



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice

0653/13

October/November 2012

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, highlighters, 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.

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.

This document consists of **19** printed pages and **1** blank page.

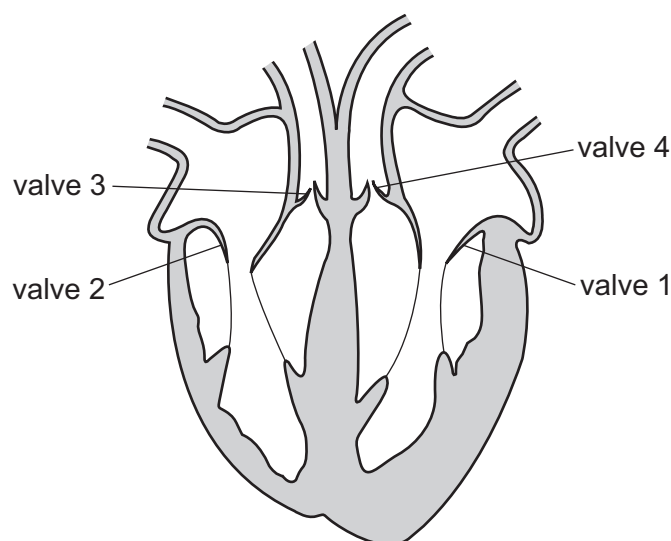


1 Water enters a plant cell.

In what order does the water pass through the cell structures before reaching the vacuole?

- A cell surface membrane → cell wall → cytoplasm
- B cell wall → cell surface membrane → cytoplasm
- C cell wall → cytoplasm → cell surface membrane
- D cytoplasm → cell wall → cell surface membrane

2 The diagram shows a section through the human heart.



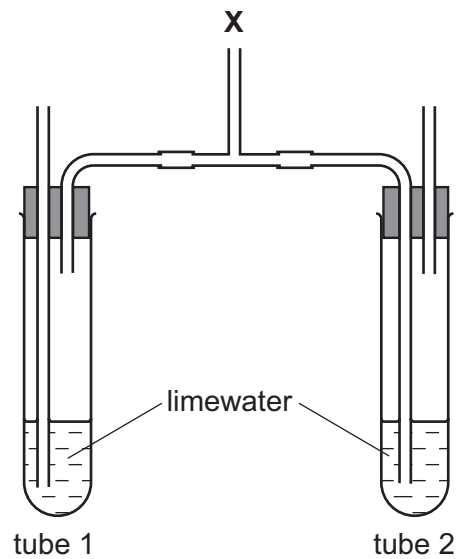
What happens to the valves as blood is being pumped to the lungs?

	valve 1	valve 2	valve 3	valve 4
A	closed	closed	open	closed
B	closed	closed	open	open
C	open	open	closed	closed
D	open	open	closed	open

3 How many proteins be used in the body?

	defending against disease	making enzymes
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 4 The diagram shows an apparatus used to show a difference between inspired and expired air.



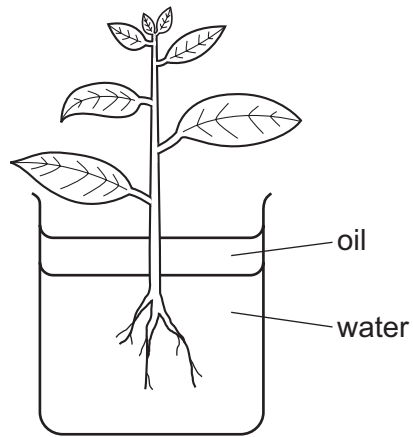
A student breathes in and out gently through tube **X**.

What will be the result after 10 breaths?

	lime water in test-tube 1	lime water in test-tube 2
A	clear	clear
B	clear	milky white
C	milky white	clear
D	milky white	milky white

- 5 Which part of blood contains haemoglobin?
- A** plasma
 - B** platelets
 - C** red blood cells
 - D** white blood cells
- 6 Which statement about enzymes is always correct?
- A** They are made of carbohydrate.
 - B** They work best at high temperatures.
 - C** They speed up chemical reactions.
 - D** They work inside living cells.

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

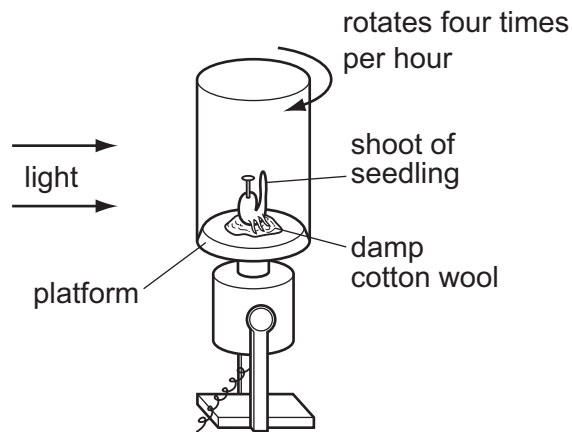


When set up, the apparatus weighs 296 g.
After two hours it weighs 292 g.

