



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE

0653/13

Paper 1 Multiple Choice

October/November 2013

45 minutes

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

* 7 8 0 4 1 9 5 2 1 0 *

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.

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.

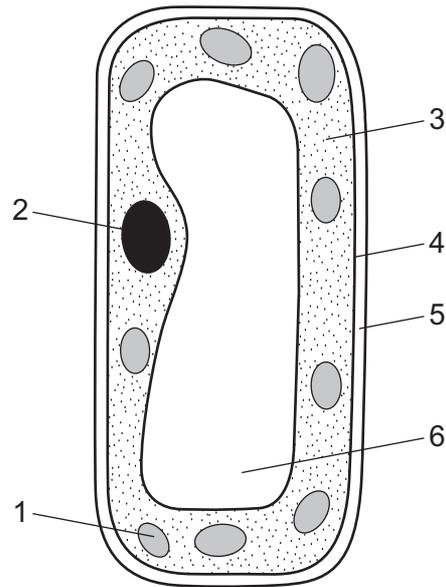
Electronic calculators may be used.

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



2

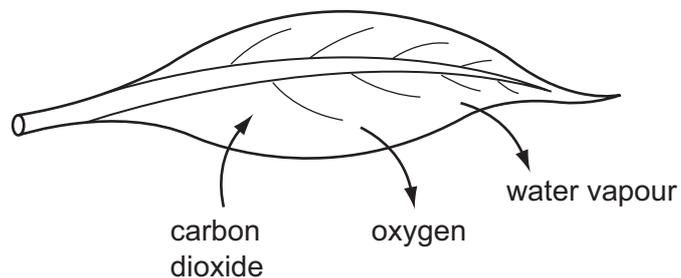
1 The diagram shows a plant cell.



Which parts of the cell are found in plant cells **only**?

- A** 1, 2 and 3 **B** 2, 3 and 4 **C** 4, 5 and 6 **D** 1, 5 and 6

2 The diagram shows a leaf in sunlight and some of the substances that diffuse into and out of it.



Which of the following has a higher concentration outside the leaf than inside the leaf?

- A** carbon dioxide only
B carbon dioxide and oxygen
C oxygen and water vapour
D water vapour only

3 Enzymes are made from

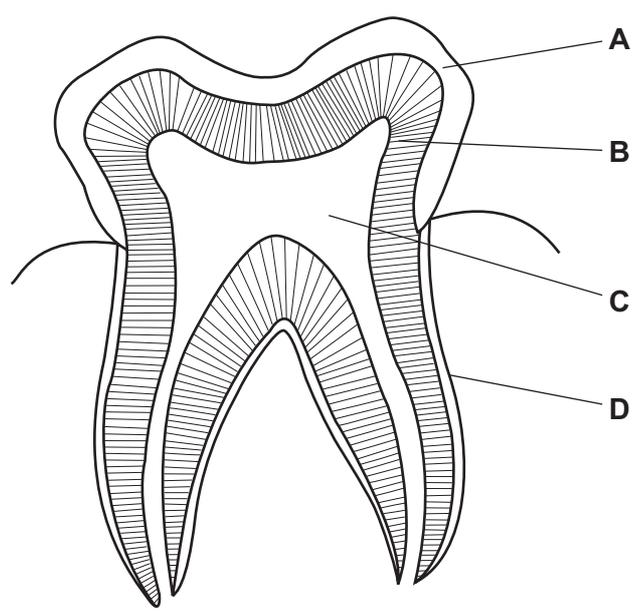
- A** fat.
B hormones.
C proteins.
D starch.

4 What are the main products of photosynthesis?

- A carbon dioxide + oxygen
- B carbon dioxide + water
- C simple sugars + oxygen
- D simple sugars + water

5 The diagram shows a section through a human tooth.

Which part is made of the hardest material?



