



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/13**

Paper 1 Multiple Choice

**October/November 2012**

**45 minutes**

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

\* 5 8 9 3 1 7 2 6 0 6 \*

**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.

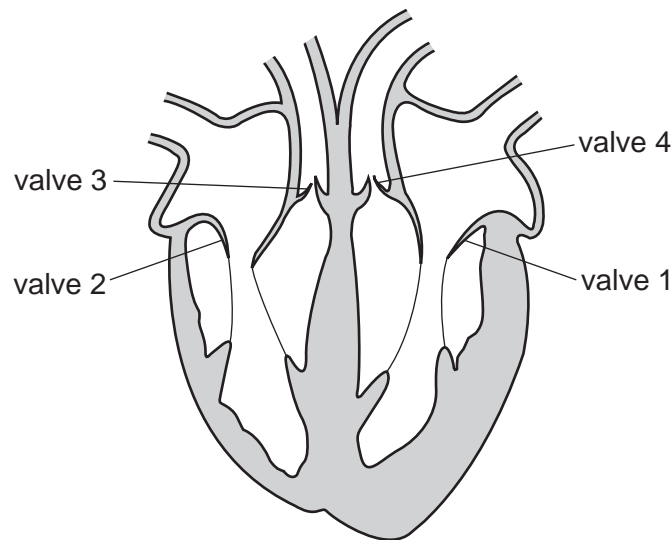


1 Water enters a plant cell.

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?

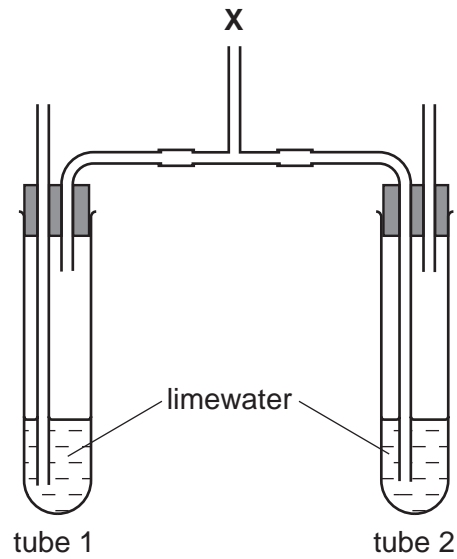
	valve 1	valve 2	valve 3	valve 4
<b>A</b>	closed	closed	open	closed
<b>B</b>	closed	closed	open	open
<b>C</b>	open	open	closed	closed
<b>D</b>	open	open	closed	open

3 How many proteins be used in the body?

	defending against disease	making enzymes
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

3

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



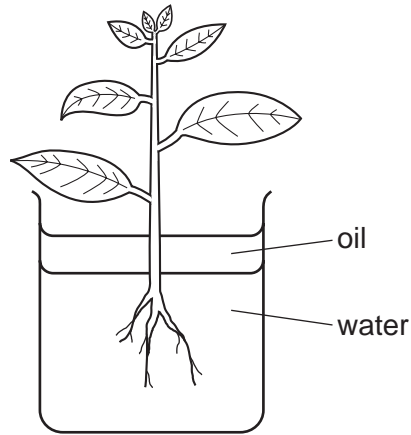
A student breathes in and out gently through tube X.

What will be the result after 10 breaths?

	lime water in test-tube 1	lime water in test-tube 2
<b>A</b>	clear	clear
<b>B</b>	clear	milky white
<b>C</b>	milky white	clear
<b>D</b>	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 evaporation.

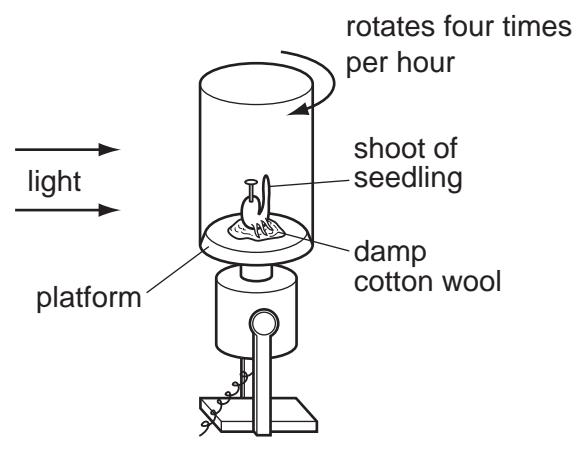


When set up, the apparatus weighs 296 g.  
After two hours it weighs 292 g.

