



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

**COMBINED SCIENCE**

**0653/12**

Paper 1 Multiple Choice

**October/November 2016**

**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 20.

Electronic calculators may be used.

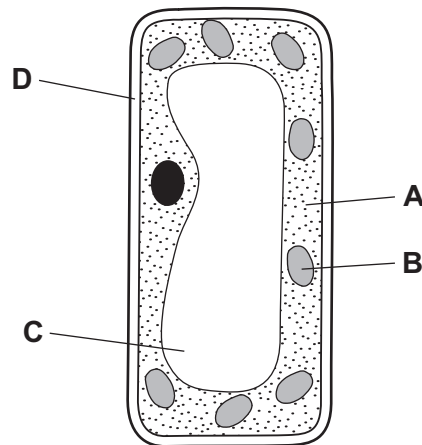
This document consists of **17** printed pages and **3** blank pages.

- 1 A plant bends towards the light.

Which characteristics of living organisms does this show?

- A movement and nutrition
  - B movement and respiration
  - C movement and sensitivity
  - D sensitivity and respiration
- 2 How do molecules move when they are involved in the process of diffusion?
- A They all move from a high to a low concentration.
  - B They all move from a low to a high concentration.
  - C They all move randomly.
  - D They show net movement against a concentration gradient.
- 3 The diagram shows a typical plant cell as seen under a light microscope.

Which part would also be present in a liver cell?

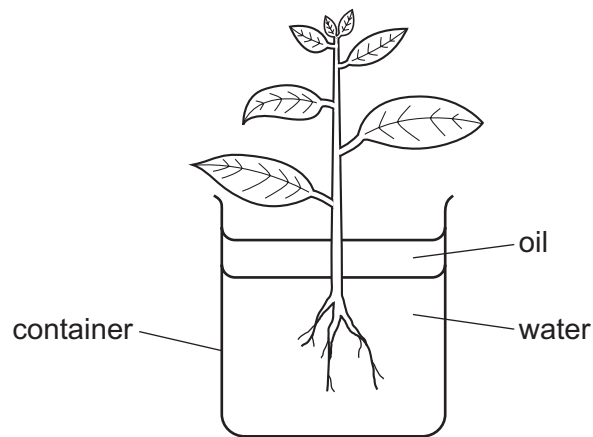


- 4 A student wants to find out if a solution contains an enzyme.

Which chemical should the student use?

- A Benedict's solution
- B biuret solution
- C ethanol
- D iodine solution

- 5 The diagram shows a plant in a container of water. The layer of oil stops the water in the container evaporating.



The initial mass of the container and contents is 296 g.

After two hours the mass of the container and contents is 292 g.

What is the rate of transpiration in this time?

- A 150 g water/hour
  - B 148 g water/hour
  - C 4 g water/hour
  - D 2 g water/hour
- 6 A student is given a clear liquid.

She tests the liquid with Benedict's solution and iodine solution.

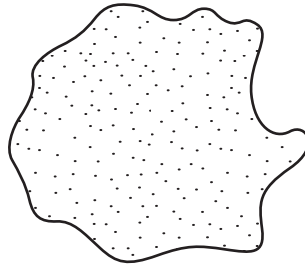
The results are shown in the table.

test	result
Benedict's solution	orange-red colour
iodine solution	orange-brown colour

Which nutrients are present in the liquid?

