



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/13**

Paper 1 Multiple Choice (Core)

**October/November 2017**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)



**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

**DO NOT WRITE IN ANY BARCODES.**

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 separate Answer Sheet.

**Read the instructions on the Answer Sheet very carefully.**

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **16** printed pages.

1 Which characteristics help to define a living organism?

- A diffusion, movement, respiration
- B excretion, nutrition, sensitivity
- C excretion, reproduction, transpiration
- D growth, inspiration, nutrition

2 Which two structures are found in a plant cell but **not** an animal cell?

- A cell membrane and cell wall
- B cell wall and chloroplasts
- C chloroplasts and nucleus
- D nucleus and cell membrane

3 What are enzymes made from?

- A fat
- B hormones
- C protein
- D starch

4 The list shows chemicals that are important to a plant.

- 1 carbon dioxide
- 2 nitrates
- 3 oxygen
- 4 water

Which chemicals does a plant use in photosynthesis?

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

5 In which order does food pass through parts of the alimentary canal?

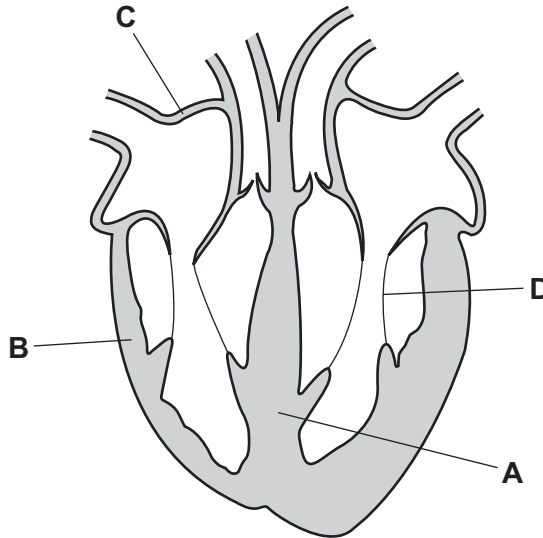
- A oesophagus → colon → small intestine
- B small intestine → oesophagus → rectum
- C small intestine → rectum → anus
- D stomach → colon → small intestine

- 6 Which row shows the effects of increasing humidity, light intensity and temperature on the rate of transpiration in a plant?


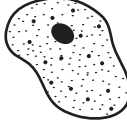
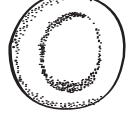

	increasing humidity	increasing light intensity	increasing temperature
<b>A</b>	rate decreases	rate decreases	rate decreases
<b>B</b>	rate decreases	rate increases	rate increases
<b>C</b>	rate increases	rate decreases	rate increases
<b>D</b>	rate increases	rate increases	rate decreases

- 7 The diagram shows a section through the human heart.

Which is the septum?



8 Which row correctly matches the cell to its function?

	cell	function
<b>A</b>		blood clotting
<b>B</b>		blood clotting
<b>C</b>		oxygen transport
<b>D</b>		oxygen transport

9 The table shows the percentage of some gases in four samples of air.

Which sample is expired air?

	percentage of gas		
	carbon dioxide	oxygen	nitrogen
<b>A</b>	1	16	75
<b>B</b>	1	21	78
<b>C</b>	4	16	78
<b>D</b>	4	21	75

10 Which statements about hormones are correct?

- 1 They are carried by the blood.
- 2 They are chemical substances.
- 3 They are destroyed by the pancreas.
- 4 They are produced by a target organ.