What is the rate of transpiration?

- A 150 g water / hour
- B 148 g water / hour
- C 4 g water / hour
- D 2 g water / hour

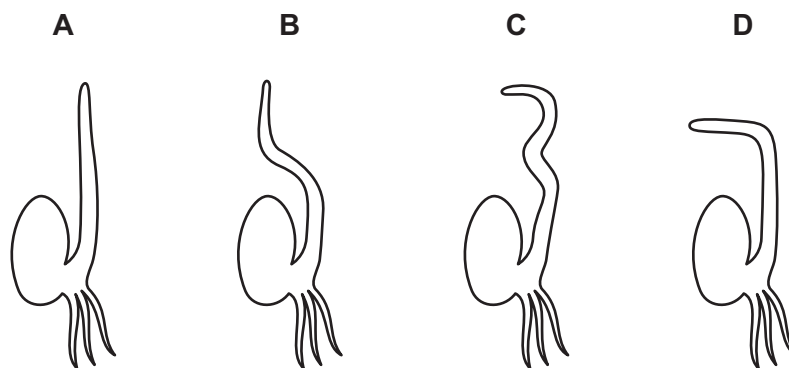
- 8 The diagram shows a seedling fixed to a platform.



The platform is stationary for two days. The platform is then rotated four times every hour for the next two days.

During all four days, the light source remains stationary.

Which shows the appearance of the seedling after the four days growth?

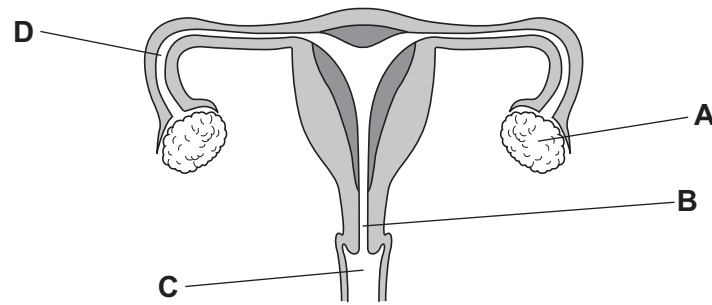


- 9 Which row shows the features of asexual reproduction in plants?

	gametes produced	involves pollination but not fertilisation	offspring genetically different from parents
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	no

10 The diagram shows the human female reproductive system.

Where is the egg fertilised?

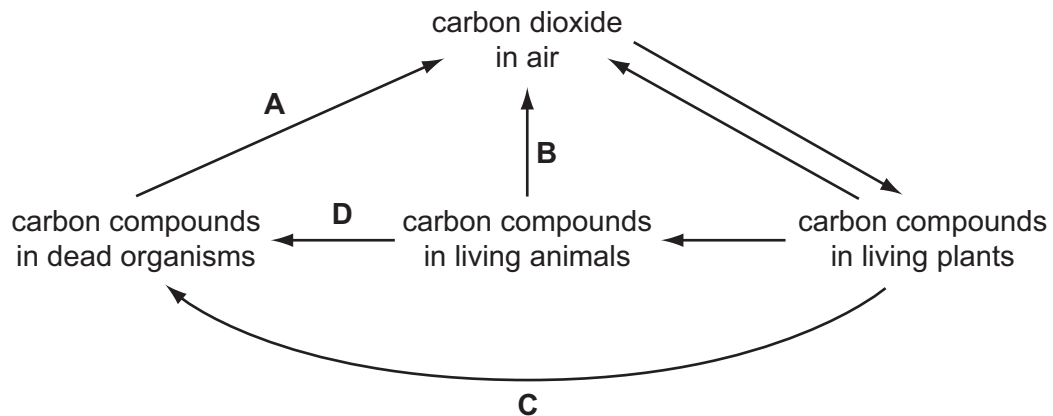


11 Which environmental conditions are normally necessary for seed germination?

	light	oxygen	suitable temperature	water
A	no	yes	no	yes
B	no	yes	yes	yes
C	yes	no	yes	no
D	yes	yes	yes	yes

12 The diagram shows part of the carbon cycle.

Which arrow represents respiration by decomposers?



13 Which two gases contribute most to global warming?

- A** carbon dioxide and methane
- B** carbon monoxide and carbon dioxide
- C** methane and oxygen
- D** oxygen and carbon monoxide

14 A method for separating a mixture of two solid salts has the following steps.

- 1 Shake with water.
- 2 Filter the resulting liquid.
- 3 Wash the residue on the filter paper.
- 4 Evaporate the filtrate until crystals form.

For which two salts does this method work?