	reducing sugar	starch
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

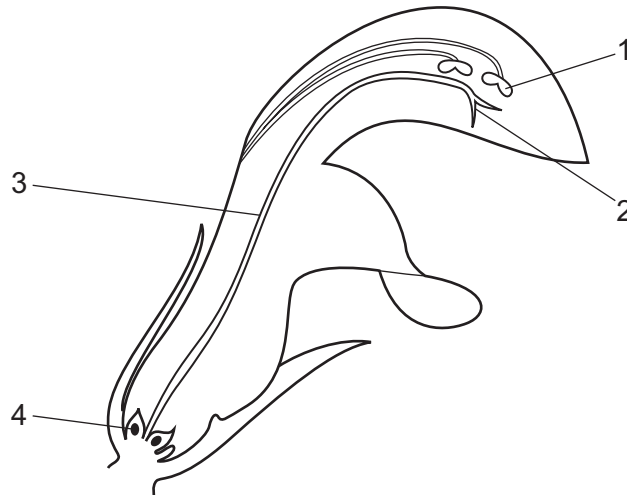
- 7 The diagram shows a type of white blood cell with a structural feature missing.



Which feature is missing?

- A cell membrane
  - B cell wall
  - C large vacuole
  - D nucleus
- 8 What makes up a higher percentage of inspired air compared with expired air?
- A carbon dioxide
  - B nitrogen
  - C noble gases
  - D oxygen
- 9 Which process in a germinating seed is a tropic response?
- A the breaking of the outer skin
  - B the root tip growing downwards
  - C the start of photosynthesis
  - D the uptake of water

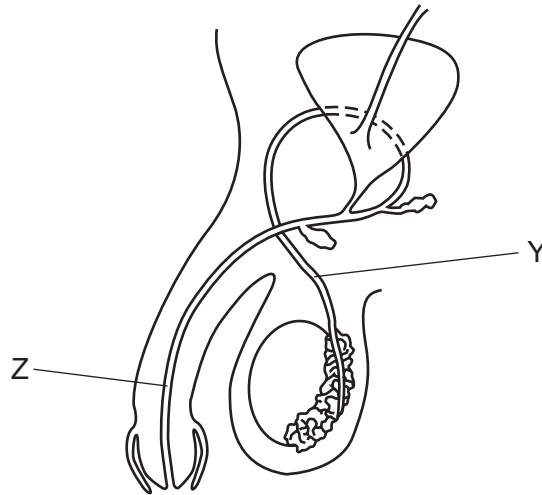
10 The diagram shows a section through a flower.



Which row in the table identifies male and female parts?

	male part	female part
<b>A</b>	1	2
<b>B</b>	2	4
<b>C</b>	3	1
<b>D</b>	4	3

11 The diagram shows the male reproductive system.



What are the parts Y and Z?

	Y	Z
<b>A</b>	prostate gland	urethra
<b>B</b>	urethra	prostate gland
<b>C</b>	sperm duct	prostate gland
<b>D</b>	sperm duct	urethra

12 A farmer chops down a tree to provide firewood. He gets warm when chopping down the tree. The farmer then burns the wood to keep warm.

What is the original source of the energy that warms the farmer in both cases?

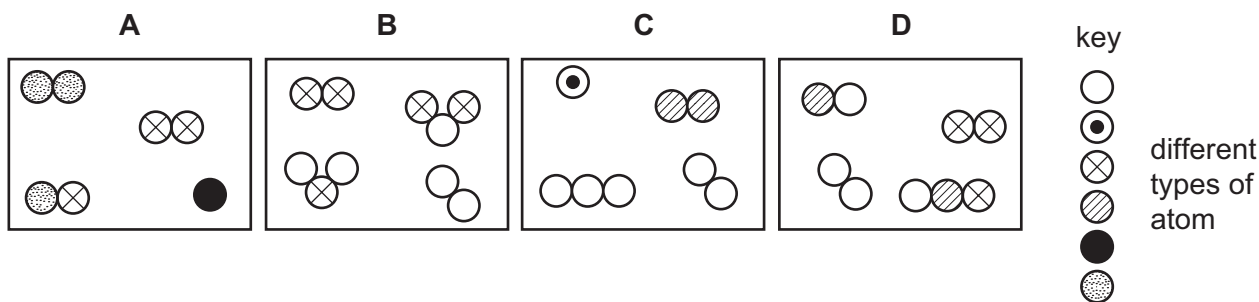
- A** photosynthesis by the tree growing the wood
- B** respiration
- C** the match used to light the fire
- D** the Sun

13 Deforestation could have which effect?

- A** a decrease in carbon dioxide in the atmosphere
- B** an increase in oxygen in the atmosphere
- C** less likelihood of flooding
- D** the extinction of species

14 The diagrams show four different mixtures of gases.

Which diagram represents a mixture containing **only** elements?