**A** 1 and 2

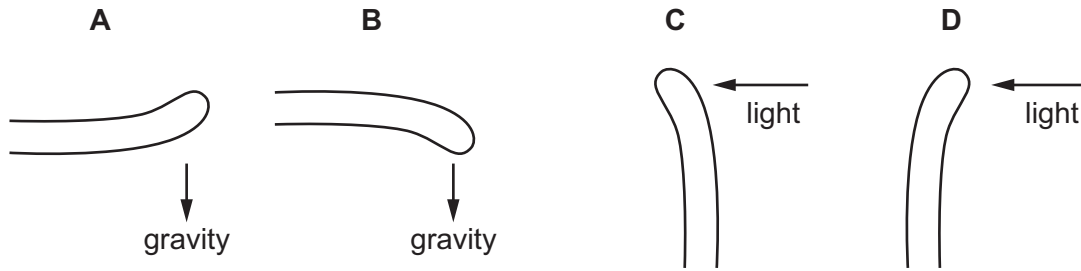
**B** 1 and 3

**C** 2 and 4

**D** 3 and 4

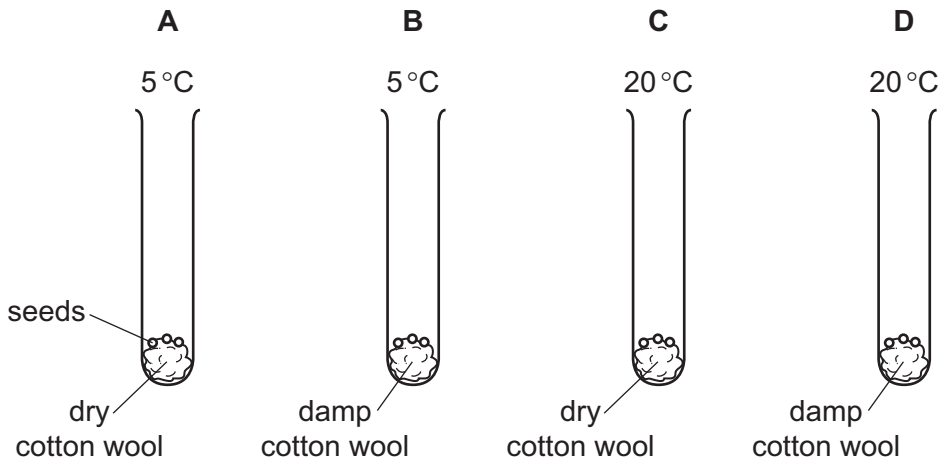
11 The diagrams show shoots of maize seedlings.

Which shoot shows a geotropic response in which it grows away from the stimulus?



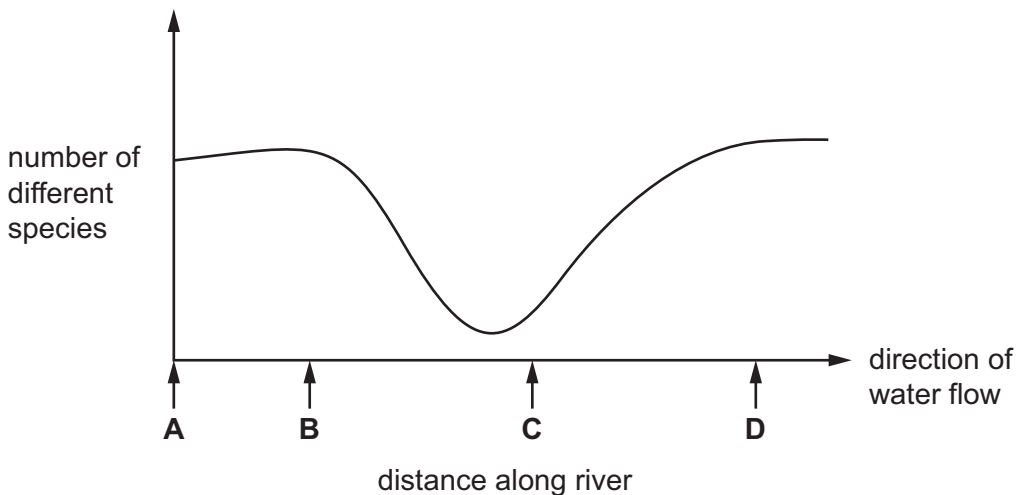
12 A student investigated the conditions needed for the germination of seeds.

Which seeds will germinate first?



13 The graph shows changes in the number of different species in the water flowing along a river.

At which point is untreated sewage released into the river?