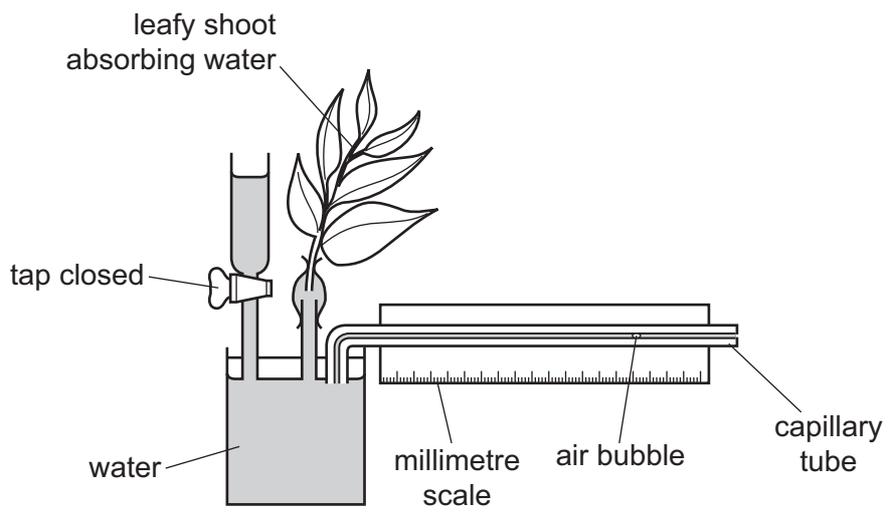
6 How do the contents of expired air differ from those of inspired air?

	carbon dioxide	nitrogen	oxygen
A	less	less	more
B	more	more	less
C	more	same	less
D	same	more	same

7 Which chambers of the heart have the thickest and most muscular walls?

- A left atrium and right atrium
- B left atrium and right ventricle
- C left ventricle and right atrium
- D left ventricle and right ventricle

8 The diagram shows an apparatus that was used to measure the uptake of water by a

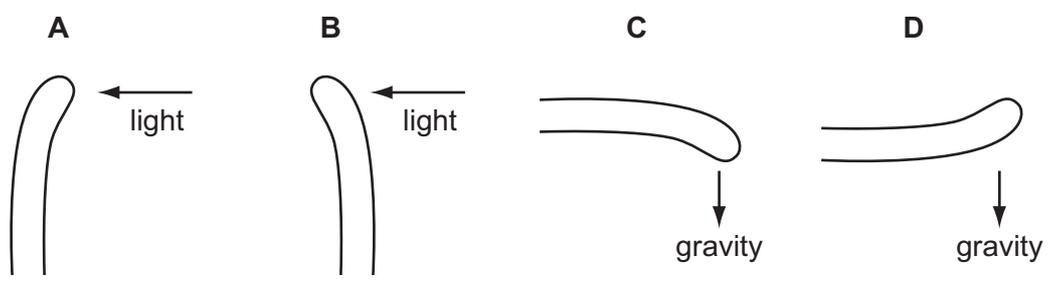


What will happen to the air bubble during the measurement?

- A It will get larger.
- B It will get smaller.
- C It will move to the left.
- D It will move to the right.

9 The diagrams show shoots of maize seedlings.

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

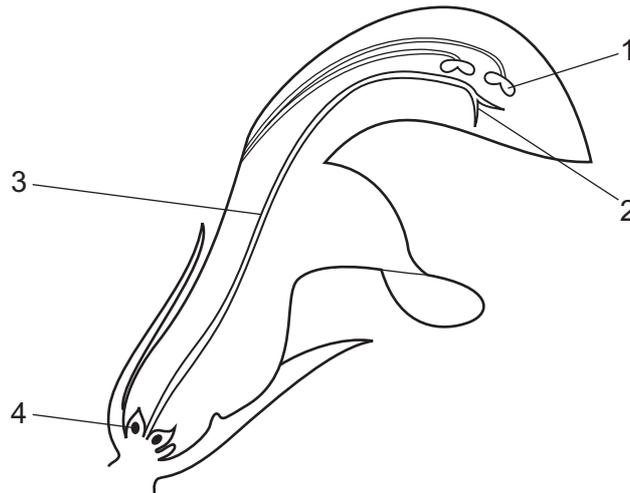


10 How often is an egg usually released from the ovaries of a woman?

- A once a week
- B once every 14 days
- C once every 28 days
- D once every 9 months

5

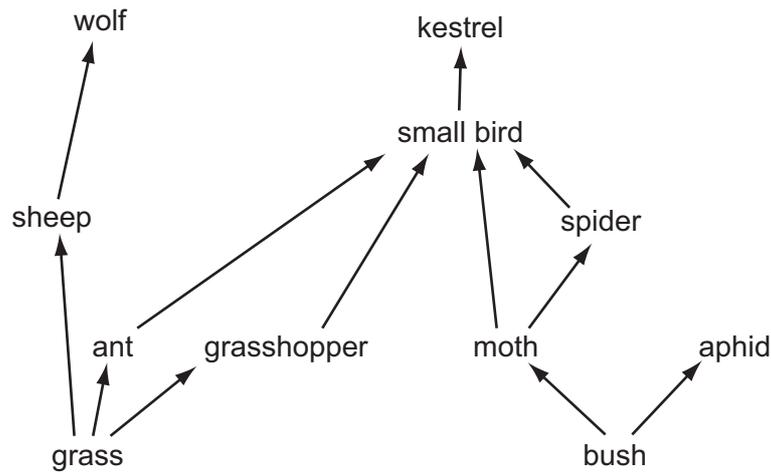
11 The diagram shows a section through a flower.