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

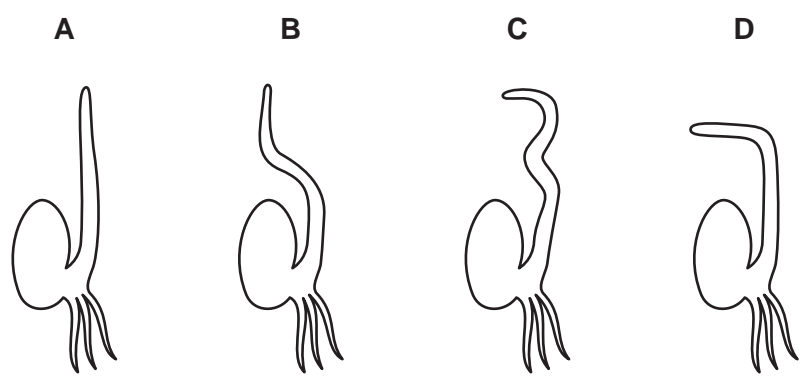
8 The diagram shows a seedling fixed to a platform.



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?

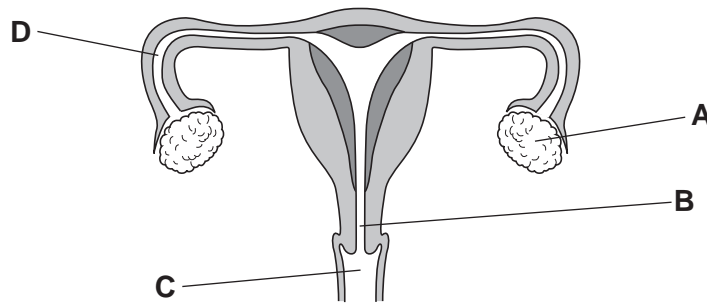


9 Which row shows the features of asexual reproduction in plants?

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

10 The diagram shows the human female reproductive system.

Where is the egg fertilised?

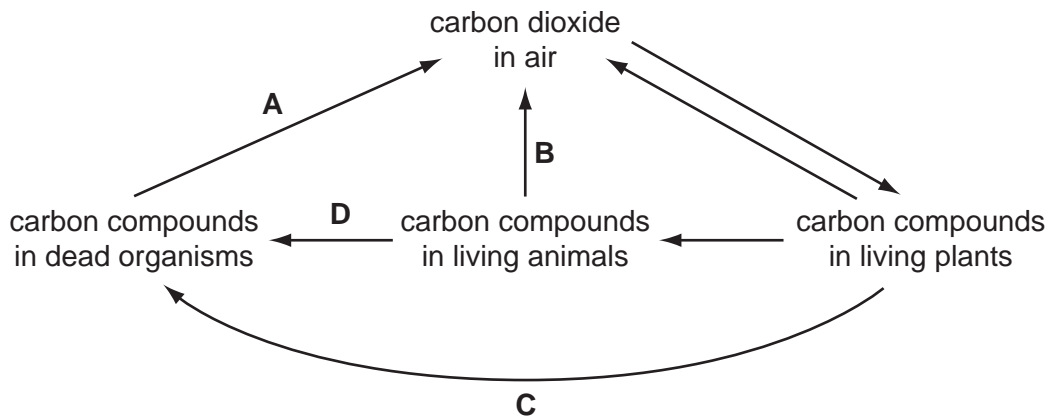


11 Which environmental conditions are normally necessary for seed germination?

	light	oxygen	suitable temperature	water
<b>A</b>	no	yes	no	yes
<b>B</b>	no	yes	yes	yes
<b>C</b>	yes	no	yes	no
<b>D</b>	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

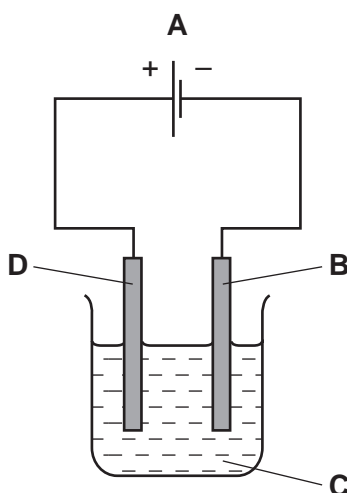
15 Fluorine and chlorine are in Group VII of the Periodic Table.