15 Which method is used to separate an insoluble salt from a mixture of the salt and water?

- A crystallisation
- B distillation
- C filtration
- D fractional distillation

16 Which process is a physical change?

- A the combustion of methane
- B the electrolysis of aqueous copper chloride
- C the melting of ice
- D the reaction of sodium with water

17 Which statement about compounds is correct?

- A An ionic compound contains two metallic elements bonded together.
- B In an ionic compound, metal ions are negatively charged.
- C When metals combine with non-metals, electrons are shared between the atoms.
- D When two non-metals combine, molecules are formed.

18 What does a word equation show?

	the changes that occur in a reaction	the speed of a reaction
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 19 What are the products of electrolysis of aqueous copper chloride using inert electrodes?
- A copper and chlorine
  - B copper and oxygen
  - C hydrogen and chlorine
  - D hydrogen and oxygen

- 20 The reaction between calcium oxide and water is used to heat food in special food cans.

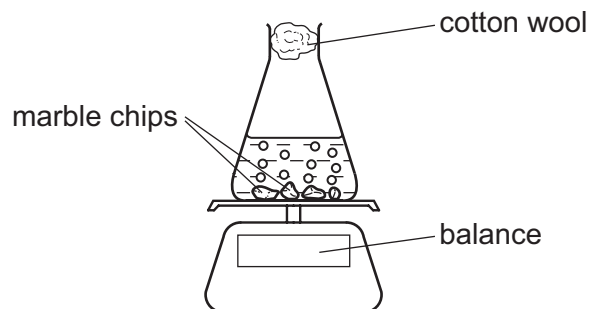
Which type of reaction occurs?

- A endothermic
- B exothermic
- C neutralisation
- D precipitation

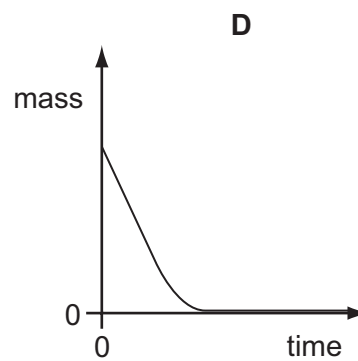
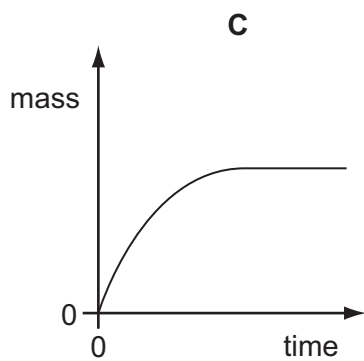
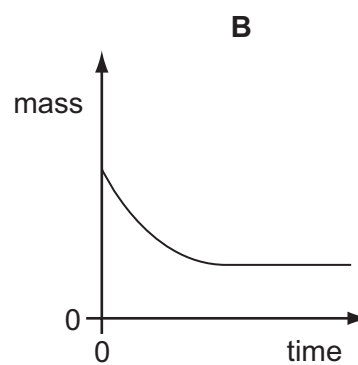
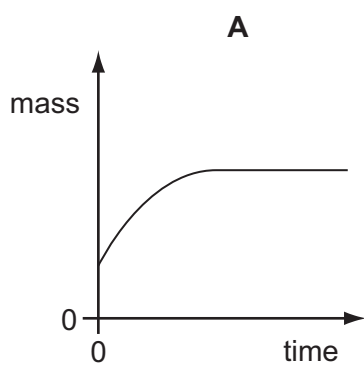