- A** barium chloride and barium nitrate
- B** barium nitrate and silver nitrate
- C** barium sulfate and silver chloride
- D** silver chloride and silver nitrate

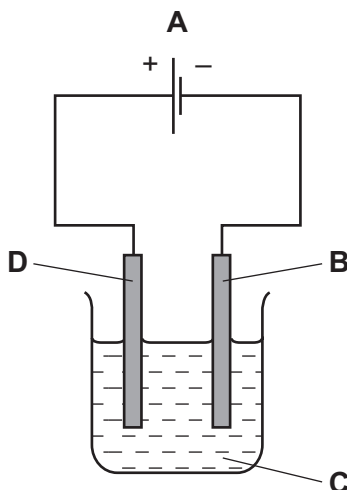
15 Fluorine and chlorine are in Group VII of the Periodic Table.

Which number increases by one between these two elements?

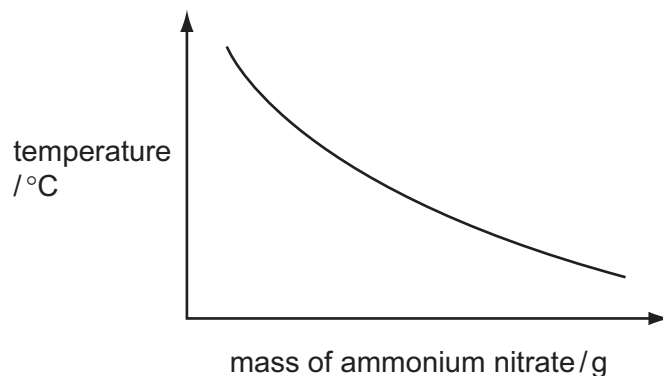
- A** the number of atoms in one molecule
- B** the number of electron shells in one atom
- C** the number of outer shell electrons in one atom
- D** the number of protons in one atom

16 The diagram shows a simple cell.

Which label is the electrolyte?

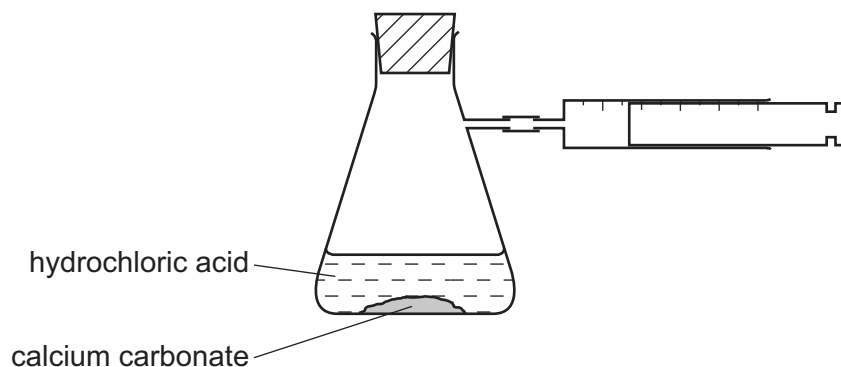


- 17 The graph shows how the temperature of water changes as ammonium nitrate is dissolved in it.



What does the graph show?

- A The ammonium nitrate does not dissolve readily.
 - B The dissolving is endothermic.
 - C The dissolving is exothermic.
 - D The solution freezes.
- 18 The apparatus below is used to investigate the speed of reaction between calcium carbonate and hydrochloric acid.



Which conditions produce the greatest speed of reaction?

	form of calcium carbonate	concentration of hydrochloric acid
A	lumps	high
B	lumps	low
C	powder	high
D	powder	low

- 19** A gas is produced when magnesium carbonate reacts with dilute sulfuric acid.

What is the correct test for this gas?

- A** It bleaches damp litmus paper.
- B** It 'pops' with a lighted splint.
- C** It relights a glowing splint.
- D** It turns limewater milky.

- 20** Which row correctly shows the pH of each type of solution?

	acidic	alkaline	neutral
A	9	5	7
B	7	9	5
C	5	9	7
D	5	7	9

- 21** The diagram shows an outline of the Periodic Table.

Which two elements have similar chemical properties?

[illegible]

- A** V and W **B** V and X **C** W and Y **D** Y and Z

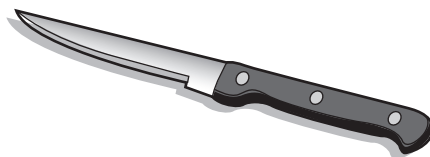
- 22 Two non-metallic elements, X and Y, are in the same group of the Periodic Table.

X is higher in the group than Y.

Which row shows the Group that includes elements X and Y and which element is more reactive?

	Group	more reactive element
A	I	X
B	I	Y
C	VII	X
D	VII	Y

- 23 The diagram shows a knife used in a kitchen to prepare vegetables.



Why is the knife blade made of stainless steel and **not** pure iron?

- A** It is a compound but iron is an element.
- B** It is easier to polish than is iron.
- C** It is more brittle than iron.
- D** It is more resistant to corrosion than is iron.

