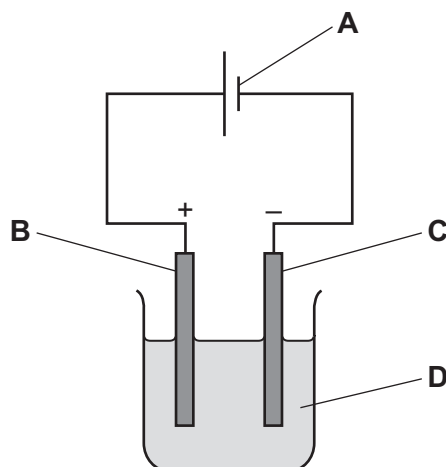
	melting point / °C
A	81–85
B	86–92
C	98–99
D	102–110

16 Which statement about a carbon dioxide molecule is correct?

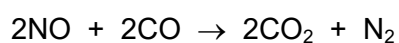
- A** It is composed of metallic elements, which are covalently bonded.
- B** It is composed of metallic elements, which are ionically bonded.
- C** It is composed of non-metallic elements, which are covalently bonded.
- D** It is composed of non-metallic elements, which are ionically bonded.

17 Apparatus used for electrolysis is shown.

Which label identifies the electrolyte?



18 The catalytic converter in the exhaust of a car brings about the reaction shown.



Which row about this reaction is correct?

	oxidation	reduction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = occurs

✗ = does not occur

19 Three different tests are carried out on an aqueous solution of substance X.

The results are shown.

test	result
add a few drops of aqueous sodium hydroxide	blue precipitate
add acidified aqueous silver nitrate	no precipitate
add acidified aqueous barium nitrate	white precipitate

What is X?

- A** copper(II) chloride
- B** copper(II) sulfate
- C** iron(II) chloride
- D** iron(II) sulfate

20 What reacts with ammonia gas?

	hydrochloric acid	sodium hydroxide
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = reacts

x = does not react

21 Substance Q is added to cold water. It floats on the water and hydrogen gas is made.

What is Q?

- A** iodine
- B** lithium
- C** magnesium
- D** zinc

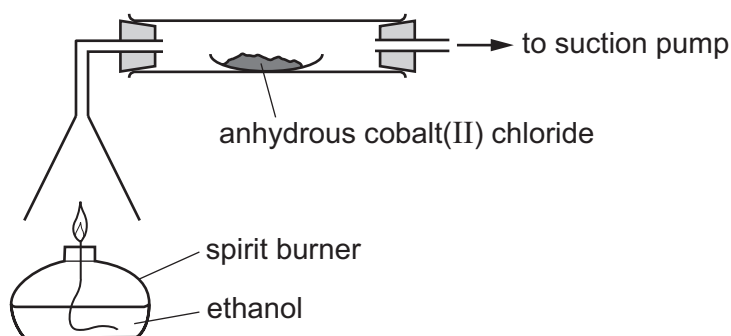
22 Which statements describe carbon?

- 1 It forms basic oxides.
- 2 It is used as an electrode in electrolysis.
- 3 It is used to extract iron from its ore.

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

23 The apparatus used to investigate the combustion of ethanol is shown.

The products of combustion are passed over anhydrous cobalt(II) chloride.



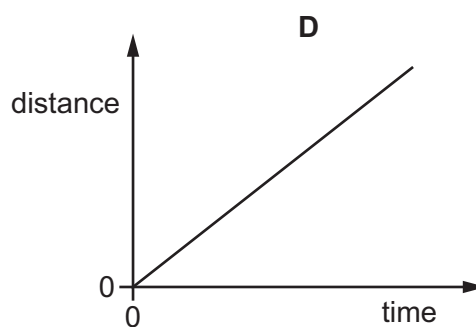
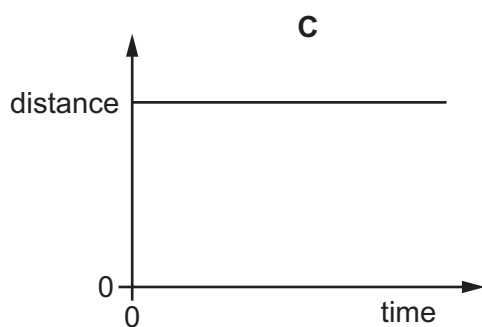
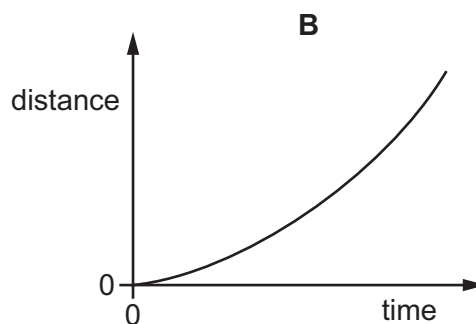
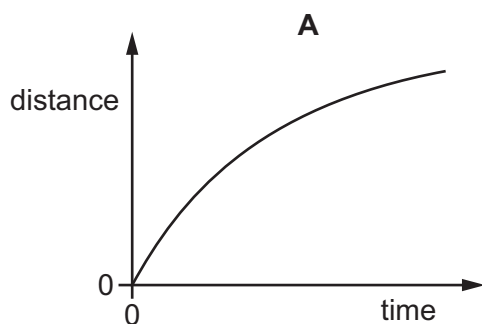
How does the colour of the cobalt(II) chloride change during the investigation?