Which number increases by one between these two elements?

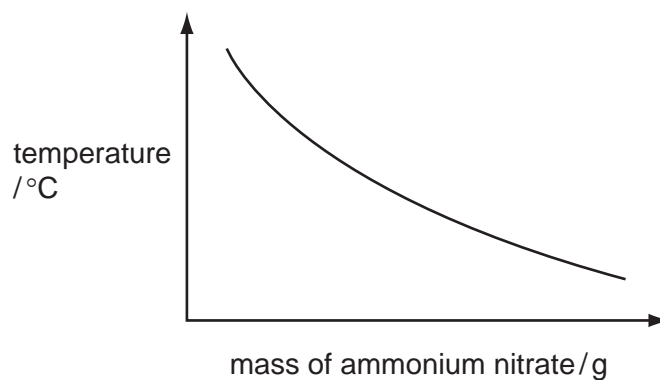
- A the number of atoms in one molecule
- B the number of electron shells in one atom
- C the number of outer shell electrons in one atom
- D the number of protons in one atom

16 The diagram shows a simple cell.

Which label is the electrolyte?

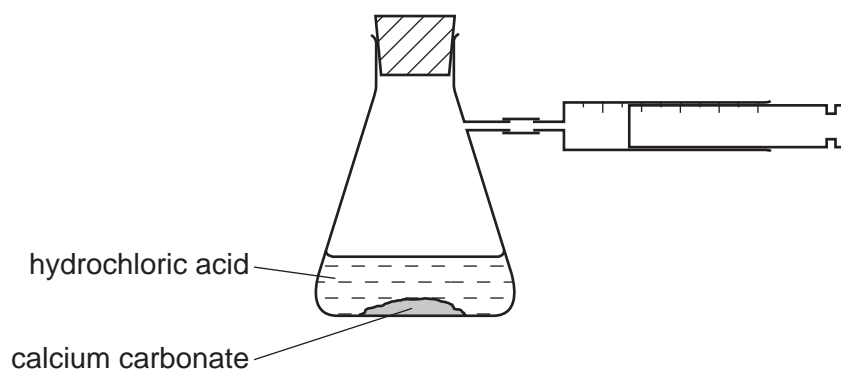


- 17 The graph shows how the temperature of water changes as ammonium nitrate is dissolved.



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
<b>A</b>	lumps	high
<b>B</b>	lumps	low
<b>C</b>	powder	high
<b>D</b>	powder	low



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

What is the correct test for this gas?

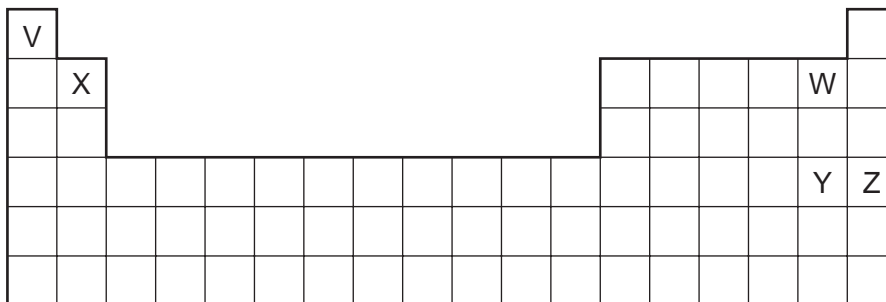
- A It bleaches damp litmus paper.
- B It 'pops' with a lighted splint.
- C It relights a glowing splint.
- D It turns limewater milky.

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

	acidic	alkaline	neutral
<b>A</b>	9	5	7
<b>B</b>	7	9	5
<b>C</b>	5	9	7
<b>D</b>	5	7	9

21 The diagram shows an outline of the Periodic Table.

Which two elements have similar chemical properties?



- 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
<b>A</b>	I	X
<b>B</b>	I	Y
<b>C</b>	VII	X
<b>D</b>	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.

