



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/12

Paper 1 Multiple Choice (Core)

February/March 2018

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.

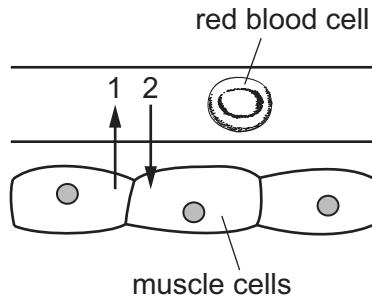
Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

1 Which is a characteristic of all living organisms?

- A breathing
- B eating
- C egestion
- D movement

2 The diagram shows a blood capillary and a red blood cell, next to three respiring muscle cells.



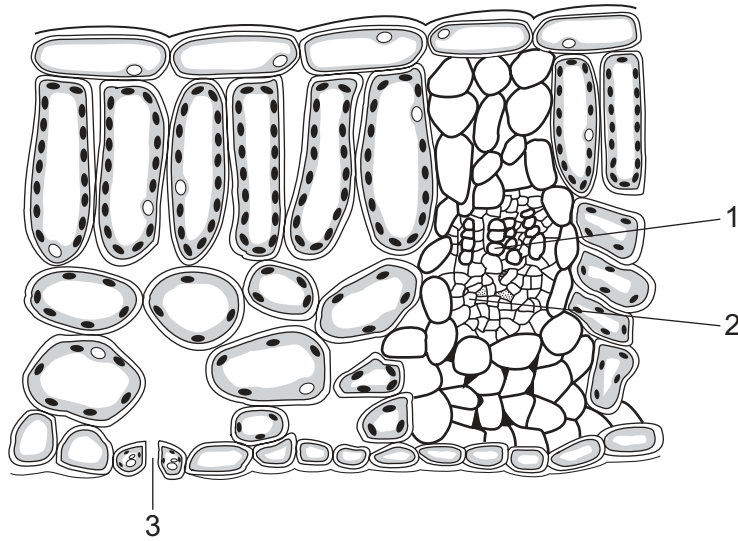
Which arrows show the net movement of carbon dioxide?

- A 1 only
 - B 2 only
 - C 1 and 2
 - D neither arrow
- 3 Which statement about enzymes is correct?
- A All enzymes work best at pH 7.
 - B All proteins are enzymes.
 - C Enzymes are biological catalysts.
 - D Low temperatures denature enzymes.
- 4 Tests were performed on four samples of food. The results are shown in the table.

Which food contains protein **only**?

	results of food tests		
	Benedict's test	biuret test	iodine test
A	blue	blue	blue/black
B	blue	purple	brown
C	red	blue	blue/black
D	red	purple	brown

5 The diagram shows a section through a leaf.

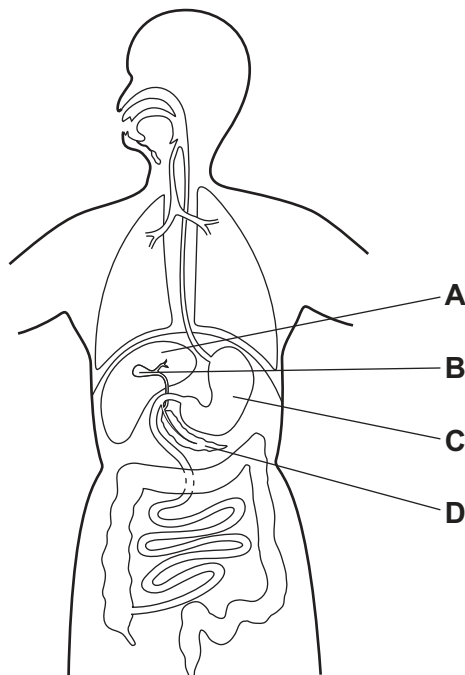


Where does carbon dioxide enter the leaf and where does water leave?