- A blue to pink
 - B blue to white
 - C pink to blue
 - D white to blue
- 24 Other than hydrogen and oxygen, which substance provides only **one** of the essential elements for plant growth?
- A K_3PO_4 B KNO_3 C $(NH_4)_3PO_4$ D NH_4NO_3
- 25 What is the chemical name for lime?
- A calcium carbonate
 - B calcium hydroxide
 - C calcium oxide
 - D calcium sulfate
- 26 What is the main constituent of natural gas?
- A ethane
 - B ethanol
 - C ethene
 - D methane

- 27 Which row shows the structure of the monomer used to make poly(ethene) and the structure of a section of poly(ethene)?

	monomer	section of poly(ethene)
A	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ -\text{C}-\text{C}-\text{C}-\text{C}- \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array} $
B	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ -\text{C}-\text{C}=\text{C}-\text{C}- \\ \quad \quad \quad \\ \text{H} \quad \quad \quad \text{H} \end{array} $
C	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{C}=\text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ -\text{C}-\text{C}-\text{C}-\text{C}- \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array} $
D	$ \begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{C}=\text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array} $	$ \begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ -\text{C}-\text{C}=\text{C}-\text{C}- \\ \quad \quad \quad \\ \text{H} \quad \quad \quad \text{H} \end{array} $

- 28 Which distance–time graph represents an object that is decelerating?



- 29 A vehicle moves a total distance of 300 m in 40 seconds.

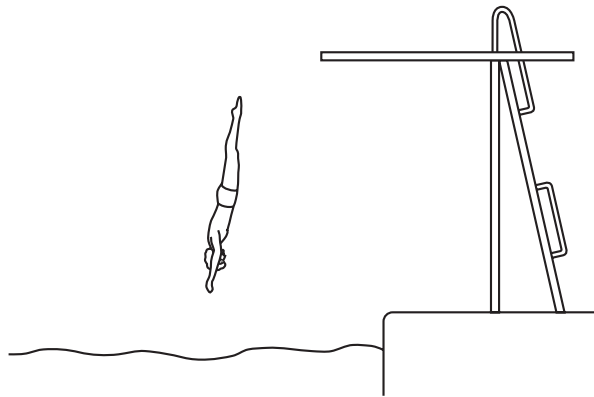
What is its average speed?

- A** 0.13 m/s **B** 7.5 m/s **C** 340 m/s **D** 12 000 m/s

- 30 Which statement applies to a system in equilibrium?

- A** There is a resultant force and there is a resultant turning effect on the system.
B There is a resultant force but there is no resultant turning effect on the system.
C There is no resultant force but there is a resultant turning effect on the system.
D There is no resultant force and there is no resultant turning effect on the system.

- 31 The diagram shows a man diving into water.



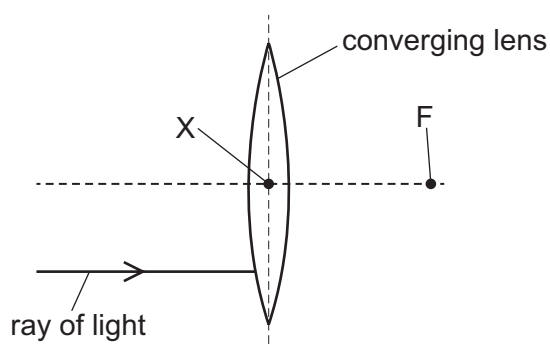
Which form of energy is increasing as he accelerates downwards through the air?