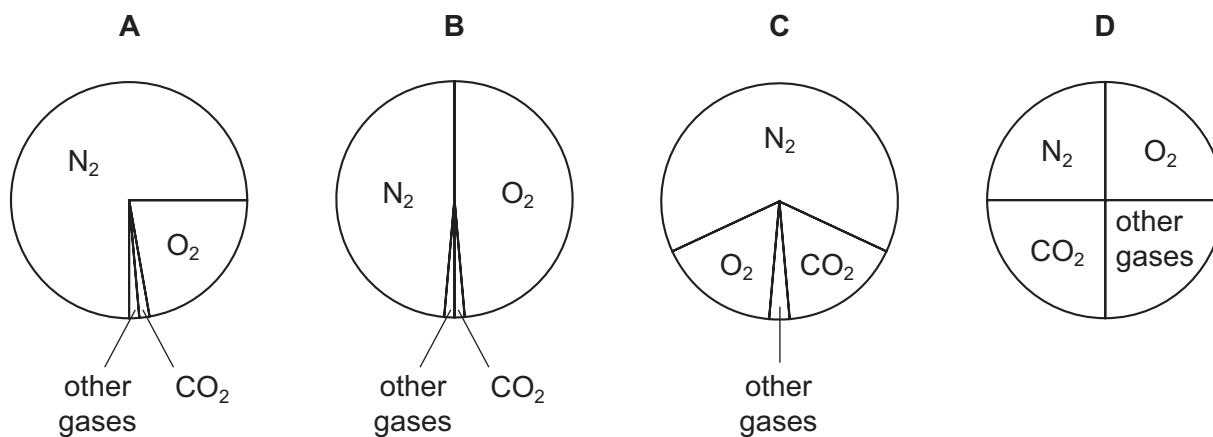
24 Reactions of three metals are listed in the table.

metal	reacts with cold water	reacts with dilute hydrochloric acid
P	no	yes
Q	no	no
R	yes	yes

What is the order of reactivity of the metals?

	most reactive	→	least reactive
A	P	Q	R
B	Q	R	P
C	R	P	Q
D	R	Q	P

25 Which pie chart correctly shows the proportions of gases in the air?



26 A hydrocarbon fuel is burned completely.



What are X and Y?

	X	Y
A	CO	H ₂
B	CO	H ₂ O
C	CO ₂	H ₂
D	CO ₂	H ₂ O

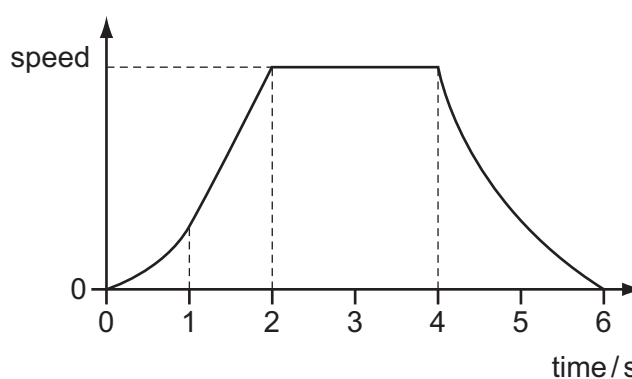
27 Petroleum is a source of hydrocarbon fuels.

Other fuels are coal and wood.

Which of these are fossil fuels?

	coal	wood	petroleum
A	yes	yes	no
B	yes	no	yes
C	no	yes	yes
D	yes	yes	yes

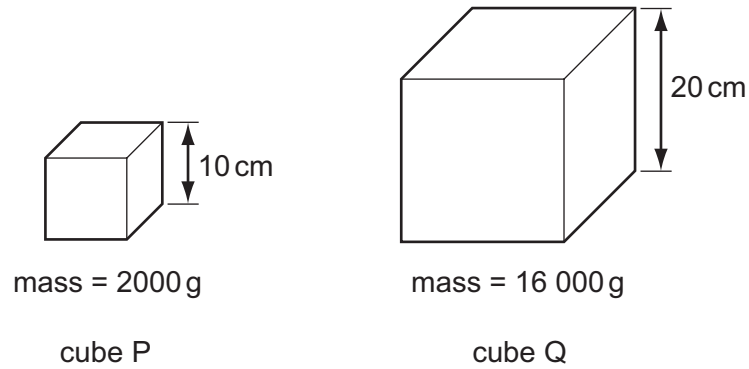
28 The graph shows how the speed of an object changes with time.



Which statement about the movement of the object is correct?

- A** It never travels at a constant speed.
- B** It stops for two seconds.
- C** It travels at its maximum speed for four seconds.
- D** It takes the same time to increase its speed as it does to decrease its speed.

29 The diagram shows two cubes P and Q. The lengths of their sides and their masses are given.



What is the density of the material of cube Q?