Which row in the table identifies male and female parts?

	male part	female part
A	1	2
B	2	4
C	3	1
D	4	3

12 The diagram shows part of a food web.



How many different types of carnivores and herbivores are shown?

	carnivores	herbivores
A	2	3
B	3	4
C	4	5
D	5	4

13 Which is a greenhouse gas that plants help to remove from the atmosphere?

- A** carbon dioxide
- B** hydrogen
- C** methane
- D** oxygen

14 Which method of separation can be used to obtain pure water from aqueous potassium chloride?

- A** chromatography
- B** crystallisation
- C** distillation
- D** filtration

15 Which reaction involves combustion?

- A calcium carbonate \rightarrow calcium oxide + carbon dioxide
 B methane + oxygen \rightarrow carbon dioxide + water
 C sodium carbonate + hydrochloric acid \rightarrow sodium chloride + water + carbon dioxide
 D sodium hydroxide + hydrochloric acid \rightarrow sodium chloride + water

16 Marble and chalk are two forms of calcium carbonate.

The diagram shows equal masses of lumps of marble and powdered chalk placed in dilute hydrochloric acid.

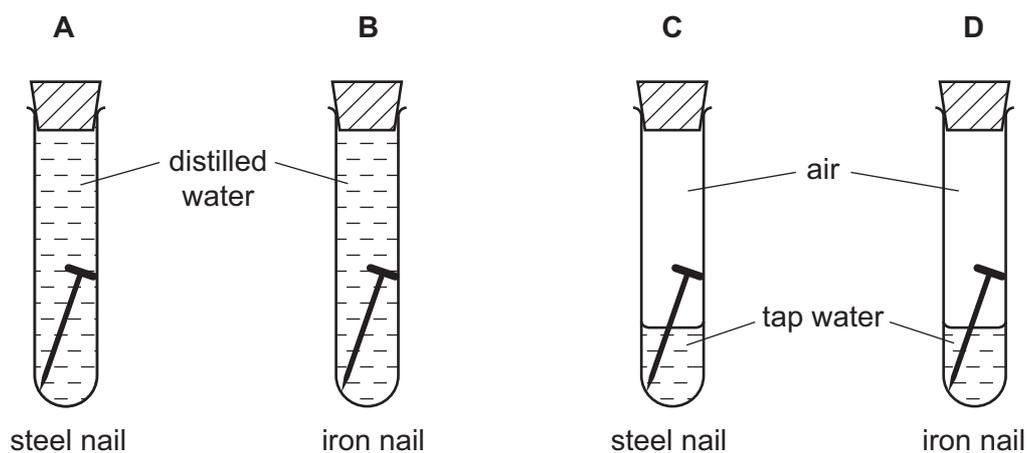


The marble takes longer than the chalk to dissolve in the acid.

Why is this?

- A Marble is more reactive than chalk.
 B Marble is more soluble than chalk.
 C The marble has the smaller surface area.
 D The marble is more basic.

17 In which test-tube does rusting occur most quickly?



18 The table shows the properties of four substances.

Which substance is an alkali?

	solubility in water	reaction with an acid
A	insoluble	reacts
B	insoluble	does not react
C	soluble	reacts
D	soluble	does not react

19 A sodium atom has a proton number of 11 and a nucleon number of 23.

Which row shows the correct number of protons, neutrons and electrons in the atom of sodium?