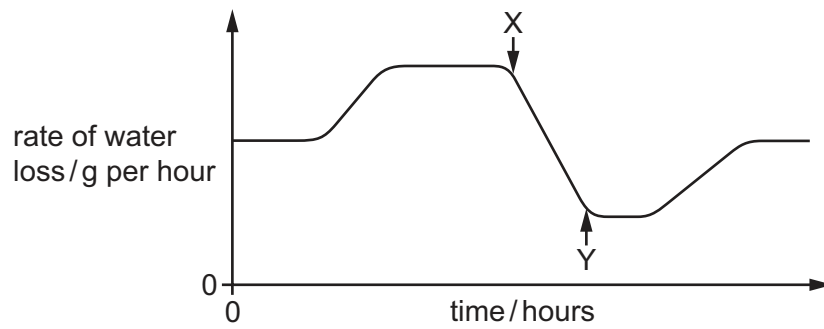
	carbon dioxide enters	water leaves
A	1	2
B	1	3
C	3	1
D	3	3

6 The diagram shows the alimentary canal.

Which label shows where bile is stored?

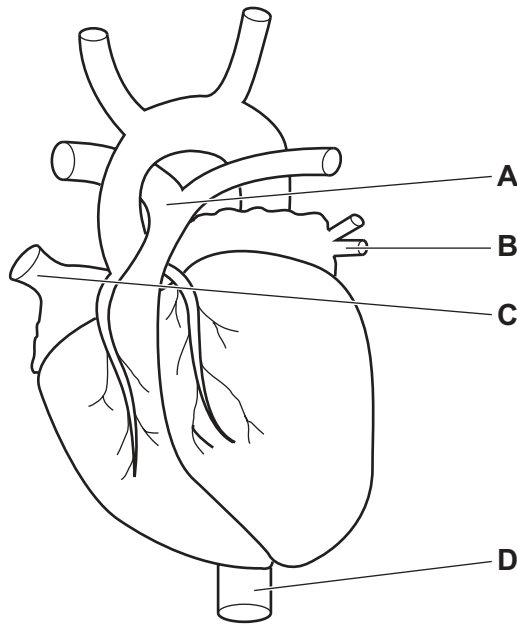


- 7 The graph shows the rate of water loss from a plant during daylight hours.



What could cause the change in the rate of water loss between point X and point Y?

- A The air becomes cooler.
 - B The air becomes drier.
 - C The day becomes sunnier.
 - D The stomata open wider.
- 8 The diagram shows the human heart and the main blood vessels associated with it.
- Which blood vessel is the pulmonary artery?



9 The depth and rate of breathing changes depending on the activity the body is doing.

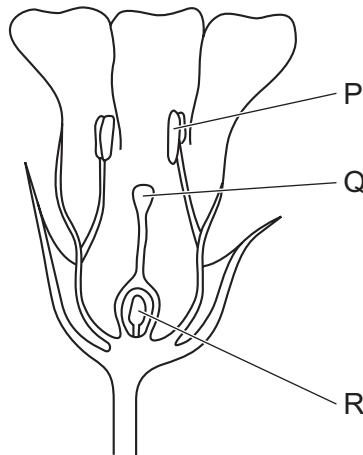
Which row shows the effects of strenuous physical exercise on the depth and rate of breathing?

	depth of breathing	rate of breathing
A	deep	fast
B	deep	slow
C	shallow	fast
D	shallow	slow