- A half that of cube P
- B the same as that of cube P
- C twice that of cube P
- D four times that of cube P

30 What is the unit of work?

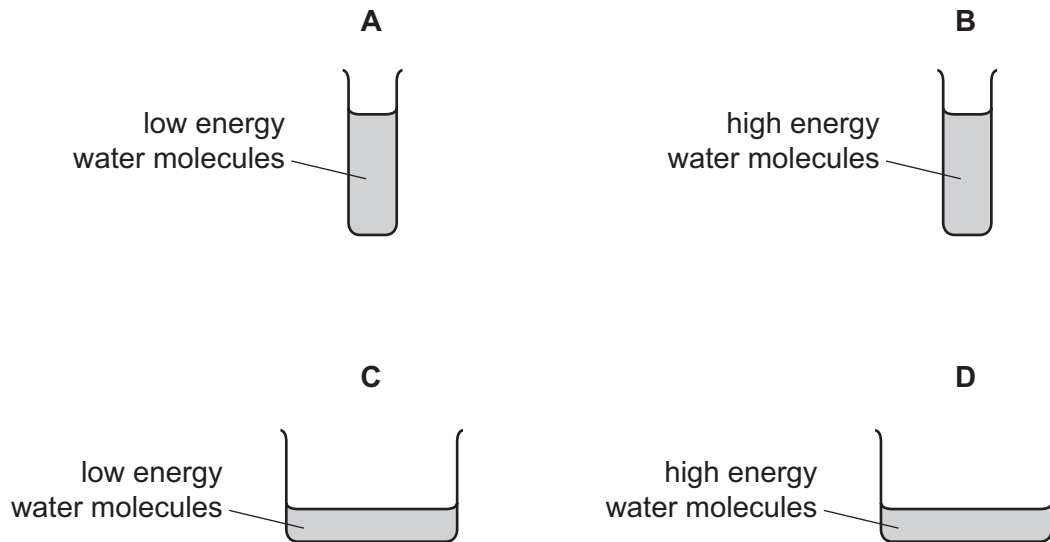
- A joule
- B kilogram
- C newton
- D watt

- 31 The diagram shows two narrow beakers **A** and **B**, and two wide beakers **C** and **D**. All four beakers contain the same mass of water.

Beaker **A** and beaker **C** contain low energy water molecules.

Beaker **B** and beaker **D** contain high energy water molecules.

From which beaker does the water evaporate most slowly?

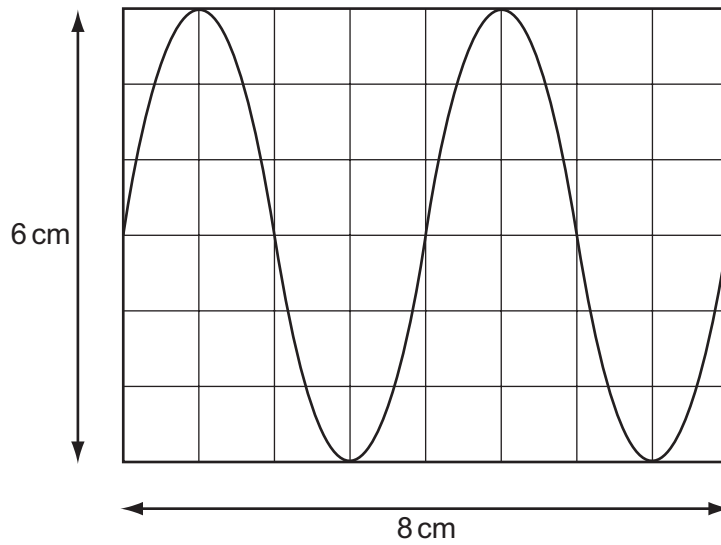


- 32 Heat energy can be lost from a hot object by radiation.

What is the name of this radiation, and is it electromagnetic?

	name of radiation	is it electromagnetic
A	infra-red	no
B	infra-red	yes
C	microwave	no
D	microwave	yes