	protons	neutrons	electrons
A	11	11	12
B	11	12	11
C	11	23	11
D	11	23	12

20 The breakdown of molten lead bromide by1..... forms the elements lead and bromine.

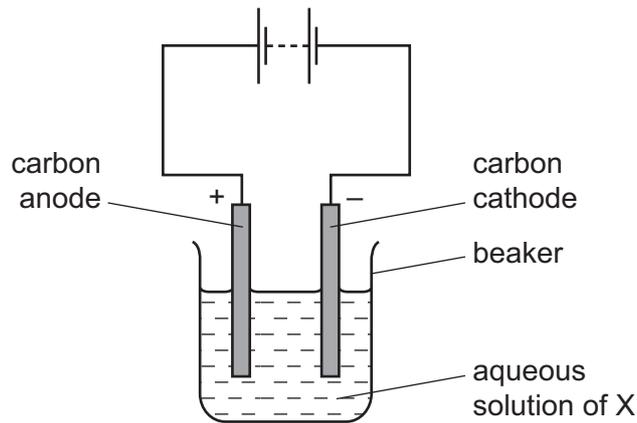
Lead is formed at the2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	electrolysis	anode
B	electrolysis	cathode
C	reduction	anode
D	reduction	cathode

9

21 An aqueous solution of X is electrolysed.

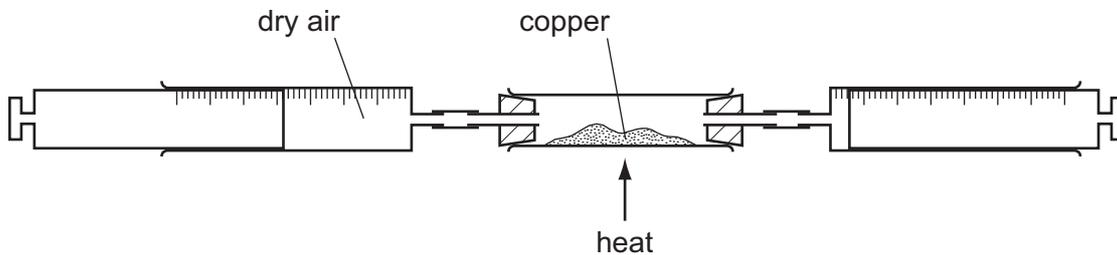


The cathode increases in mass and turns red-brown.

What is X?

- A copper(II) chloride
- B iodine
- C lead(II) bromide
- D sodium chloride

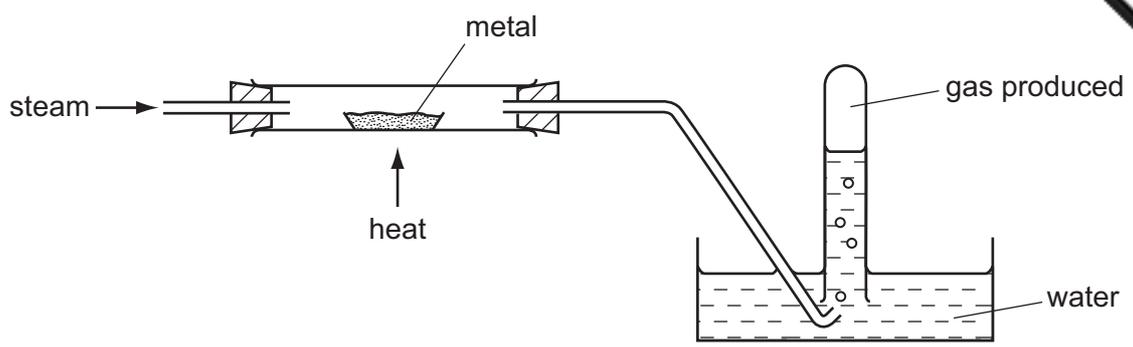
22 60 cm³ of dry air is passed over hot copper until all the oxygen has reacted.



Which volume of gas remains at the end of the reaction?

- A 6 cm³
- B 12 cm³
- C 48 cm³
- D 54 cm³

23 Steam is passed over a heated metal.



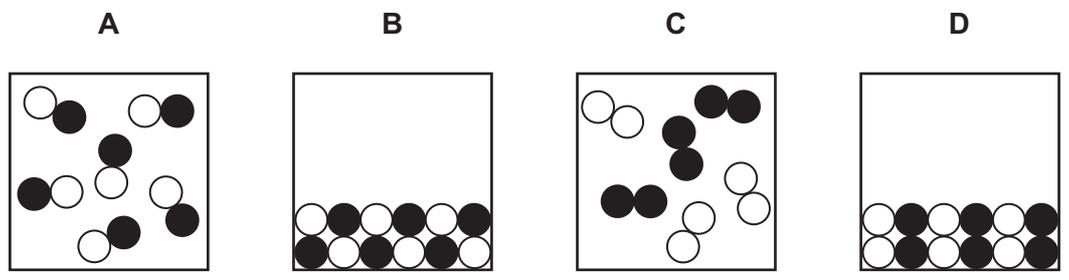
The metal reacts and a gas is produced.