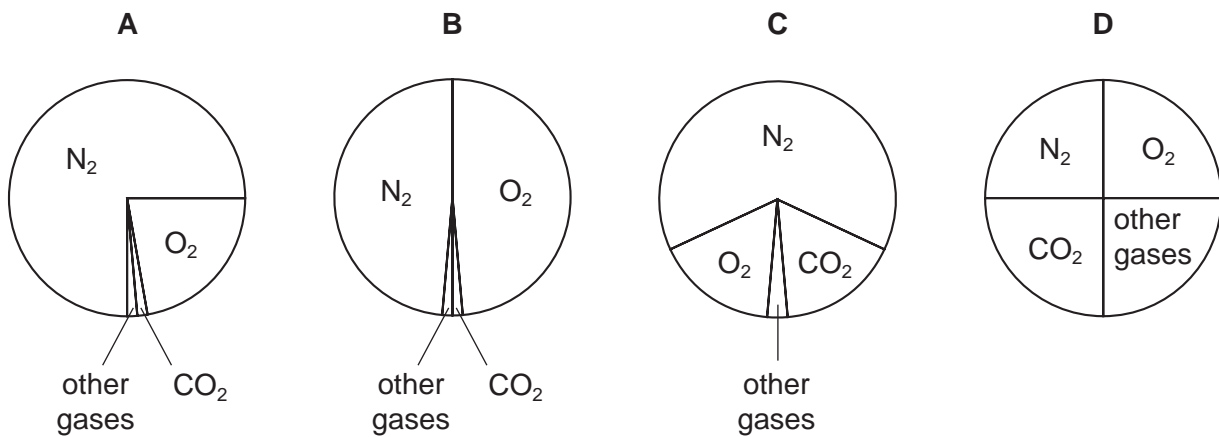
24 Reactions of three metals are listed in the table.

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
<b>A</b>	P		R
<b>B</b>	Q		P
<b>C</b>	R		Q
<b>D</b>	R		P

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



12

26 A hydrocarbon fuel is burned completely.



What are X and Y?

	X	Y
<b>A</b>	CO	H <sub>2</sub>
<b>B</b>	CO	H <sub>2</sub> O
<b>C</b>	CO <sub>2</sub>	H <sub>2</sub>
<b>D</b>	CO <sub>2</sub>	H <sub>2</sub> O

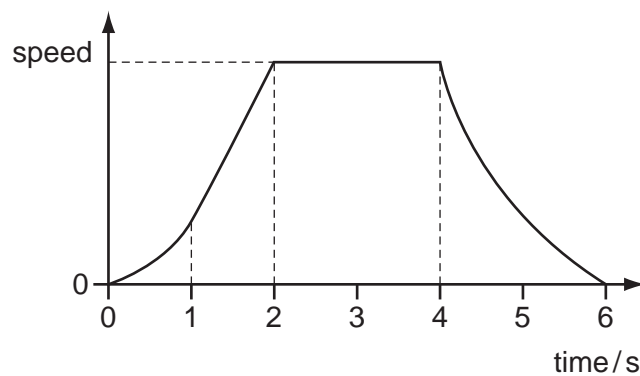
27 Petroleum is a source of hydrocarbon fuels.

Other fuels are coal and wood.

Which of these are fossil fuels?

	coal	wood	petroleum
<b>A</b>	yes	yes	no
<b>B</b>	yes	no	yes
<b>C</b>	no	yes	yes
<b>D</b>	yes	yes	yes

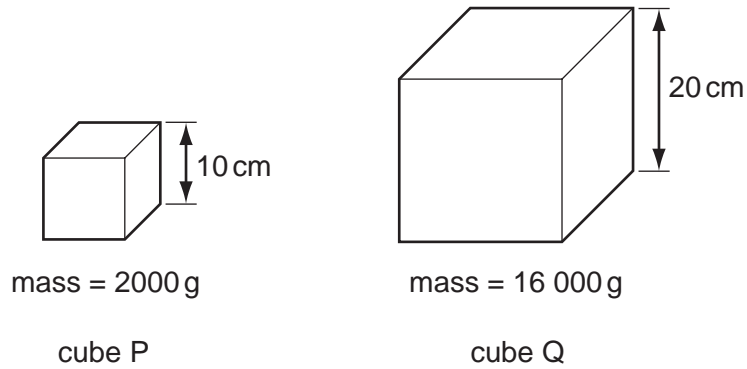
28 The graph shows how the speed of an object changes with time.



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



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?