14 The formulae of three substances are shown.

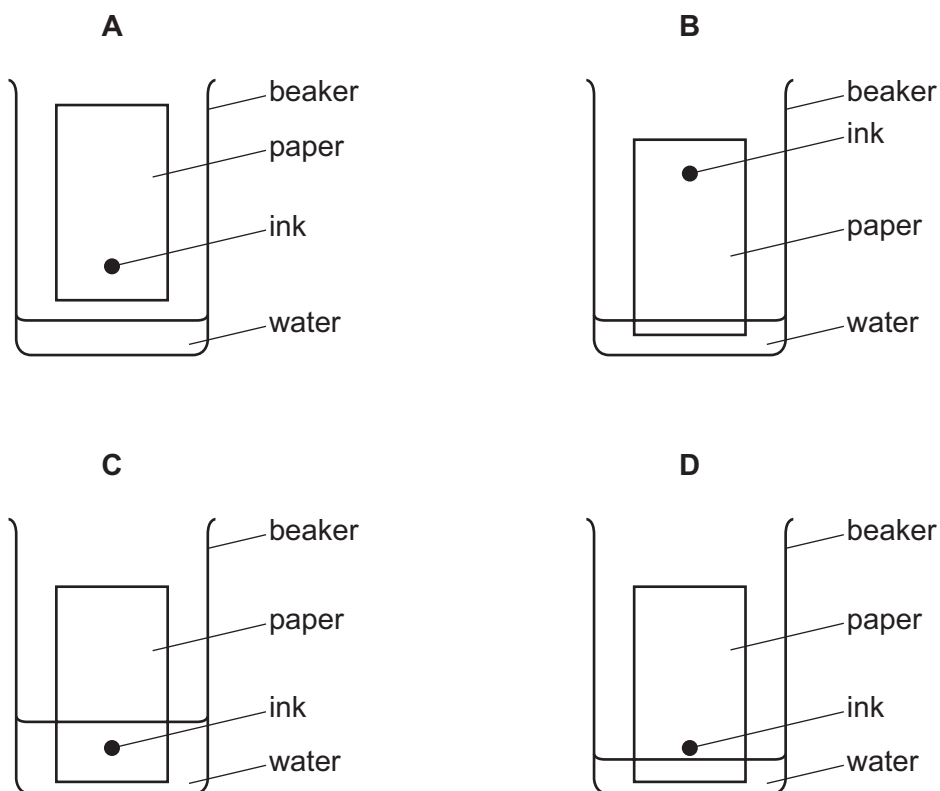
substance	formula
methane	CH <sub>4</sub>
water	H <sub>2</sub> O
oxygen	O <sub>2</sub>

Which statement is correct?

- A Methane is made from five different types of atom.
- B Methane, water and oxygen are molecules.
- C Only methane and water are molecules.
- D Oxygen is made from two different types of atom.

15 Chromatography separates ink into different colours.

Which diagram shows how the apparatus is set up?



16 Which row describes the type of change for each process?

	melting ice	sodium reacting with water
<b>A</b>	chemical	physical
<b>B</b>	chemical	chemical
<b>C</b>	physical	physical
<b>D</b>	physical	chemical

17 One molecule of a compound contains twice as many carbon atoms as oxygen atoms, and three times as many hydrogen atoms as carbon atoms.

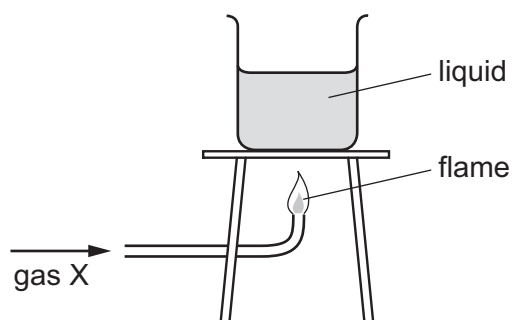
What is the formula of this compound?

- A**  $C_2H_3O$       **B**  $C_2H_6O$       **C**  $C_2H_6O_2$       **D**  $C_4H_6O_2$

18 Which row describes an ionic compound?

	melting point	can be electrolysed
<b>A</b>	high	no
<b>B</b>	high	yes
<b>C</b>	low	no
<b>D</b>	low	yes

19 The diagram shows gas X burning and heating a liquid.

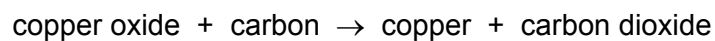


Which row is correct?

	gas X	the burning of gas X is exothermic
<b>A</b>	hydrogen	✓
<b>B</b>	hydrogen	x
<b>C</b>	oxygen	✓
<b>D</b>	oxygen	x

20 Copper is produced by heating copper oxide with carbon.

The word equation for this reaction is shown.



Which statement explains why this is a redox reaction?