The gas ignites with a pop when tested with a lighted splint.

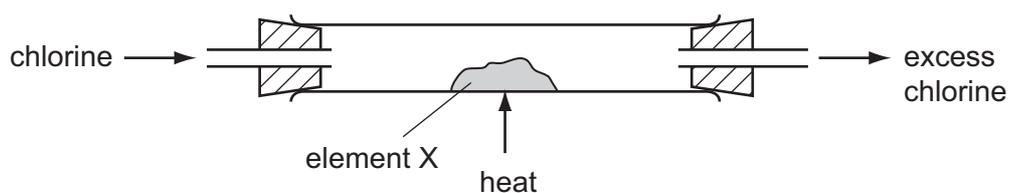
What are the metal and the gas?

	metal	gas
A	copper	hydrogen
B	copper	oxygen
C	magnesium	oxygen
D	zinc	hydrogen

24 Which diagram represents gaseous hydrogen chloride, HCl?



25 Element X reacts with chlorine to form a red-brown compound.



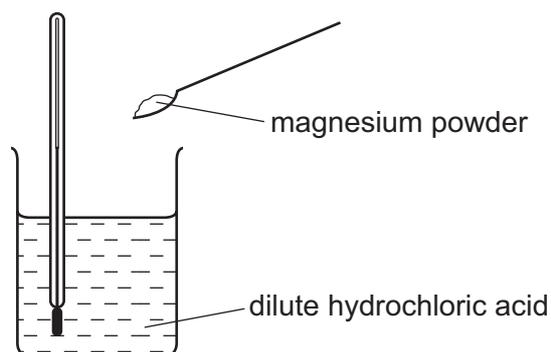
Which row describes element X and its melting point?

	type of element	melting point of X
A	alkali metal	high
B	alkali metal	low
C	transition element	high
D	transition element	low

26 Which row describes the physical state of some of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

- 27 The diagram shows how the temperature change can be measured when magnesium reacts with hydrochloric acid.

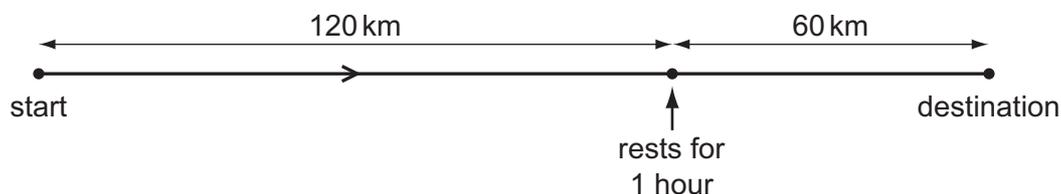


Thermometer reading before adding magnesium powder = 20.6°C

Thermometer reading after adding magnesium powder = 32.4°C

Which statement is correct?

- A** The reaction is endothermic and gives out heat.
B The reaction is endothermic and takes in heat.
C The reaction is exothermic and gives out heat.
D The reaction is exothermic and takes in heat.
- 28 A car travels between two towns. After 1 hour the driver has travelled 120 km. She then stops and rests for an hour. She takes another hour to travel a further 60 km to reach her destination.

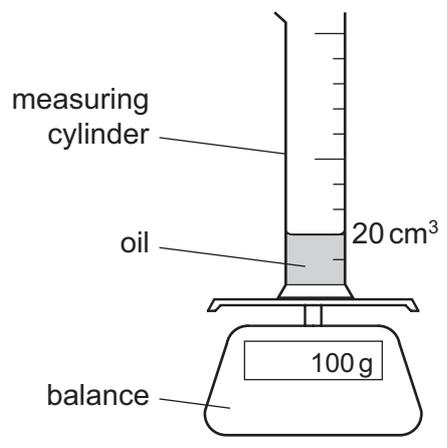


What is the average speed of the car for the whole journey?

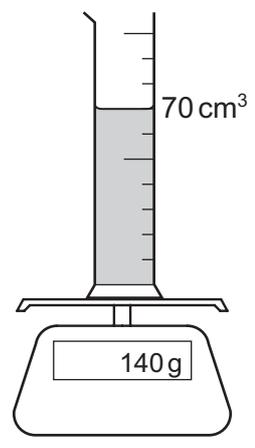
- A** 60 km/h **B** 90 km/h **C** 120 km/h **D** 180 km/h

29 A measuring cylinder contains 20 cm^3 of oil. The measuring cylinder is placed on a balance and the reading on the balance is 100 g.