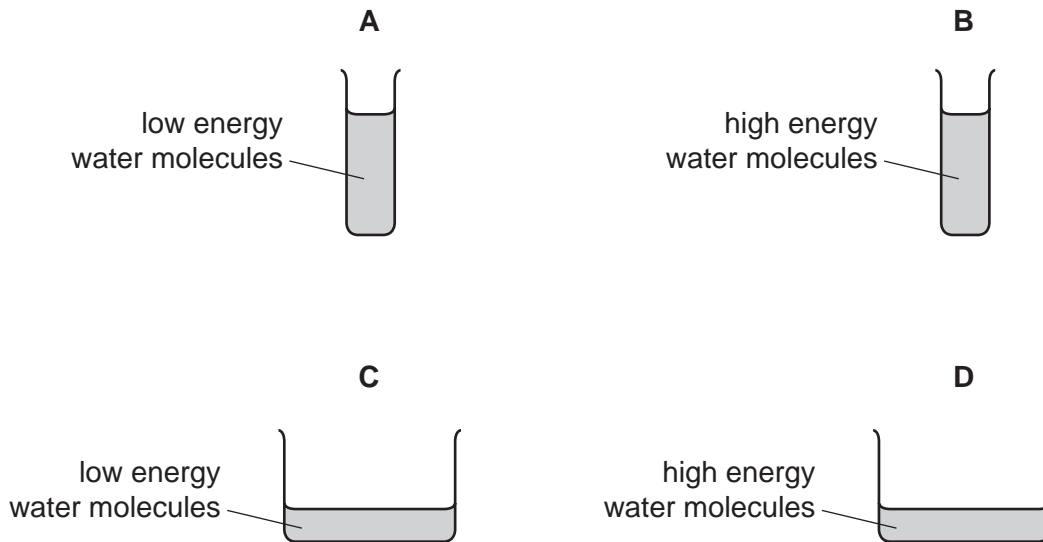
- A joule
- B kilogram
- C newton
- D watt

- 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?

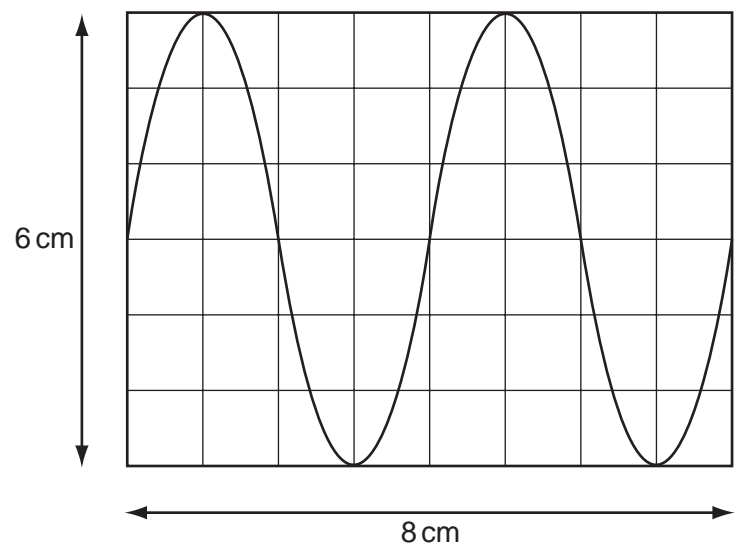


- 32 Heat energy can be lost from a hot object by radiation.