- A** chemical
B elastic potential (strain)
C gravitational potential
D kinetic
- 32 Which two quantities are used to calculate power?
- A** distance moved and time taken
B speed and distance moved
C work done and speed
D work done and time taken

33 Which row shows a good thermal conductor and a bad thermal conductor?

	good conductor	bad conductor
A	copper	air
B	copper	silver
C	water	air
D	water	silver

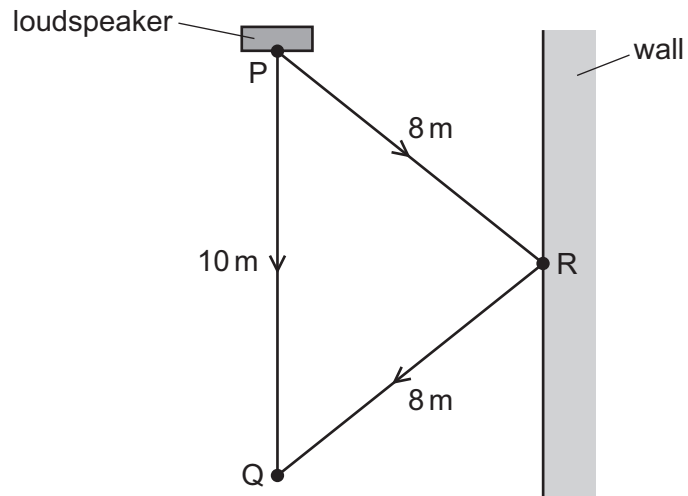
34 The diagram shows a ray of light striking a converging lens.



What happens to the ray after it passes through the lens?

- A** It continues in its original direction.
- B** It travels away from the principal focus F of the lens.
- C** It travels towards the centre X of the lens.
- D** It travels towards the principal focus F of the lens.

- 35 Sound from a loudspeaker at P travels directly to Q. Sound also reaches Q after being reflected from a wall at R.

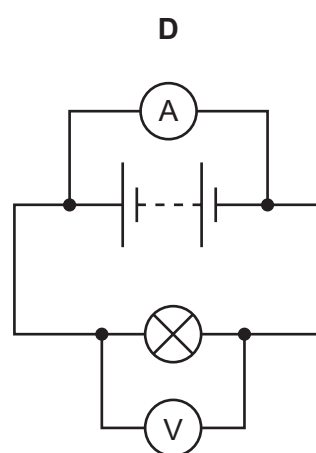
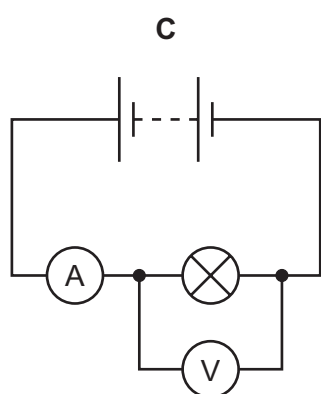
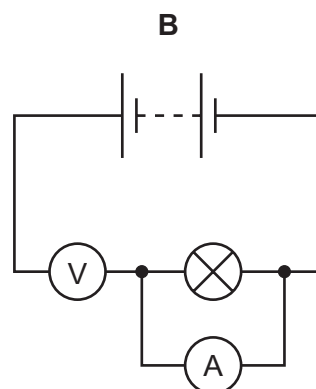
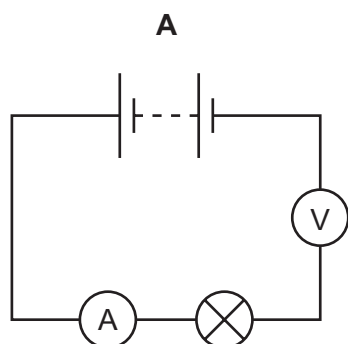


The speed of sound is 330 m/s.

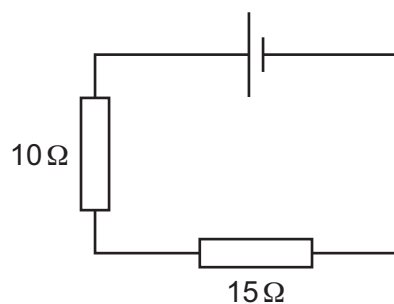
What is the **difference** in time for sound to travel from P to Q by the two routes?

- A $\left(\frac{6}{330}\right)\text{s}$ B $\left(\frac{16}{330}\right)\text{s}$ C $(6 \times 330)\text{s}$ D $(16 \times 330)\text{s}$

- 36** Which circuit shows an ammeter that measures the current in the lamp and a voltmeter that measures the potential difference (p.d.) across the lamp?