10 What is the result of a tropism?

- A** feeding
- B** gravity
- C** growth
- D** light

11 The diagram shows a section through a flower.

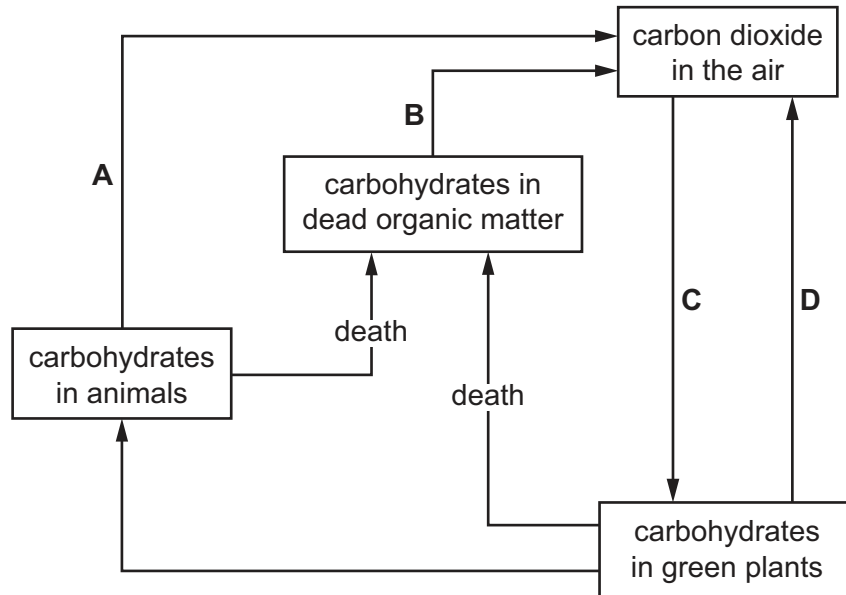


Where are the male and female gametes (sex cells) made?

	male gametes	female gametes
A	P	Q
B	P	R
C	Q	P
D	Q	R

12 The diagram shows part of the carbon cycle.

Which arrow represents a process that releases oxygen into the atmosphere?



13 Many countries work to conserve important resources.

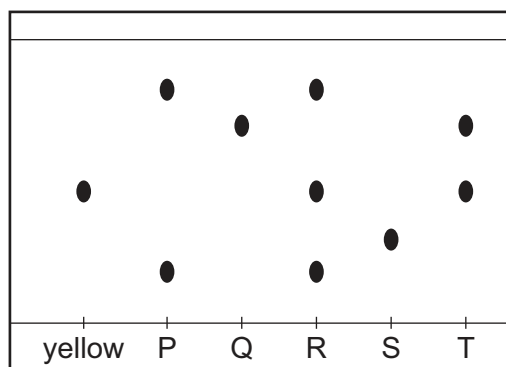
Which is **not** an important resource to conserve?

- A fossil fuels
- B sewage
- C species
- D water

14 Which statement about atoms and molecules is correct?

- A Atoms gain or lose electrons to become molecules.
- B Atoms of the same element contain the same number of molecules.
- C Molecules are the simplest unit of an atom.
- D Molecules contain atoms which are covalently bonded.

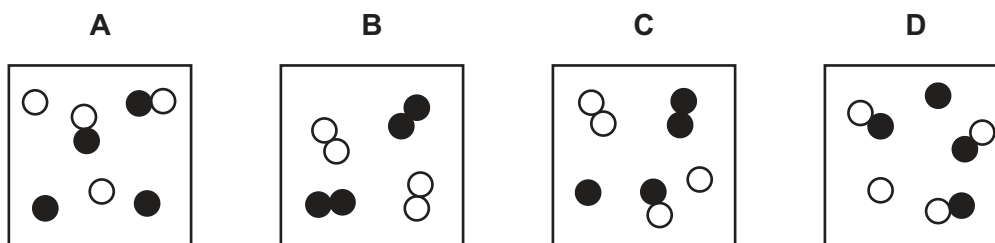
15 The chromatogram obtained from inks P, Q, R, S and T is shown.



Which inks contain the colour yellow?

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

16 Which diagram represents a mixture of two elements?



17 The atomic number of argon is 18.

The mass number of argon is 40.

How many protons, neutrons and electrons are there in an argon atom?

	protons	neutrons	electrons
A	18	18	22
B	18	22	18
C	22	18	18
D	22	18	22

18 What is the formula of sulfuric acid?

- A** HSO_3 **B** HSO_4 **C** H_2SO_3 **D** H_2SO_4

- 19 During the electrolysis of aqueous copper chloride, inert electrodes are placed in the solution.

The copper chloride solution is the1..... .