33 The diagram represents a wave.

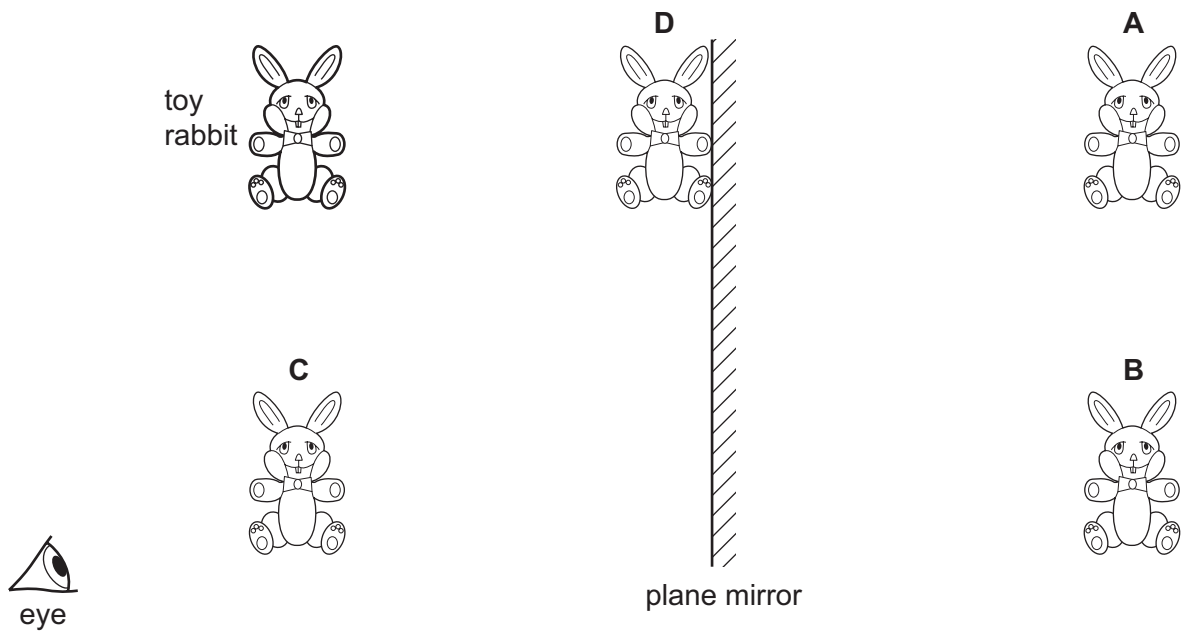


What is the wavelength of the wave?

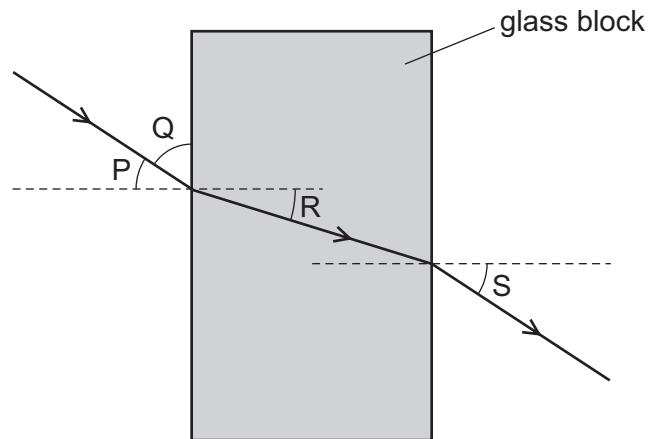
- A** 3 cm **B** 4 cm **C** 6 cm **D** 8 cm

34 The diagram shows the position of the eye of a person looking at the reflection of a toy rabbit in a plane mirror.

At which position is the image seen?



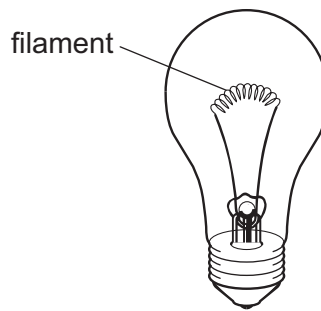
35 The diagram shows a ray of light passing through a glass block.



Which two angles are the angle of incidence and the angle of refraction?

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

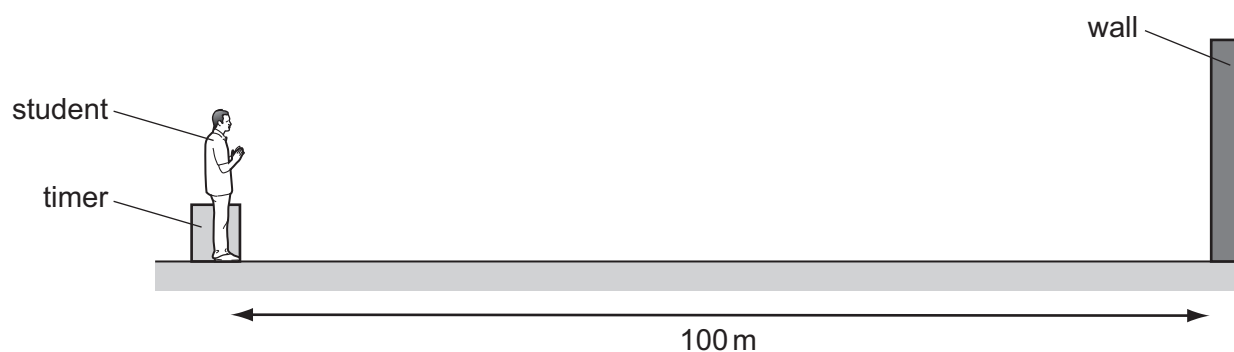
36 The diagram shows a filament lamp.



What are the main types of wave given out by the filament once the lamp is lit?

- A** visible light and infra-red
B visible light and microwaves
C visible light and radio
D visible light and ultraviolet

- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall which is 100 m away from him.