21 Marble chips react with dilute hydrochloric acid producing carbon dioxide.

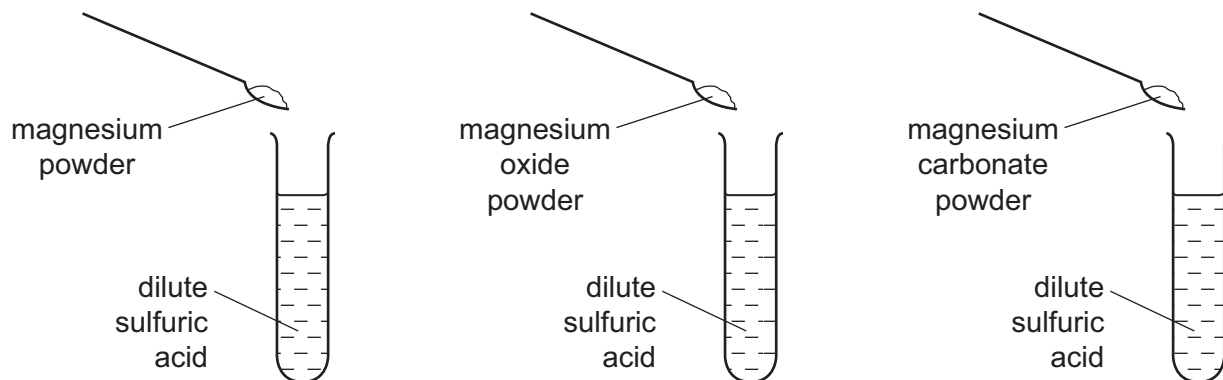
The progress of this reaction is followed using the apparatus shown.



Which graph shows the results of this experiment?



22 Three powders are added to dilute sulfuric acid, as shown.



Which of the powders react to produce water?

	magnesium	magnesium oxide	magnesium carbonate
<b>A</b>	✓	✓	x
<b>B</b>	✓	x	x
<b>C</b>	x	✓	✓
<b>D</b>	x	x	✓

key

✓ = does produce water

x = does not produce water

23 A mixture of ammonium carbonate and ammonium chloride is heated with aqueous sodium hydroxide.

Which gas is produced?

- A** ammonia
- B** carbon dioxide
- C** chlorine
- D** hydrogen chloride

24 Which describes a noble gas?

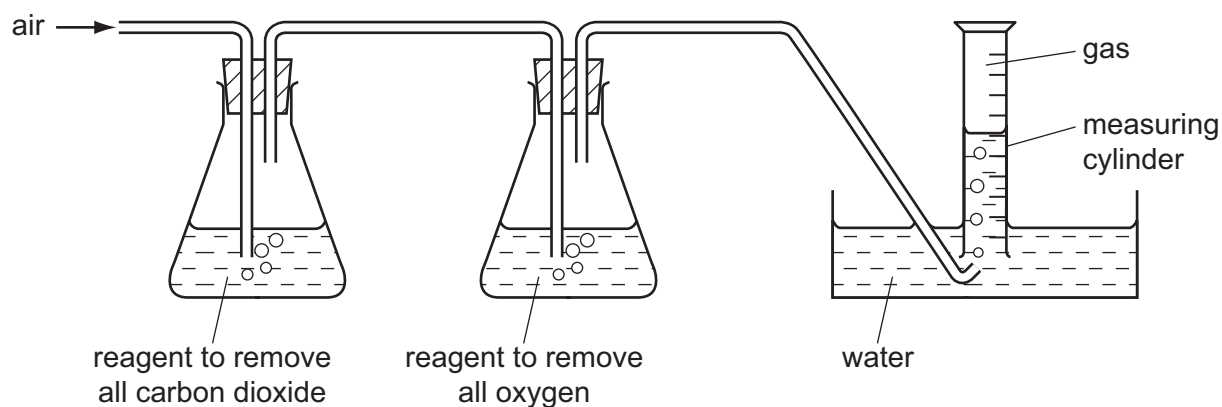
- A** compound, colourless, does not burn in air
- B** element, colourless, burns in air
- C** element, colourless, does not burn in air
- D** element, green, does not burn in air

25 Tenorite is a mineral that contains copper oxide.

How is copper obtained from tenorite?