- A** Carbon dioxide contains oxygen.
- B** Carbon is a solid and carbon dioxide is a gas.
- C** Copper oxide is oxidised.
- D** Copper oxide loses oxygen and carbon gains oxygen.



21 Dilute sulfuric acid is added to copper(II) oxide. The mixture is warmed gently.

Which observations are correct?

	colour of solution formed	gas formed
<b>A</b>	blue	no
<b>B</b>	blue	yes
<b>C</b>	colourless	no
<b>D</b>	colourless	yes

22 Separate samples of the gases ammonia, carbon dioxide, chlorine and hydrogen are tested with damp red litmus paper.

How many of these gases turn the litmus paper blue?

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

23 Which statement describes the arrangement of elements from sodium to argon in the Periodic Table?

- A** They are in neutron number order and change from metallic to non-metallic.  
**B** They are in neutron number order and change from non-metallic to metallic.  
**C** They are in proton number order and change from metallic to non-metallic.  
**D** They are in proton number order and change from non-metallic to metallic.

24 What is **not** a property of transition elements?

- A** conduct electricity  
**B** form coloured compounds  
**C** high melting point  
**D** low density

25 Platinite is made by melting and mixing iron and nickel.

Which type of substance is platinite?

- A** alloy  
**B** hydrocarbon  
**C** ionic compound  
**D** transition metal

26 P, Q, R and S are four gases found in clean air.

P is very unreactive.

Q makes up 21% of the air.

R makes up 78% of the air.

S is formed when fossil fuels are burned.

Which row is correct?

	P	Q	R	S
<b>A</b>	argon	nitrogen	oxygen	carbon dioxide
<b>B</b>	argon	oxygen	nitrogen	carbon dioxide
<b>C</b>	carbon dioxide	oxygen	nitrogen	argon
<b>D</b>	carbon dioxide	nitrogen	oxygen	argon

27 Which power stations burn fossil fuels?

1 a coal-fired power station

2 a nuclear power station

3 an oil-fired power station

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

28 A car travels at various speeds during a short journey.

The table shows the distances travelled and the times taken during each of four stages P, Q, R and S.

stage	P	Q	R	S
distance travelled / km	1.8	3.6	2.7	2.7
time taken / minutes	2.0	2.0	4.0	3.0

During which two stages is the car travelling at the same average speed?

**A** P and Q      **B** P and S      **C** Q and R      **D** R and S

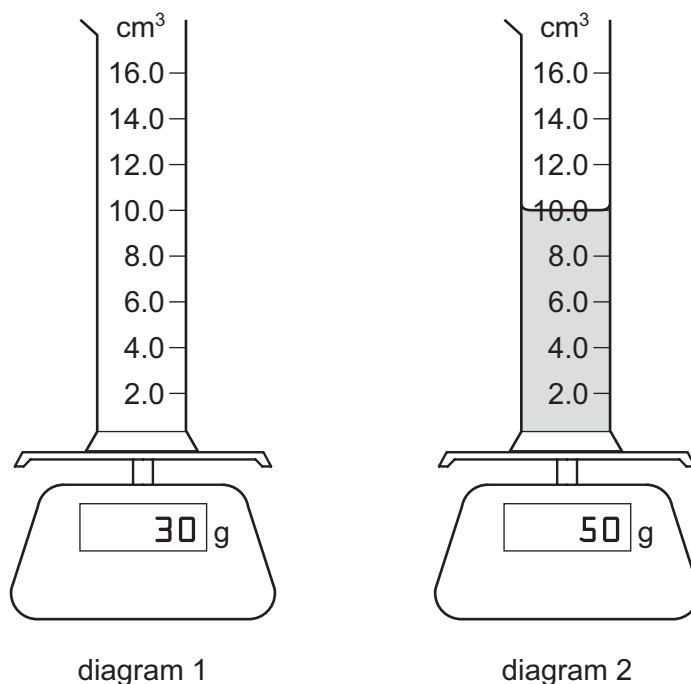
29 The mass of an astronaut on the Moon is 70 kg.

What is the mass of the astronaut on the Earth?

**A** 7 kg      **B** 70 kg      **C** 80 kg      **D** 700 kg

30 Diagram 1 shows an empty measuring cylinder on a balance.

Diagram 2 shows the same measuring cylinder on the balance, but it now contains a liquid.



What is the density of the liquid?