The volume of oil in the measuring cylinder is now increased to 70 cm^3 . The reading on the balance is now 140 g.



before extra oil is added

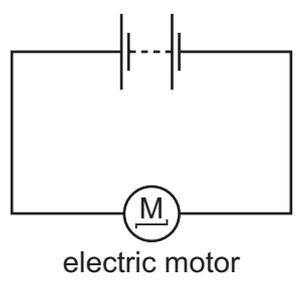


after extra oil is added

What is the density of the oil?

- A 0.50 g/cm^3
- B 0.80 g/cm^3
- C 1.25 g/cm^3
- D 2.00 g/cm^3

30 An electric circuit contains a battery and an electric motor.



electric motor

Which energy transfer takes place in the battery and which takes place in the electric motor?

	battery	electric motor
A	chemical to electrical	electrical to kinetic
B	chemical to electrical	kinetic to electrical
C	electrical to chemical	electrical to kinetic
D	electrical to chemical	kinetic to electrical

31 A drop of liquid falls on a student's skin and evaporates quickly.

What is the effect on the skin and the reason for this effect?

- A The skin cools because the most energetic molecules escape from the liquid.
- B The skin cools because the most energetic molecules remain in the liquid.
- C The skin warms because the most energetic molecules escape from the liquid.
- D The skin warms because the most energetic molecules remain in the liquid.

32 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

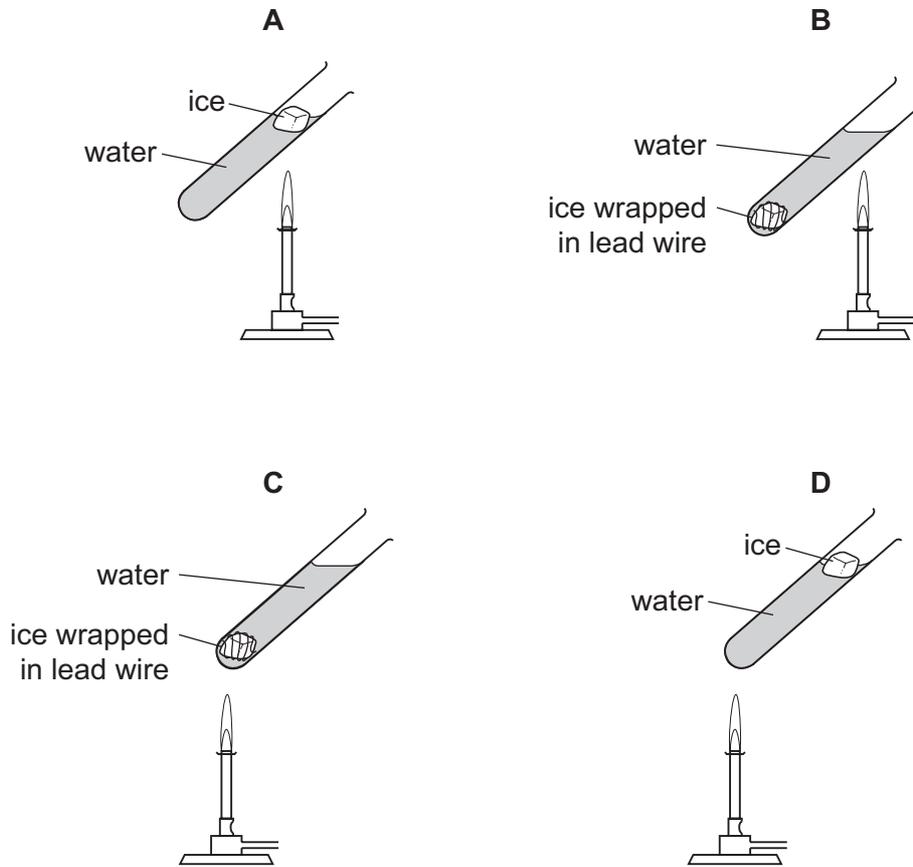
	melting point	boiling point
benzene	5.4 °C	80 °C
glycerine	18 °C	290 °C

At which temperature will both benzene and glycerine be liquid?