- A Heat a mixture of tenorite and carbon.
- B Pass electricity through solid tenorite.
- C React tenorite with a metal that is less reactive than copper.
- D React tenorite with hydrochloric acid.

26 A 100 cm<sup>3</sup> sample of air is passed into the apparatus as shown.



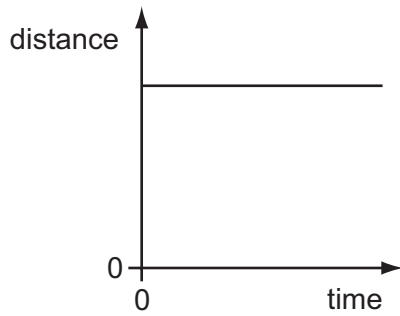
What is the volume and the composition of the gas collected in the measuring cylinder?

	volume / cm <sup>3</sup>	composition
<b>A</b>	21	pure nitrogen
<b>B</b>	21	nitrogen and other gases
<b>C</b>	79	pure nitrogen
<b>D</b>	79	nitrogen and other gases

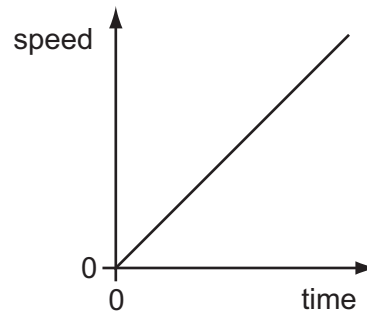
27 What is the main constituent of natural gas?

- A ethane
- B methane
- C nitrogen
- D oxygen

28 Graph 1 is a distance/time graph. Graph 2 is a speed/time graph.



graph 1



graph 2

Which, if any, of these graphs represents the motion of a car that is accelerating?

- A graph 1 only
  - B graph 2 only
  - C both graphs
  - D neither graph
- 29 A 1.0 kg sample of aluminium is kept in a laboratory. A 1.0 kg sample of iron is kept in a different laboratory in the same building.

Which quantity must be identical for these two samples?

- A density
  - B temperature
  - C volume
  - D weight
- 30 A parachutist falls at a constant speed. Her kinetic energy does not change.

Which form of energy is increasing as she falls?

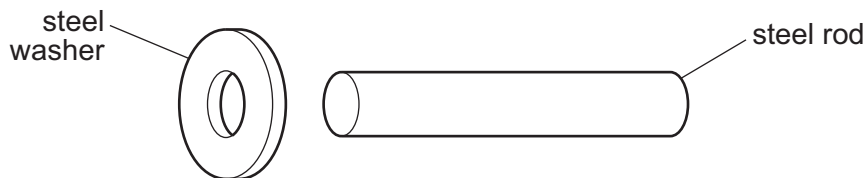
- A chemical energy
- B gravitational (potential) energy
- C nuclear energy
- D thermal energy

31 A bowl contains some warm water. The water evaporates from the bowl.

Which row describes where the evaporation occurs and the effect of the evaporation on the temperature of the water left in the bowl?

	where evaporation occurs	effect on temperature of water in bowl
<b>A</b>	only on the surface	decreases
<b>B</b>	only on the surface	no change
<b>C</b>	throughout the water	decreases
<b>D</b>	throughout the water	no change

32 An engineer wants to fix a steel washer on to a steel rod. The rod is slightly too big to fit into the hole in the washer.