- A** 0.20 g/cm<sup>3</sup>    **B** 0.50 g/cm<sup>3</sup>    **C** 2.0 g/cm<sup>3</sup>    **D** 5.0 g/cm<sup>3</sup>

31 On a hot day with no wind, a boy swims in warm water in a swimming pool.

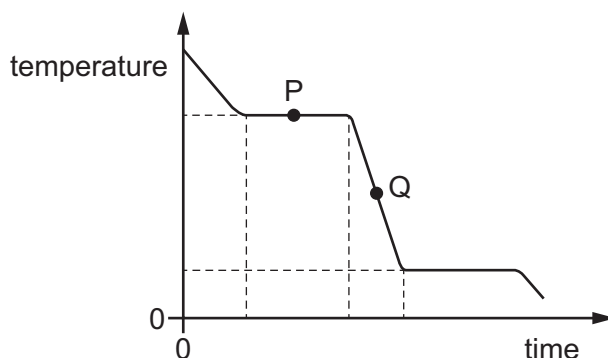
The boy now leaves the pool and feels cold.

Why does the boy feel cold even though it is a hot day?

- A** The less energetic water molecules on his skin escape as the water evaporates.  
**B** The less energetic water molecules on his skin escape as the water freezes.  
**C** The more energetic water molecules on his skin escape as the water evaporates.  
**D** The more energetic water molecules on his skin escape as the water freezes.

- 32 A substance is a gas and loses energy thermally at a constant rate.

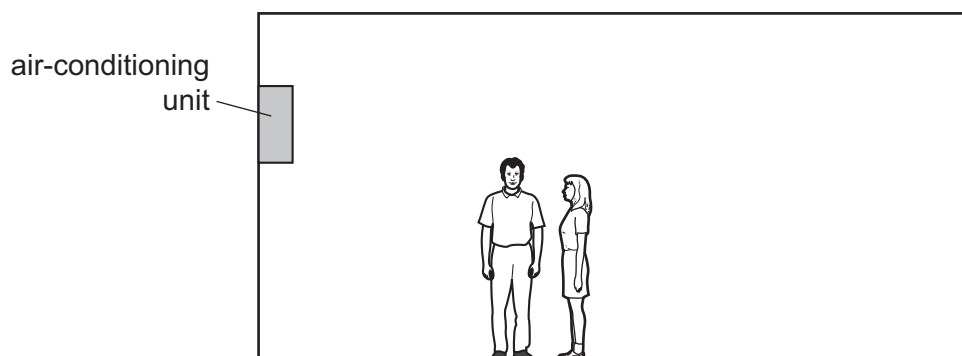
The graph shows how the temperature of the gas changes with time. Two points on the graph are labelled P and Q.



In which state is the substance at P and in which state is the substance at Q?

	state at P	state at Q
<b>A</b>	all gas	all liquid
<b>B</b>	all gas	gas and liquid
<b>C</b>	gas and liquid	all liquid
<b>D</b>	gas and liquid	gas and liquid

- 33 The diagram shows an air-conditioning unit on the wall of a room. The unit draws in warm air from the room and releases cold air into the room.



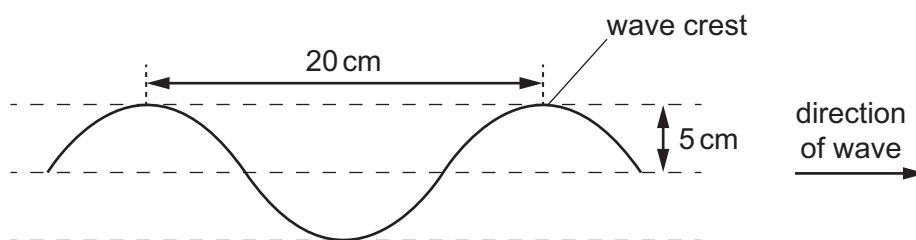
What happens to the cold air and what is the reason?

	cold air	reason
<b>A</b>	falls	it is less dense than warm air
<b>B</b>	falls	it is more dense than warm air
<b>C</b>	rises	it is less dense than warm air
<b>D</b>	rises	it is more dense than warm air

34 The diagram shows a section of a rope.

Four wave crests pass a point on the rope every second.