Copper is deposited on the2..... when electricity is passed through the solution.

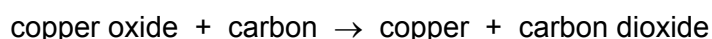
Which words complete gaps 1 and 2?

	1	2
A	electrode	anode
B	electrode	cathode
C	electrolyte	anode
D	electrolyte	cathode

- 20 Excess magnesium ribbon is reacted with 10 cm³ of dilute hydrochloric acid. The hydrogen gas produced is collected and measured.

Which change to the reaction conditions increases the rate of reaction **and** the volume of hydrogen produced?

- A** Use a lower temperature.
- B** Use a transition metal catalyst.
- C** Use concentrated hydrochloric acid.
- D** Use powdered magnesium.
- 21 The equation shows the reaction of copper oxide with carbon.



In the reaction, the carbon is the1..... agent and is2..... during the reaction.

Which words complete gaps 1 and 2?

	1	2
A	oxidising	oxidised
B	oxidising	reduced
C	reducing	oxidised
D	reducing	reduced

22 What reacts with dilute hydrochloric acid to make magnesium chloride?

- 1 magnesium
- 2 magnesium carbonate
- 3 magnesium oxide

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

23 Which row describes the properties of a transition element?

	density	melting point	electrical conductor
A	high	high	yes
B	high	low	no
C	low	high	no
D	low	low	yes

24 The noble gases make up Group VIII of the Periodic Table.

Which statement is correct?

- A** Argon exists as non-bonded atoms.
- B** Krypton is very poisonous.
- C** Neon burns in pure oxygen with a red flame.
- D** The chemical formula of helium is He₂.

25 Why is drinking water treated with chlorine?

- A** to improve the taste
- B** to kill bacteria
- C** to remove colour
- D** to remove insoluble impurities

26 Which statement about the rusting of iron is correct?

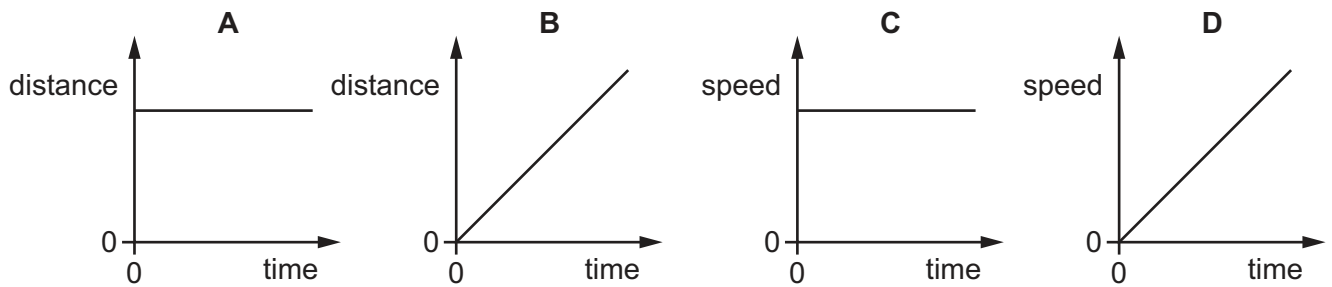
- A** Iron becomes lighter when it rusts.
- B** Iron is reduced when it rusts.
- C** Rusting is a reaction involving iron, oxygen and water.
- D** Rusting is a reaction involving iron and water only.

27 What gas is the main constituent of natural gas?

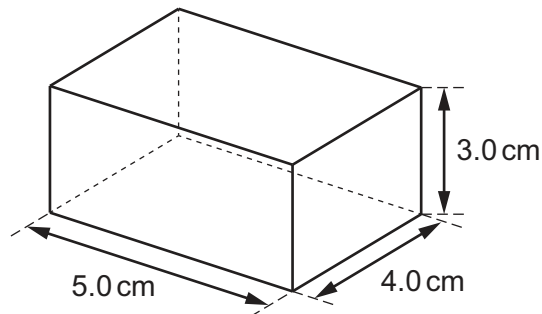
- A carbon dioxide
- B methane
- C nitrogen
- D oxygen

28 The diagrams show distance-time and speed-time graphs.

Which graph represents a body at rest?