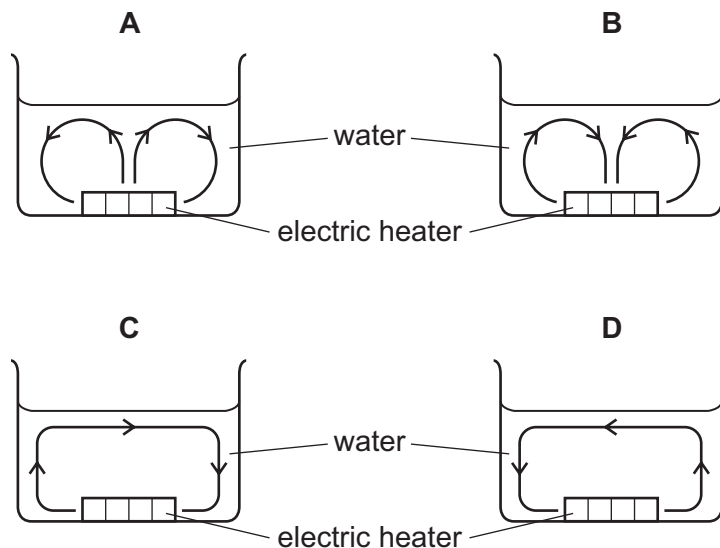


How can the engineer fit the washer on to the rod?

- A** Cool the washer and push it over the rod.
- B** Cool the washer and the rod to the same temperature and then push them together.
- C** Heat the rod and then push it in the hole.
- D** Heat the washer and then place it over the rod.

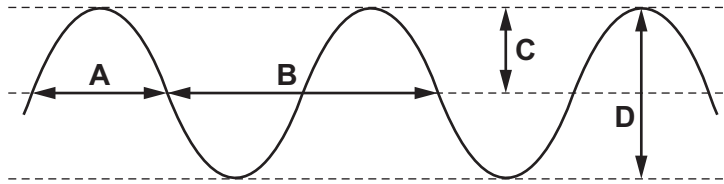
33 Water in a beaker is heated by an electric heater in the position shown.

Which diagram shows the convection current formed?

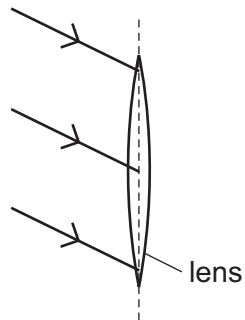


34 The diagram represents a water wave.

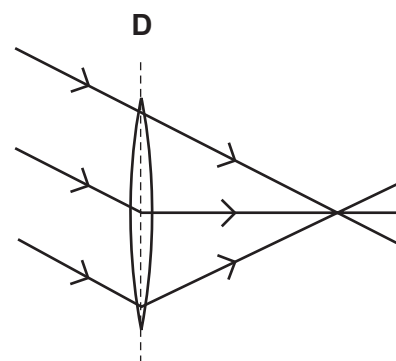
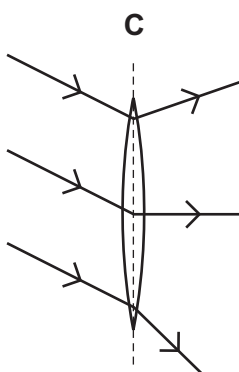
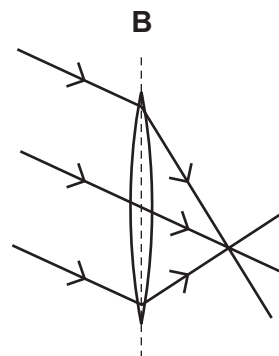
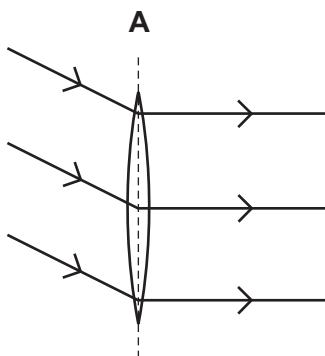
Which labelled distance shows the amplitude of the wave?