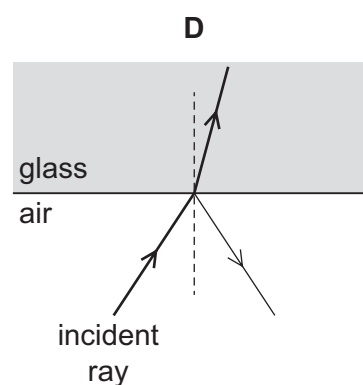
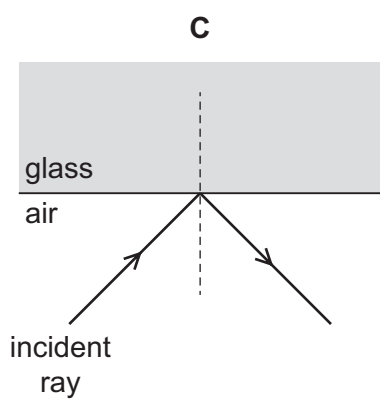
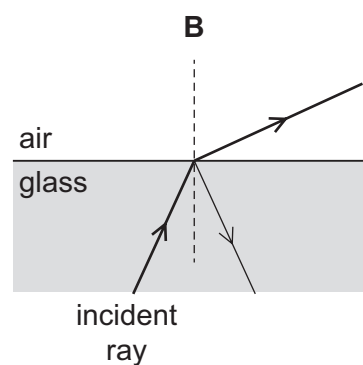
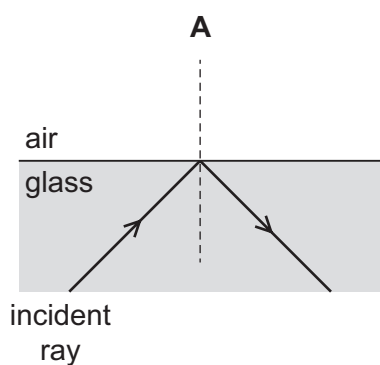
Each wave crest travels 80 cm in one second.



What is the speed of the wave?

- A** 4.0 cm/s      **B** 5.0 cm/s      **C** 20 cm/s      **D** 80 cm/s

35 Which diagram shows a ray of light undergoing total internal reflection?



- 36 Electromagnetic waves are used to scan passengers' luggage before they board an aeroplane.

Electromagnetic waves are also used in a television remote controller.

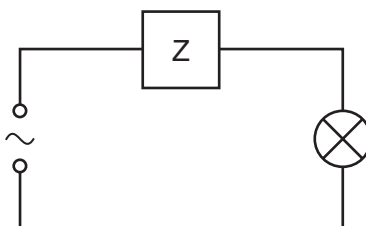
Which type of electromagnetic wave is used for each of these purposes?

	scanning luggage	television remote controller
<b>A</b>	radio waves	infra-red waves
<b>B</b>	radio waves	ultraviolet waves
<b>C</b>	X-rays	infra-red waves
<b>D</b>	X-rays	ultraviolet waves

- 37 What is the approximate range of frequencies of sound that can be heard by a human, and which property of a sound wave causes echoes?

	range of frequencies / Hz	property that causes echoes
<b>A</b>	2.0 to 2000	reflection
<b>B</b>	2.0 to 2000	refraction
<b>C</b>	20 to 20 000	reflection
<b>D</b>	20 to 20 000	refraction