29 The solid block shown is made of a metal with density 7.0 g/cm^3 .



What is the mass of the block?

- A 4.7g
- B 8.6g
- C 84g
- D 420g

- 30 A student plots an extension-load graph for a spring.

He measures the length of the spring with no load attached.

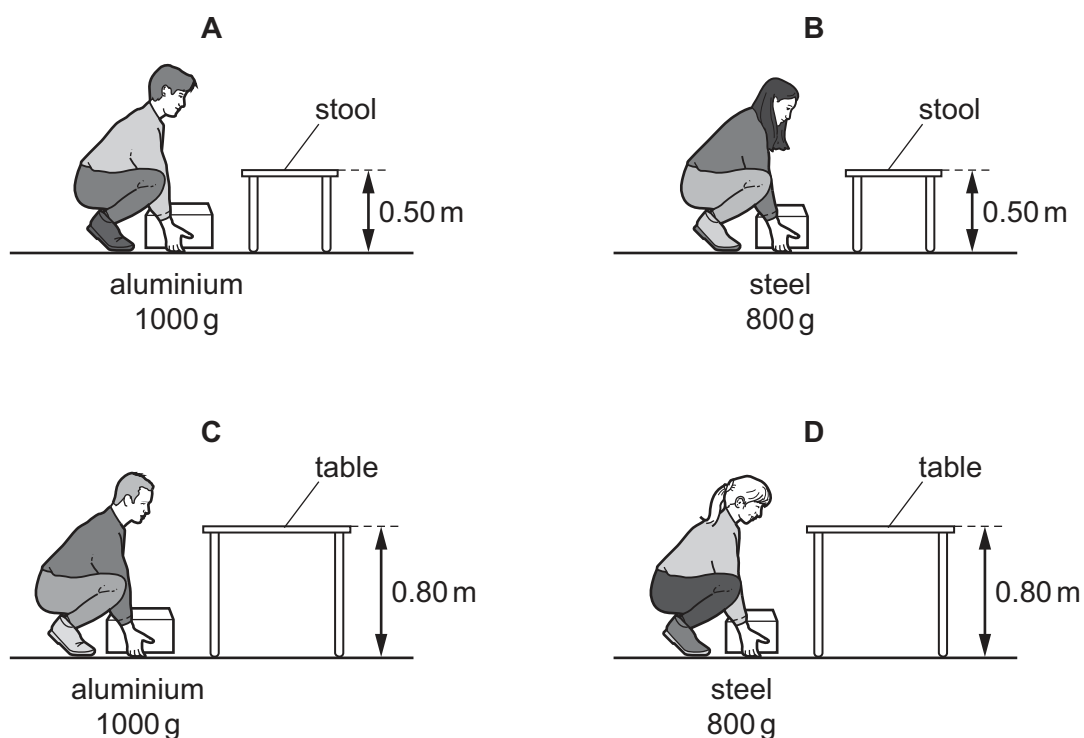
Next he hangs a load from the spring and measures the new length of the spring. He repeats this for different loads.

How does the student calculate the extension for each value of load?

- A new length + original length
 B new length – original length
 C new length \times original length
 D new length \div original length
- 31 Which energy resource is non-renewable?
- A geothermal energy
 B hydroelectric energy
 C nuclear energy
 D wave energy
- 32 In an experiment, four students each lift a different empty metal box from the floor on to a stool or a table. Two students lift a box made of aluminium, and two students lift a box made of steel.

The diagrams show the height of the stool and the table, and the masses of the boxes.

Which student does the most work on the box that he or she is lifting?



33 What is a property of both solids and liquids?

- A They always fill a container.
- B They can flow.
- C They have a fixed shape.
- D They have a fixed volume.