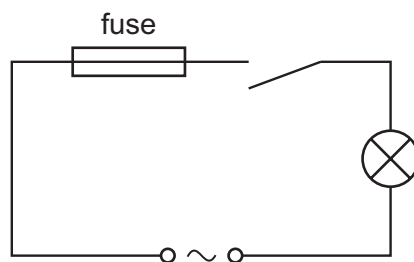
- 37** A student connects a circuit as shown.



What is the total resistance of the circuit?

- A** $5.0\ \Omega$ **B** $10\ \Omega$ **C** $15\ \Omega$ **D** $25\ \Omega$

38 A student connects the circuit shown.



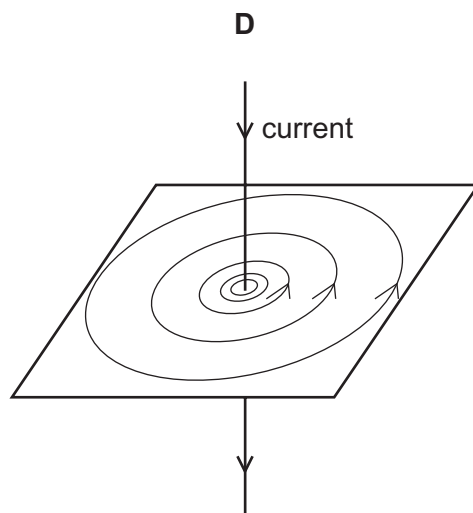
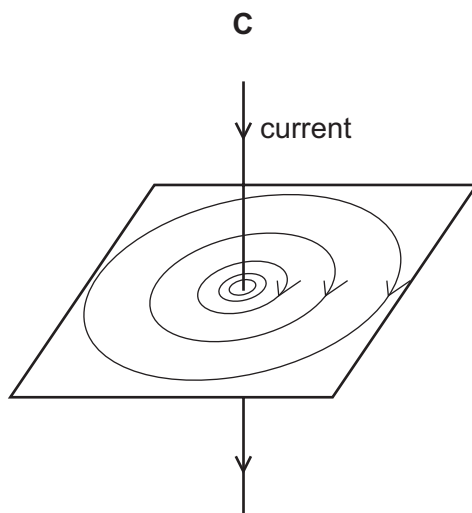
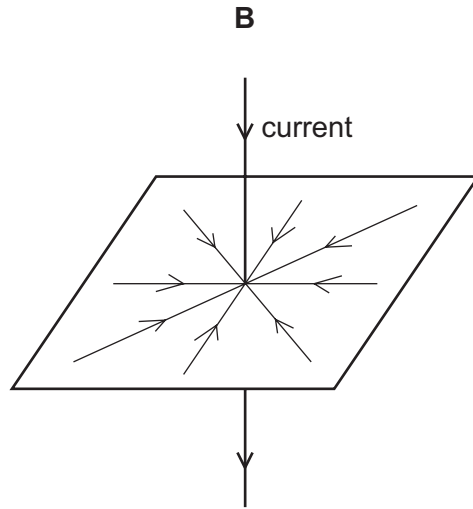
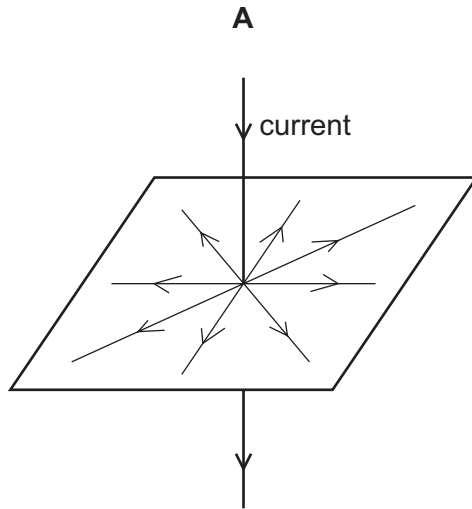
When the switch is closed the fuse blows and stops the current.

What is a possible reason for this?

- A** The current rating of the fuse is too high.
- B** The current is too large.
- C** The lamp is too dim.
- D** The voltage is too small.

39 The diagrams each show a wire carrying a current in the direction of the arrow.

Which diagram shows the pattern and the direction of the magnetic field around the wire?



40 A radioactive nucleus emits a β -particle.

What happens to the proton number (atomic number) of the nucleus?

- A** It stays the same.
- B** It increases by 1.
- C** It decreases by 2.
- D** It decreases by 4.

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The Periodic Table of Elements

Group																			
I	II											III	IV	V	VI	VII	VIII		
		1 H hydrogen 1																	
		Key atomic number atomic symbol name relative atomic mass																	
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	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 —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	114 Fl flerovium —		116 Lv livermorium —					

lanthanoids

actinoids

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 —

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