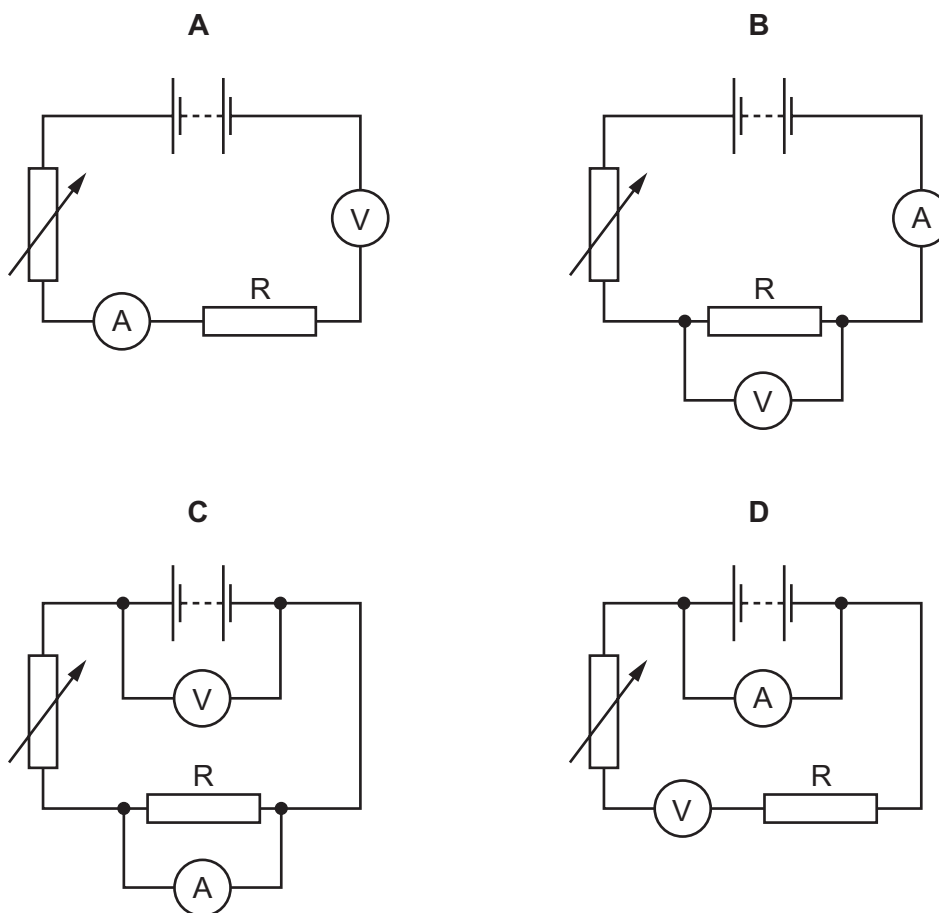
- 38 The device Z in this circuit is designed to cut off the electricity supply **automatically** if too much current flows.



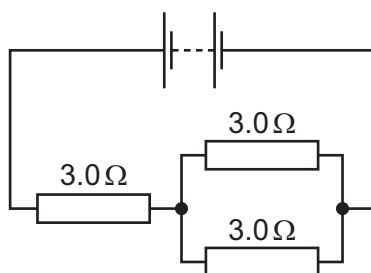
What is device Z?

- A** a fuse
- B** a resistor
- C** a switch
- D** an ammeter

39 Which circuit is used to determine the resistance of the resistor R?



40 Three  $3.0\ \Omega$  resistors are connected in a circuit as shown.



What is the combined resistance of the three resistors in this circuit?

- A less than  $3.0\ \Omega$
- B between  $3.0\ \Omega$  and  $6.0\ \Omega$
- C between  $6.0\ \Omega$  and  $9.0\ \Omega$
- D  $9.0\ \Omega$