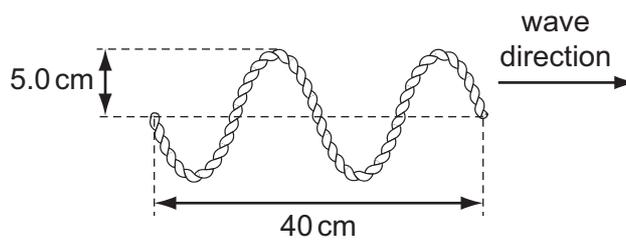
- A 0 °C
- B 50 °C
- C 100 °C
- D 150 °C

33 The diagrams show four identical pieces of ice that are heated in test-tubes of water. The burners provide heat at the same rate.

In which test-tube does the ice take the longest time to melt?



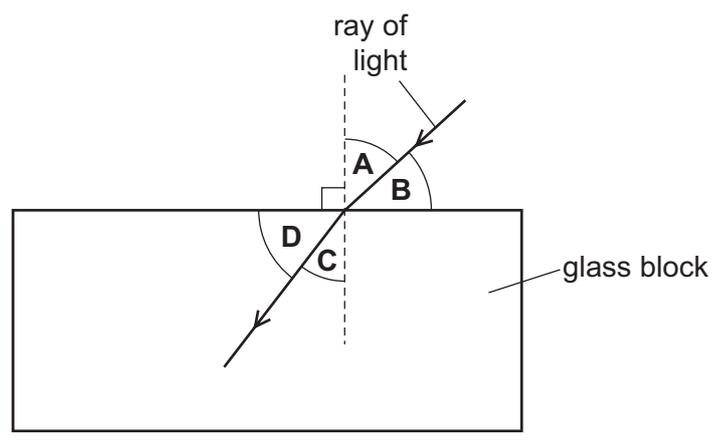
34 A student vibrates the end of a horizontal rope and sends a wave along the rope. The wave is shown in the diagram.



What is the amplitude of the wave, and what is the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	5.0	10
B	5.0	20
C	10	10
D	10	20

35 The diagram shows a ray of light as it enters a block of glass.

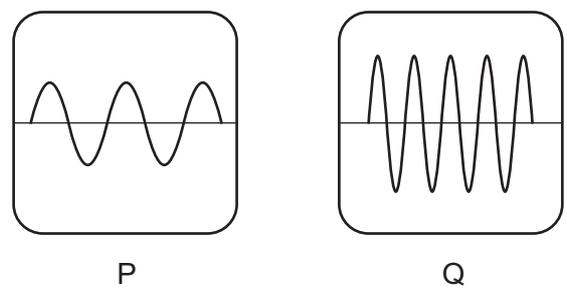


Which of the labelled angles is the angle of refraction?

36 Which two colours of the visible spectrum of light have the greatest difference in their wavelengths?

- A blue and red
- B red and green
- C orange and red
- D yellow and blue

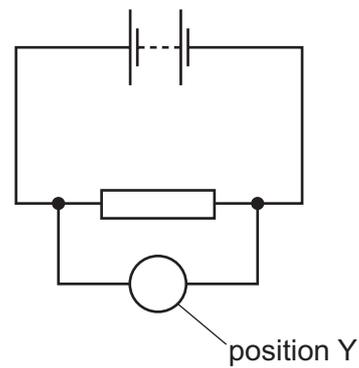
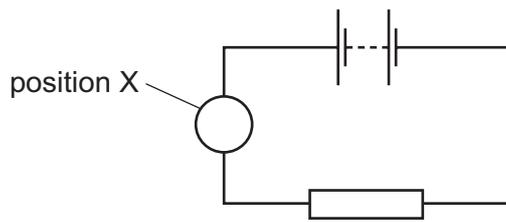
37 Two sound waves P and Q are displayed on an oscilloscope. The settings on the oscilloscope are the same for P and Q.



Which statement correctly compares the pitch and the loudness of the two sounds?

- A P has a higher pitch and is louder than Q.
- B P has a higher pitch and is quieter than Q.
- C P has a lower pitch and is louder than Q.
- D P has a lower pitch and is quieter than Q.

- 38 A student wishes to measure the potential difference across a resistor. The circuit shows two different positions in which a meter can be connected.



What meter is used, and where is it connected in the circuit?

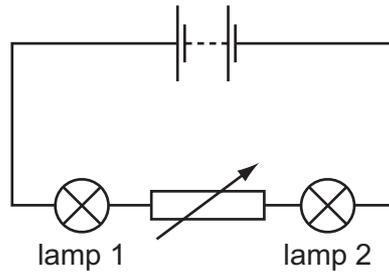
- A an ammeter in position X
 - B an ammeter in position Y
 - C a voltmeter in position X
 - D a voltmeter in position Y
- 39 When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A whilst the computer is in use.