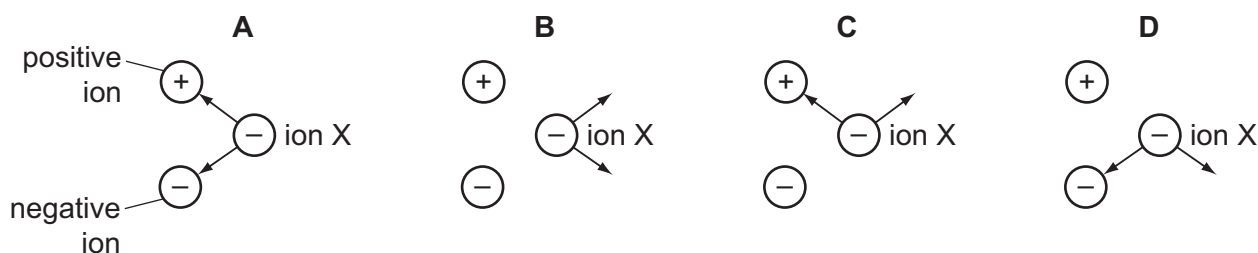


An electronic timer detects the echo of the sound 0.6 s after it is made.

Which calculation should the student use to determine the speed of sound?

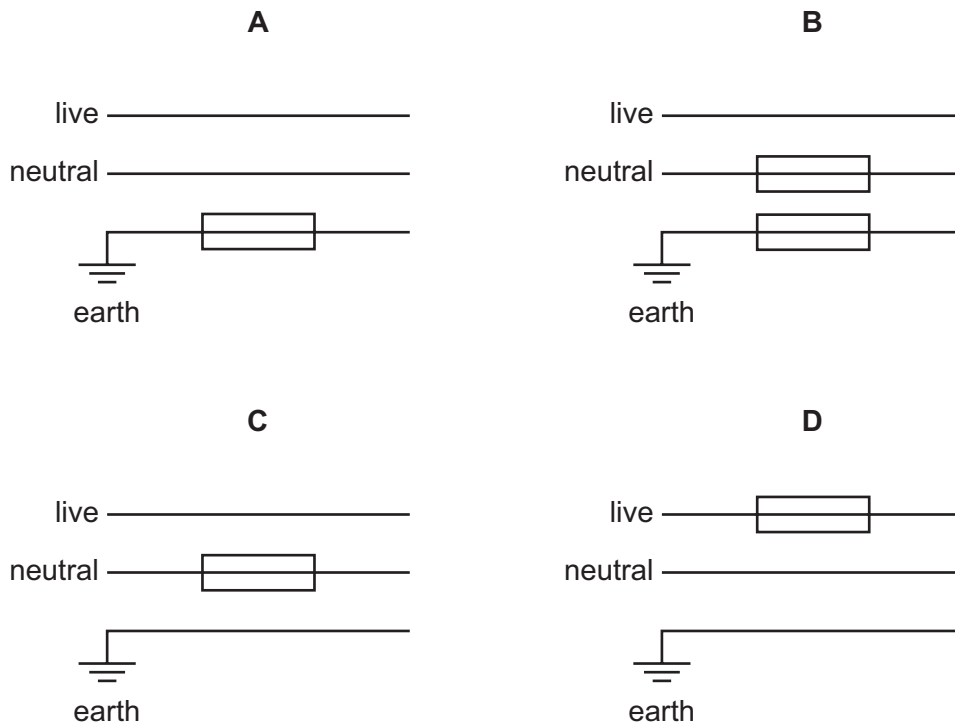
- A $\frac{100}{0.6}$ m/s B $\frac{100}{1.2}$ m/s C $\frac{200}{0.3}$ m/s D $\frac{200}{0.6}$ m/s
- 38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?

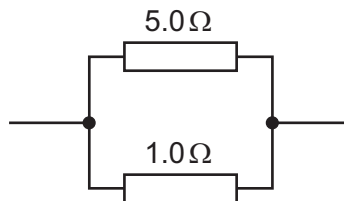


39 Fuses protect mains electrical circuits.

Which diagram shows how the fuse(s) should be connected to provide the maximum safety?



40 A student connects two resistors in parallel.



Which statement about the total resistance of the combination of resistors is correct?

- A** It is less than $1.0\ \Omega$.
- B** It is between $1.0\ \Omega$ and $5.0\ \Omega$.
- C** It is $6.0\ \Omega$.
- D** It is more than $6.0\ \Omega$.