35 Three rays of light are incident on a converging lens as shown.



Which diagram shows the rays after passing through the lens?



36 Which statement about the electromagnetic spectrum is correct?

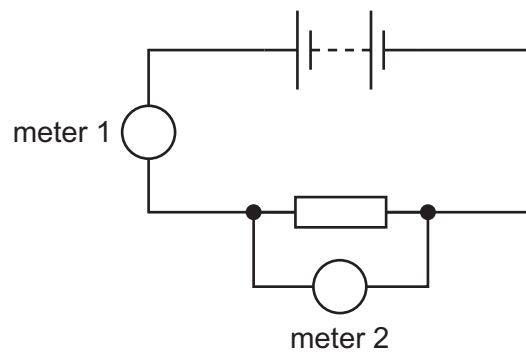
- A Gamma rays have the highest frequency.
- B Microwaves have the smallest wavelength.
- C Ultraviolet waves have the largest wavelength.
- D Visible light has the lowest frequency.

37 A fire alarm is not loud enough. An engineer adjusts it so that it produces a note of the same pitch which is louder.

What effect does this have on the amplitude and on the frequency of the sound waves from the alarm?

	amplitude	frequency
<b>A</b>	larger	larger
<b>B</b>	larger	unchanged
<b>C</b>	unchanged	larger
<b>D</b>	unchanged	unchanged

38 An ammeter and a voltmeter are correctly connected in a circuit so that the resistance of the resistor can be calculated. The ammeter reads 2.0 A and the voltmeter reads 4.0 V.



Which row correctly identifies the voltmeter and gives the resistance of the resistor?

	voltmeter	resistance of resistor / $\Omega$
<b>A</b>	meter 1	0.50
<b>B</b>	meter 1	2.0
<b>C</b>	meter 2	0.50
<b>D</b>	meter 2	2.0

- 39 When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A while the computer is in use.

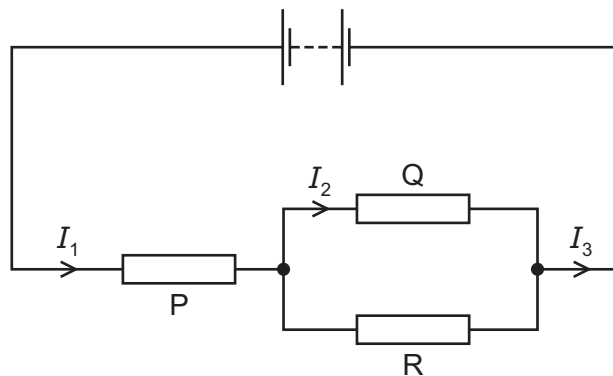
The wire connecting the computer to the power supply can safely carry a current of up to 10.0 A.

The circuit contains a fuse.

Which value of fuse is suitable to use to provide the greatest protection?

- A** 1.0 A            **B** 3.0 A            **C** 5.0 A            **D** 13.0 A
- 40 The diagram shows a circuit with a battery connected to three resistors P, Q and R.

In different parts of the circuit the currents are  $I_1$ ,  $I_2$  and  $I_3$ , as shown.



Which is correct?

- A**  $I_1$  is equal to  $I_2$  **and**  $I_2$  is equal to  $I_3$ .
- B**  $I_1$  is larger than  $I_2$  **and**  $I_2$  is larger than  $I_3$ .
- C**  $I_1$  is larger than  $I_2$  **and**  $I_2$  is smaller than  $I_3$ .
- D**  $I_1$  is smaller than  $I_2$  **and**  $I_2$  is larger than  $I_3$ .



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The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	VIII						VIII				
3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Key</b>                      atomic number                      atomic symbol                      name                      relative atomic mass                 </div>											2 <b>He</b> helium 4				
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
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.)