The Periodic Table of Elements

		Group																																				
I	II	III	IV	V	VI	VII	VIII																															
3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9	<table border="1"> <tr> <td>1 <b>H</b> hydrogen 1</td> <td colspan="10"> <table border="1"> <tr> <td colspan="2"> <b>Key</b>                      atomic number                      atomic symbol                      name                      relative atomic mass                 </td> </tr> </table> </td> </tr> <tr> <td>11 <b>Na</b> sodium 23</td> <td>12 <b>Mg</b> magnesium 24</td> </tr> </table>										1 <b>H</b> hydrogen 1	<table border="1"> <tr> <td colspan="2"> <b>Key</b>                      atomic number                      atomic symbol                      name                      relative atomic mass                 </td> </tr> </table>										<b>Key</b> atomic number atomic symbol name relative atomic mass		11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24	5 <b>B</b> boron 11	6 <b>C</b> carbon 12	7 <b>N</b> nitrogen 14	8 <b>O</b> oxygen 16	9 <b>F</b> fluorine 19	10 <b>Ne</b> neon 20	13 <b>Al</b> aluminium 27	14 <b>Si</b> silicon 28	15 <b>P</b> phosphorus 31	16 <b>S</b> sulfur 32	17 <b>Cl</b> chlorine 35.5	18 <b>Ar</b> argon 40
1 <b>H</b> hydrogen 1	<table border="1"> <tr> <td colspan="2"> <b>Key</b>                      atomic number                      atomic symbol                      name                      relative atomic mass                 </td> </tr> </table>											<b>Key</b> atomic number atomic symbol name relative atomic mass																										
<b>Key</b> atomic number atomic symbol name relative atomic mass																																						
11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24																																					
19 <b>K</b> potassium 39	20 <b>Ca</b> calcium 40	21 <b>Sc</b> scandium 45	22 <b>Ti</b> titanium 48	23 <b>V</b> vanadium 51	24 <b>Cr</b> chromium 52	25 <b>Mn</b> manganese 55	26 <b>Fe</b> iron 56	27 <b>Co</b> cobalt 59	28 <b>Ni</b> nickel 59	29 <b>Cu</b> copper 64	30 <b>Zn</b> zinc 65	31 <b>Ga</b> gallium 70	32 <b>Ge</b> germanium 73	33 <b>As</b> arsenic 75	34 <b>Se</b> selenium 79	35 <b>Br</b> bromine 80	36 <b>Kr</b> krypton 84																					
37 <b>Rb</b> rubidium 85	38 <b>Sr</b> strontium 88	39 <b>Y</b> yttrium 89	40 <b>Zr</b> zirconium 91	41 <b>Nb</b> niobium 93	42 <b>Mo</b> molybdenum 96	43 <b>Tc</b> technetium —	44 <b>Ru</b> ruthenium 101	45 <b>Rh</b> rhodium 103	46 <b>Pd</b> palladium 106	47 <b>Ag</b> silver 108	48 <b>Cd</b> cadmium 112	49 <b>In</b> indium 115	50 <b>Sn</b> tin 119	51 <b>Sb</b> antimony 122	52 <b>Te</b> tellurium 128	53 <b>I</b> iodine 127	54 <b>Xe</b> xenon 131																					
55 <b>Cs</b> caesium 133	56 <b>Ba</b> barium 137	57–71 lanthanoids	72 <b>Hf</b> hafnium 178	73 <b>Ta</b> tantalum 181	74 <b>W</b> tungsten 184	75 <b>Re</b> rhenium 186	76 <b>Os</b> osmium 190	77 <b>Ir</b> iridium 192	78 <b>Pt</b> platinum 195	79 <b>Au</b> gold 197	80 <b>Hg</b> mercury 201	81 <b>Tl</b> thallium 204	82 <b>Pb</b> lead 207	83 <b>Bi</b> bismuth 209	84 <b>Po</b> polonium —	85 <b>At</b> astatine —	86 <b>Rn</b> radon —																					
87 <b>Fr</b> francium —	88 <b>Ra</b> radium —	89–103 actinoids	104 <b>Rf</b> rutherfordium —	105 <b>Db</b> dubnium —	106 <b>Sg</b> seaborgium —	107 <b>Bh</b> bohrium —	108 <b>Hs</b> hassium —	109 <b>Mt</b> meitnerium —	110 <b>Ds</b> darmstadtium —	111 <b>Rg</b> roentgenium —	112 <b>Cn</b> copernicium —	114 <b>Fl</b> flerovium —	116 <b>Lv</b> livermorium —	—	—	—	—																					

lanthanoids	57 <b>La</b> lanthanum 139	58 <b>Ce</b> cerium 140	59 <b>Pr</b> praseodymium 141	60 <b>Nd</b> neodymium 144	61 <b>Pm</b> promethium —	62 <b>Sm</b> samarium 150	63 <b>Eu</b> europium 152	64 <b>Gd</b> gadolinium 157	65 <b>Tb</b> terbium 159	66 <b>Dy</b> dysprosium 163	67 <b>Ho</b> holmium 165	68 <b>Er</b> erbium 167	69 <b>Tm</b> thulium 169	70 <b>Yb</b> ytterbium 173	71 <b>Lu</b> lutetium 175
actinoids	89 <b>Ac</b> actinium —	90 <b>Th</b> thorium 232	91 <b>Pa</b> protactinium 231	92 <b>U</b> uranium 238	93 <b>Np</b> neptunium —	94 <b>Pu</b> plutonium —	95 <b>Am</b> americium —	96 <b>Cm</b> curium —	97 <b>Bk</b> berkelium —	98 <b>Cf</b> californium —	99 <b>Es</b> einsteinium —	100 <b>Fm</b> fermium —	101 <b>Md</b> mendelevium —	102 <b>No</b> nobelium —	103 <b>Lr</b> lawrencium —

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