



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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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)



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.

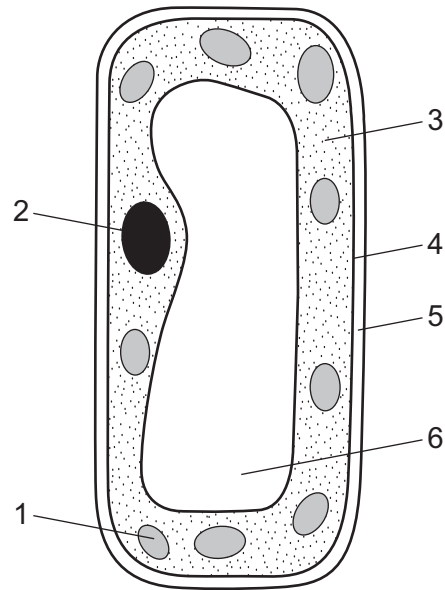
A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

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

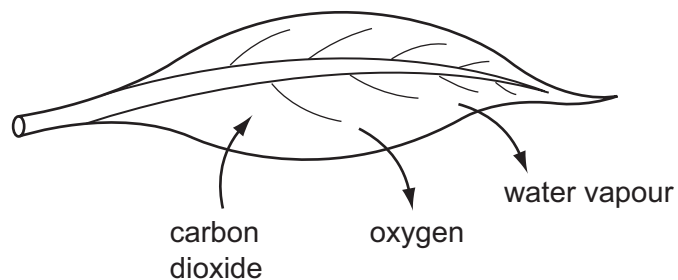


- 1 The diagram shows a plant cell.



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?

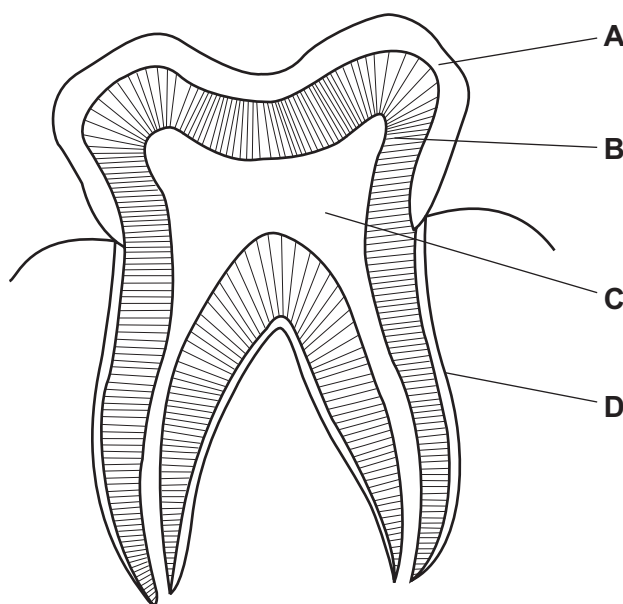
- A** carbon dioxide only
B carbon dioxide and oxygen
C oxygen and water vapour
D water vapour only
- 3 Enzymes are made from
- A** fat.
B hormones.
C proteins.
D starch.

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?



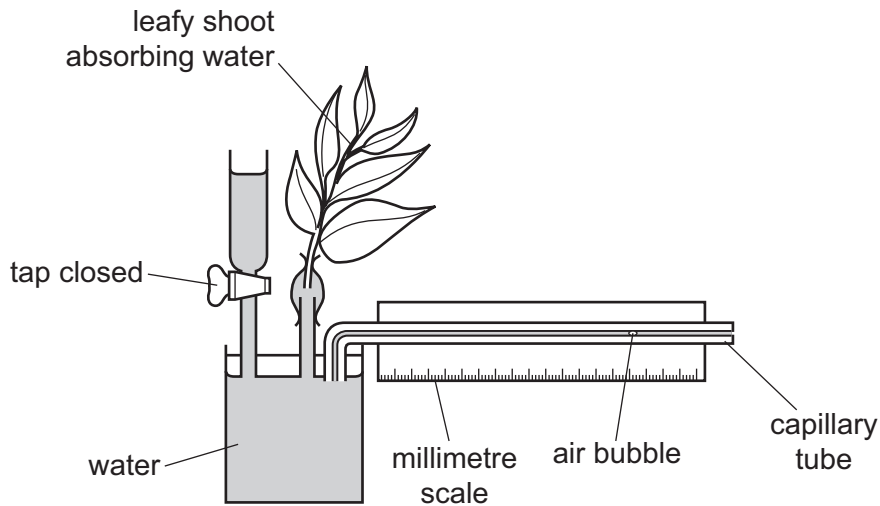
6 How do the contents of expired air differ from those of inspired air?

| | 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

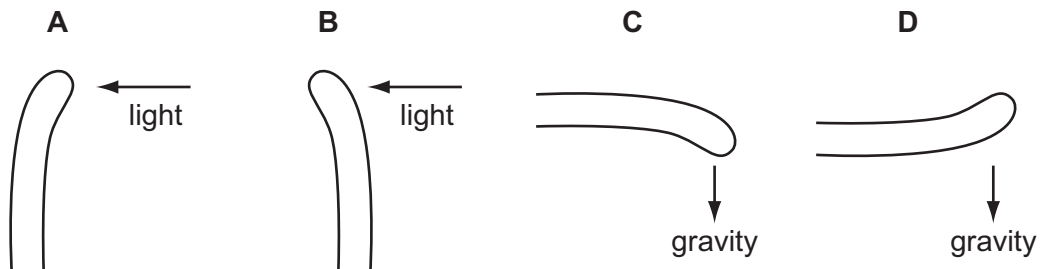
- 8 The diagram shows an apparatus that was used to measure the uptake of water by a



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.