The mains plug for the computer contains a fuse.

Which value of fuse would be suitable to use and would provide the greatest protection?

- A 1.0 A
- B 3.0 A
- C 5.0 A
- D 13.0 A

40 A circuit contains two lamps and a variable resistor.



The resistance of the variable resistor is increased.

What happens to the brightness of lamp 1 and what happens to the brightness of lamp 2?

	brightness of lamp 1	brightness of lamp 2
A	decreases	decreases
B	decreases	increases
C	no change	decreases
D	no change	increases

DATA SHEET
The Periodic Table of the Elements

		Group																																																																					
		I	II	III	IV	V	VI	VII	0																																																														
		1 H Hydrogen 1																																																																					
7	9	Li Lithium 3	Be Beryllium 4																																																																				
23	24	Na Sodium 11	Mg Magnesium 12																																																																				
39	40	K Potassium 19	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	80 Br Bromine 35	84 Kr Krypton 36																																																				
85	88	Rb Rubidium 37	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 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54																																																				
133	137	Cs Caesium 55	Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	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	210 At Astatine 85	210 Rn Radon 86																																																					
	226	Fr Francium 87	Ra Radium 88	227 Ac Actinium 89																																																																			
		*58-71 Lanthanoid series										†90-103 Actinoid series																																																											
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;">X</td> </tr> <tr> <td style="padding: 2px;">b</td> <td style="padding: 2px;"></td> </tr> </table>										a	X	b		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">140</td> <td style="padding: 2px;">Ce Cerium 58</td> <td style="padding: 2px;">141</td> <td style="padding: 2px;">Pr Praseodymium 59</td> <td style="padding: 2px;">144</td> <td style="padding: 2px;">Nd Neodymium 60</td> <td style="padding: 2px;">150</td> <td style="padding: 2px;">Sm Samarium 62</td> <td style="padding: 2px;">152</td> <td style="padding: 2px;">Eu Europium 63</td> <td style="padding: 2px;">157</td> <td style="padding: 2px;">Gd Gadolinium 64</td> <td style="padding: 2px;">162</td> <td style="padding: 2px;">Dy Dysprosium 66</td> <td style="padding: 2px;">165</td> <td style="padding: 2px;">Ho Holmium 67</td> <td style="padding: 2px;">169</td> <td style="padding: 2px;">Tm Thulium 69</td> <td style="padding: 2px;">173</td> <td style="padding: 2px;">Yb Ytterbium 70</td> <td style="padding: 2px;">175</td> <td style="padding: 2px;">Lu Lutetium 71</td> </tr> <tr> <td style="padding: 2px;">232</td> <td style="padding: 2px;">Th Thorium 90</td> <td style="padding: 2px;">238</td> <td style="padding: 2px;">U Uranium 92</td> <td style="padding: 2px;">238</td> <td style="padding: 2px;">U Uranium 92</td> <td style="padding: 2px;">94</td> <td style="padding: 2px;">Pu Plutonium 94</td> <td style="padding: 2px;">95</td> <td style="padding: 2px;">Am Americium 95</td> <td style="padding: 2px;">96</td> <td style="padding: 2px;">Cm Curium 96</td> <td style="padding: 2px;">98</td> <td style="padding: 2px;">Cf Californium 98</td> <td style="padding: 2px;">99</td> <td style="padding: 2px;">Es Einsteinium 99</td> <td style="padding: 2px;">100</td> <td style="padding: 2px;">Fm Fermium 100</td> <td style="padding: 2px;">101</td> <td style="padding: 2px;">Md Mendelevium 101</td> <td style="padding: 2px;">102</td> <td style="padding: 2px;">No Nobelium 102</td> <td style="padding: 2px;">103</td> <td style="padding: 2px;">Lr Lawrencium 103</td> </tr> </table>										140	Ce Cerium 58	141	Pr Praseodymium 59	144	Nd Neodymium 60	150	Sm Samarium 62	152	Eu Europium 63	157	Gd Gadolinium 64	162	Dy Dysprosium 66	165	Ho Holmium 67	169	Tm Thulium 69	173	Yb Ytterbium 70	175	Lu Lutetium 71	232	Th Thorium 90	238	U Uranium 92	238	U Uranium 92	94	Pu Plutonium 94	95	Am Americium 95	96	Cm Curium 96	98	Cf Californium 98	99	Es Einsteinium 99	100	Fm Fermium 100	101	Md Mendelevium 101	102	No Nobelium 102	103	Lr Lawrencium 103
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		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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