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DATA SHEET
The Periodic Table of the Elements

Group																							
I	II											III	IV	V	VI	VII	0						
												1 H Hydrogen 1											
7 Li Lithium 3	9 Be Beryllium 4																						
23 Na Sodium 11	24 Mg Magnesium 12																						
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	84 Kr Krypton 36							
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	101 Rh Rhodium 45	103 Pd Palladium 46	106 Ag Silver 47	108 Cd Cadmium 48	112 In Indium 49	115 Sn Tin 50	119 Sb Antimony 51	122 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54							
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	222 Rn Radon 86							
87 Fr Francium	88 Ra Radium	89 Ac Actinium																					
58-71 Lanthanoid series													175 Lu Lutetium 71										
90-103 Actinoid series													169 Tm Thulium 69				173 Yb Ytterbium 70						
Key													167 Er Erbium 68				165 Ho Holmium 67						
a													162 Dy Dysprosium 66				160 No Nobelium 102						
X													159 Tb Terbium 65				157 Gd Gadolinium 64						
b													152 Eu Europium 63				150 Sm Samarium 62						
X													144 Nd Neodymium 60				141 Pr Praseodymium 59						
X													140 Ce Cerium 58				138 La Lanthanum 57						
X													137 Ba Barium 56				135 Xe Xenon 54						
X													133 Cs Caesium 55				131 Xe Xenon 54						
X													131 Xe Xenon 54				129 Kr Krypton 36						
X													127 I Iodine 53				125 At Astatine 85						
X													125 At Astatine 85				123 Bi Bismuth 83						
X													123 Bi Bismuth 83				121 Po Polonium 84						
X													121 Po Polonium 84				119 Sb Antimony 51						
X													119 Sb Antimony 51				117 Ts Tennessine 117						
X													117 Ts Tennessine 117				115 Sn Tin 50						
X													115 Sn Tin 50				113 Bi Bismuth 83						
X													113 Bi Bismuth 83				111 In Indium 49						
X													111 In Indium 49				109 Ag Silver 47						
X													109 Ag Silver 47				107 Au Gold 79						
X													107 Au Gold 79				105 At Astatine 85						
X													105 At Astatine 85				103 Lr Lawrencium 103						
X													103 Lr Lawrencium 103				101 Md Mendelevium 101						
X													101 Md Mendelevium 101				99 Es Einsteinium 99						
X													99 Es Einsteinium 99				97 Bk Berkelium 97						
X													97 Bk Berkelium 97				95 Am Americium 95						
X													95 Am Americium 95				93 Np Neptunium 93						
X													93 Np Neptunium 93				91 Pa Protactinium 91						
X													91 Pa Protactinium 91				89 Ac Actinium 89						
X													89 Ac Actinium 89				87 Fr Francium						
X													87 Fr Francium				85 At Astatine 85						
X													85 At Astatine 85				83 Bi Bismuth 83						
X													83 Bi Bismuth 83				81 Tl Thallium 81						
X													81 Tl Thallium 81				79 Au Gold 79						
X													79 Au Gold 79				77 Ir Iridium 77						
X													77 Ir Iridium 77				75 Re Rhenium 75						
X													75 Re Rhenium 75				73 Ta Tantalum 73						
X													73 Ta Tantalum 73				71 Lu Lutetium 71						
X													71 Lu Lutetium 71				69 Tm Thulium 69						
X													69 Tm Thulium 69				67 Ho Holmium 67						
X													67 Ho Holmium 67				65 Tb Terbium 65						
X													65 Tb Terbium 65				63 Eu Europium 63						
X													63 Eu Europium 63				61 Pm Promethium 61						
X													61 Pm Promethium 61				59 Pr Praseodymium 59						
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X													47 Ag Silver 47				45 Rh Rhodium 45						
X													45 Rh Rhodium 45				43 Tc Technetium 43						
X													43 Tc Technetium 43				41 Nb Niobium 41						
X													41 Nb Niobium 41				39 Y Yttrium 39						
X													39 Y Yttrium 39				37 Rb Rubidium 37						
X													37 Rb Rubidium 37				35 Br Bromine 35						
X													35 Br Bromine 35				33 As Arsenic 33						
X													33 As Arsenic 33				31 P Phosphorus 15						
X													31 P Phosphorus 15				29 Cu Copper 29						
X													29 Cu Copper 29				27 Al Aluminium 13						
X													27 Al Aluminium 13				25 Mn Manganese 25						
X													25 Mn Manganese 25				23 V Vanadium 23						
X													23 V Vanadium 23				21 Sc Scandium 21						
X													21 Sc Scandium 21				19 K Potassium 19						
X													19 K Potassium 19				17 Cl Chlorine 17						
X													17 Cl Chlorine 17				15 P Phosphorus 15						
X													15 P Phosphorus 15				13 Al Aluminium 13						
X													13 Al Aluminium 13				11 B Boron 5						
X													11 B Boron 5				9 F Fluorine 9						
X													9 F Fluorine 9				7 N Nitrogen 7						
X													7 N Nitrogen 7				5 C Carbon 6						
X													5 C Carbon 6				3 Li Lithium 3						
X													3 Li Lithium 3				1 H Hydrogen 1						
X													1 H Hydrogen 1				0 He Helium 2						

*58-71 Lanthanoid series
†90-103 Actinoid series

a	X	b
Key		
a = relative atomic mass	X = atomic symbol	b = proton (atomic) number

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

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