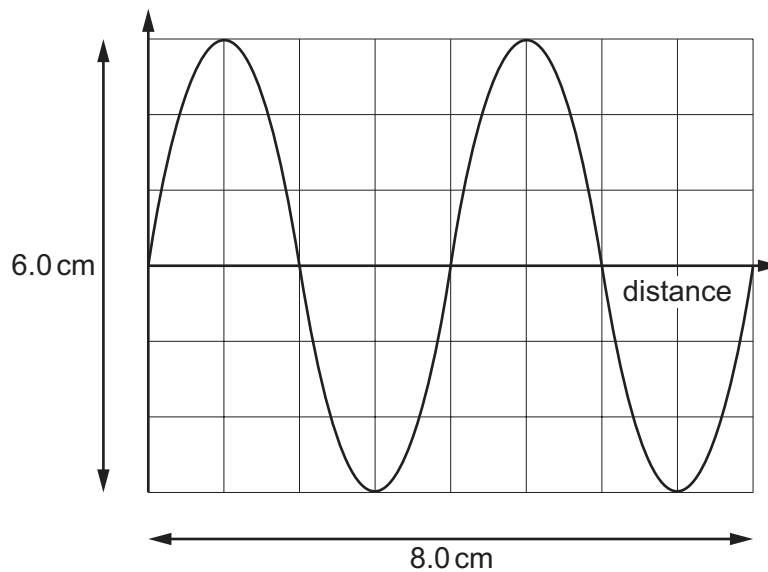
34 A student makes two statements about infra-red radiation.

- 1 It is electromagnetic radiation.
- 2 It transfers thermal energy through a vacuum.

Which of these statements are correct?

- A 1 only
- B 1 and 2
- C 2 only
- D neither 1 nor 2

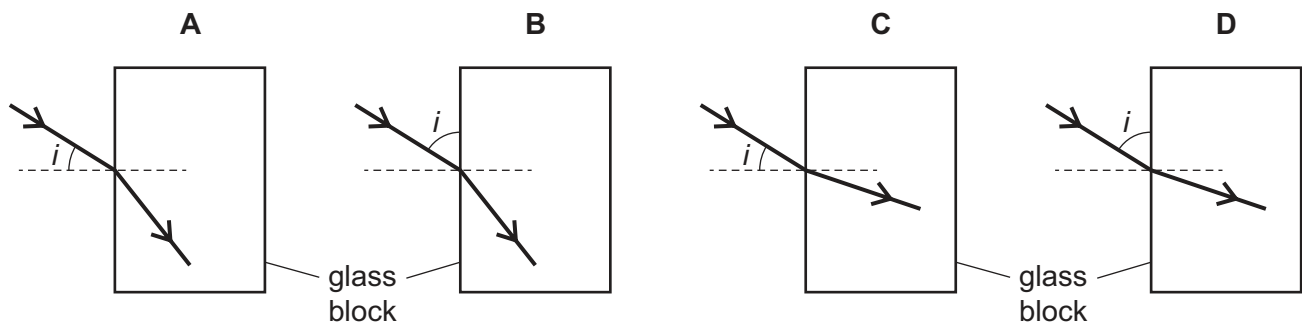
35 The diagram represents a wave.



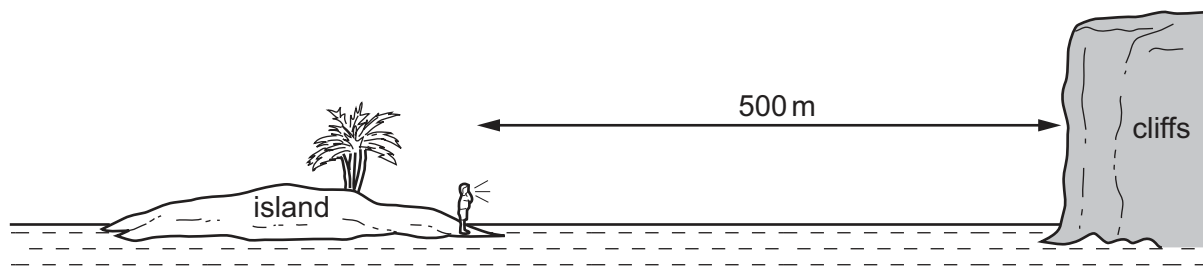
What is the wavelength of the wave?