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

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

33 The diagram represents a wave.

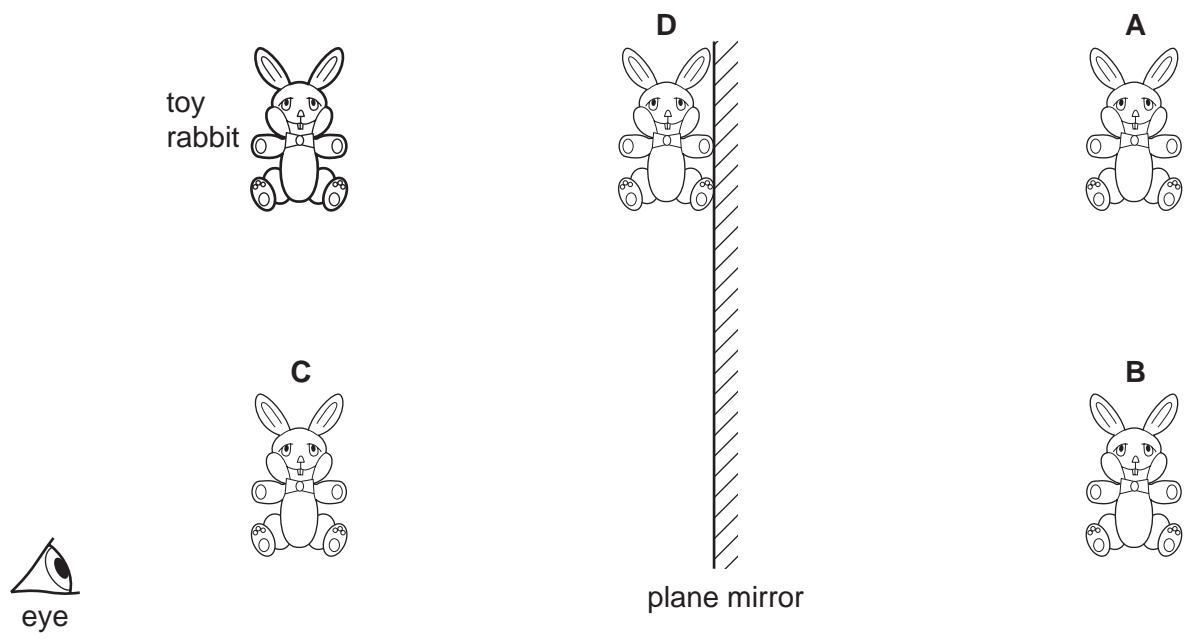


What is the wavelength of the wave?

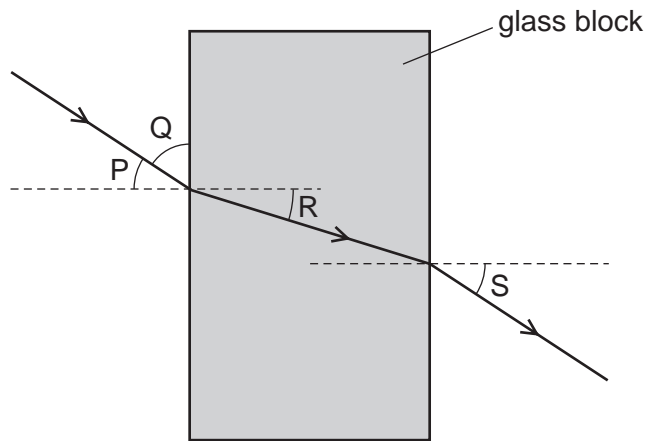
- A 3 cm
- B 4 cm
- C 6 cm
- D 8 cm

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?



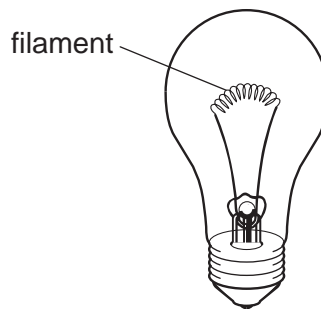
35 The diagram shows a ray of light passing through a glass block.



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.

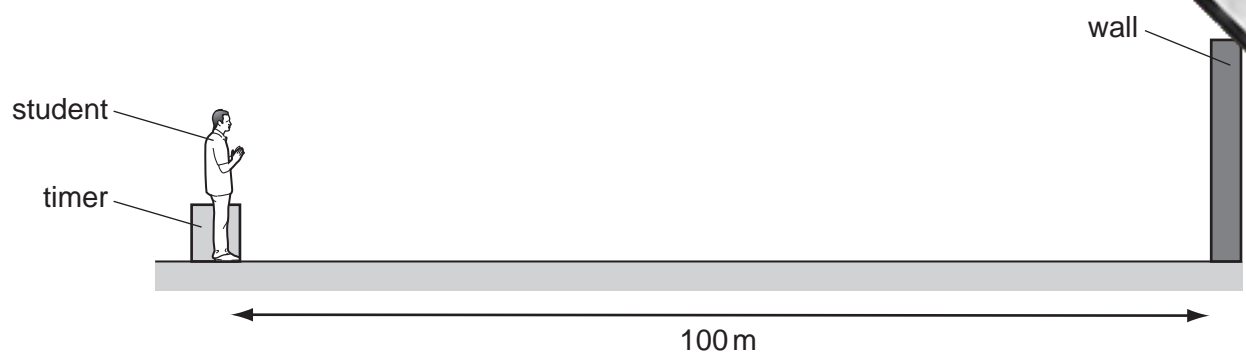


What are the main types of wave given out by the filament once the lamp is lit?

- 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 off a wall which is 100 m away from him.



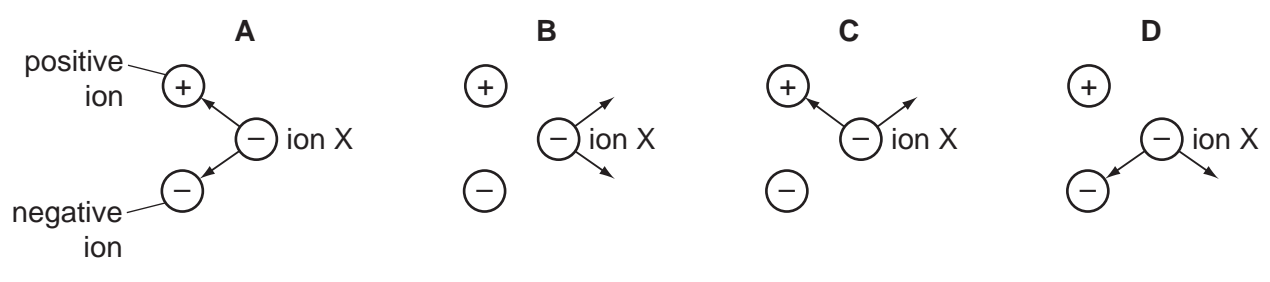
An electronic timer detects the echo of the sound 0.6 s after it is made.

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

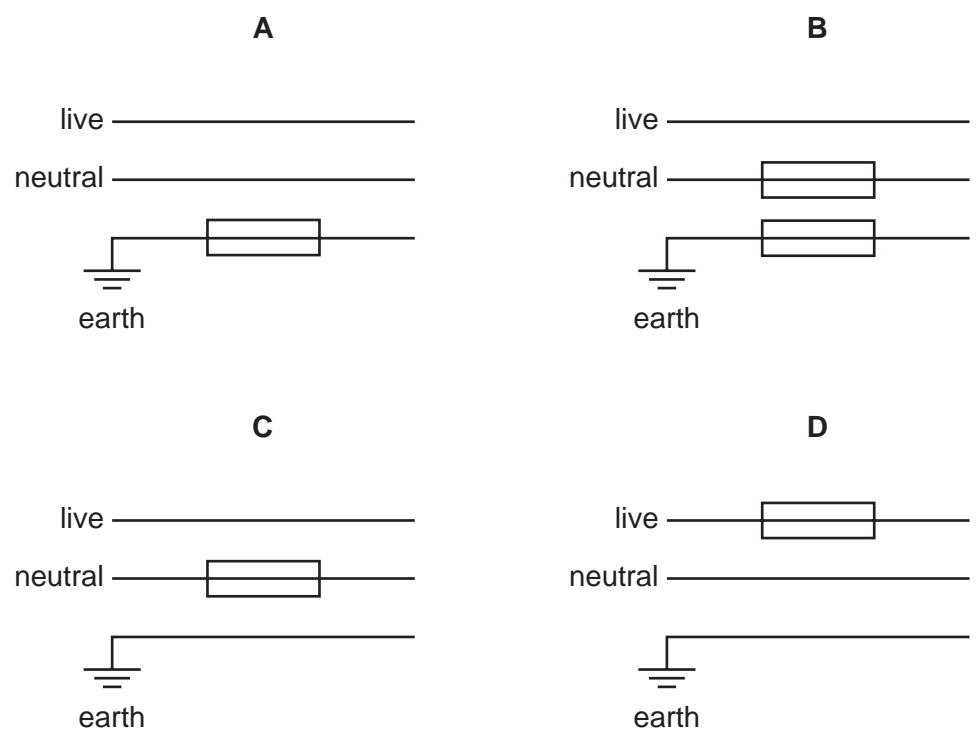
38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

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

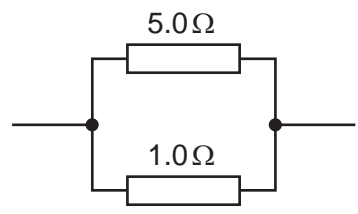


39 Fuses protect mains electrical circuits.

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  $6.0\ \Omega$ .



**DATA SHEET**  
**The Periodic Table of the Elements**

		Group												
I	II	III	IV	V	VI	VII	0					0		
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36	
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	91 <b>Zr</b> Zirconium 40	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54	
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	181 <b>Ta</b> Tantalum 73	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86	
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	145 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	169 <b>Er</b> Erbium 68	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	232 <b>Th</b> Thorium 90	232 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>Md</b> Mendelevium 101	238 <b>Lr</b> Lawrencium 103

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

Key  

a	<b>X</b>
b	

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

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

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