- A 3.0 cm
- B 4.0 cm
- C 6.0 cm
- D 8.0 cm

- 36 Which diagram shows how a ray of light passes from air into a glass block, and shows the angle of incidence labelled i ?



- 37 A boy on an island is 500 m from some cliffs.



He shouts and he hears an echo from the cliffs.

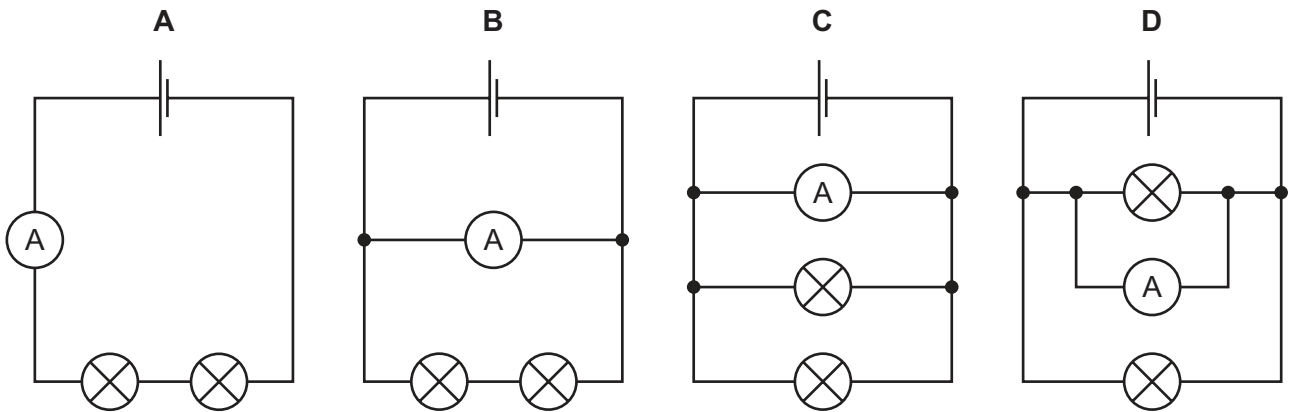
Sound travels at 340 m/s through the air.

What is the time interval between when the boy shouts and when he hears the echo?

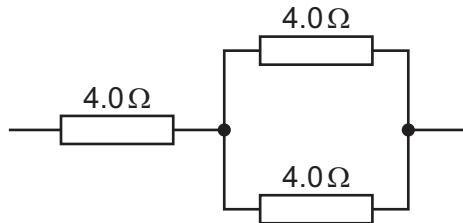
- A $\frac{500}{340}$ s B $\frac{2 \times 500}{340}$ s C $\frac{340}{500}$ s D $\frac{2 \times 340}{500}$ s
- 38 Why is the electricity supply to a house fitted with a fuse?
- A to increase the current in the circuit
- B to increase the resistance of the circuit
- C to maintain a constant current in the circuit
- D to prevent overheating of the cables in the circuit

- 39 The diagrams show four circuits, each containing an ammeter and two lamps with different resistances.

Which circuit shows an ammeter with a reading equal to the current in each lamp?



- 40 Three $4.0\ \Omega$ resistors are connected as shown.



What is the combined resistance of this arrangement?

- A less than $4.0\ \Omega$
- B between $4.0\ \Omega$ and $8.0\ \Omega$
- C between $8.0\ \Omega$ and $12\ \Omega$
- D $12\ \Omega$

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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	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> Key atomic number atomic symbol name relative atomic mass </div>										2 He helium 4					
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
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 —	114 Fl flerovium —	116 Lv livermorium —	—	—	—	—

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.).