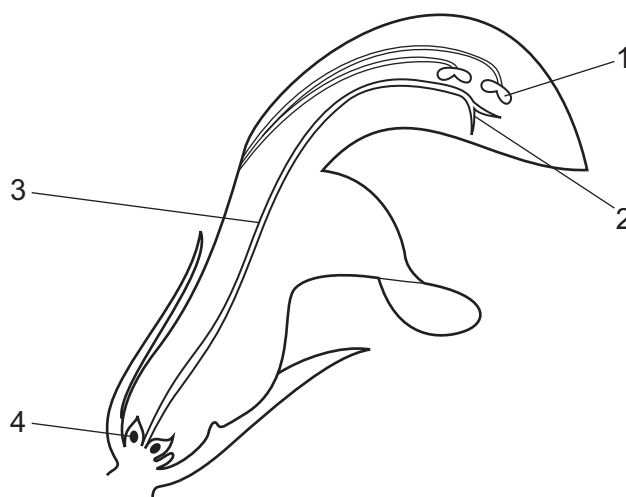
Which shoot shows a geotropic response in which it grows away from the stimulus?



- 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

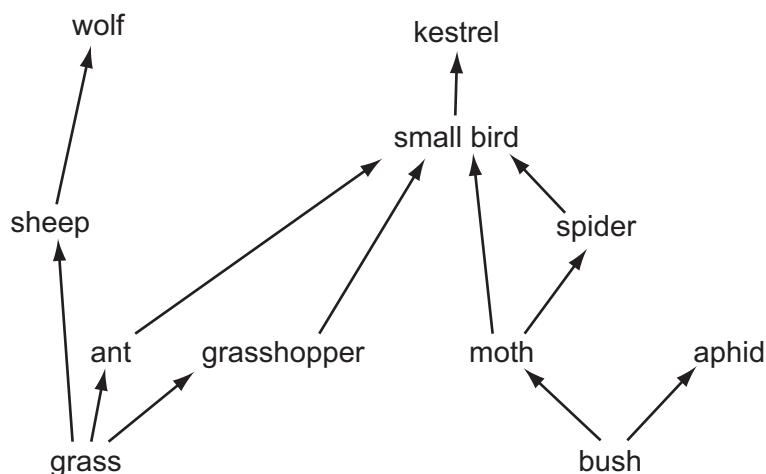
11 The diagram shows a section through a flower.



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?

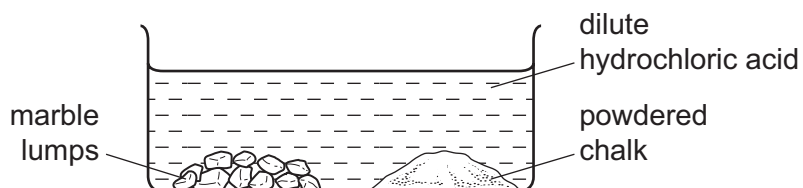
- A** chromatography
- B** crystallisation
- C** distillation
- D** filtration

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.

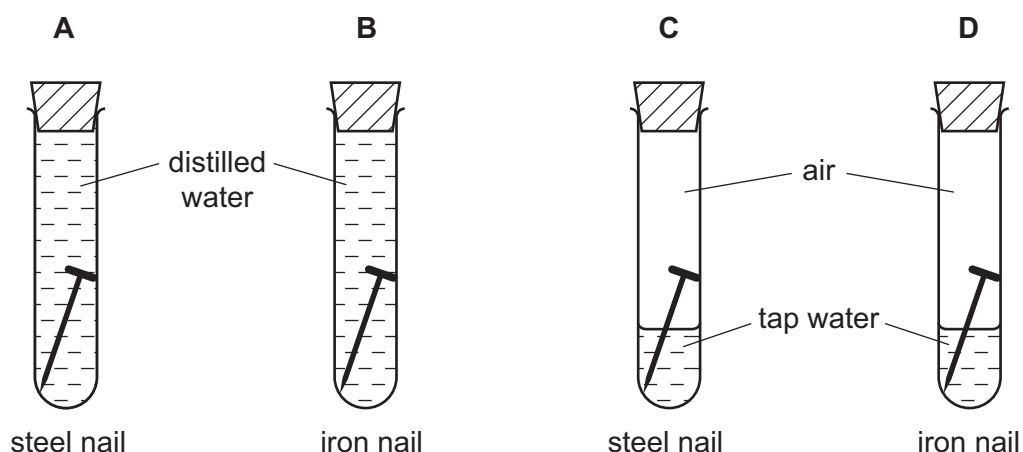


The marble takes longer than the chalk to dissolve in the acid.

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 |

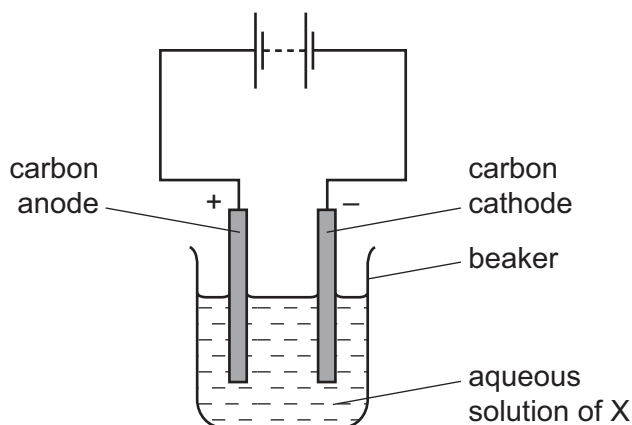
- 20 The breakdown of molten lead bromide by1..... forms the elements lead and bromine.

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 |

21 An aqueous solution of X is electrolysed.

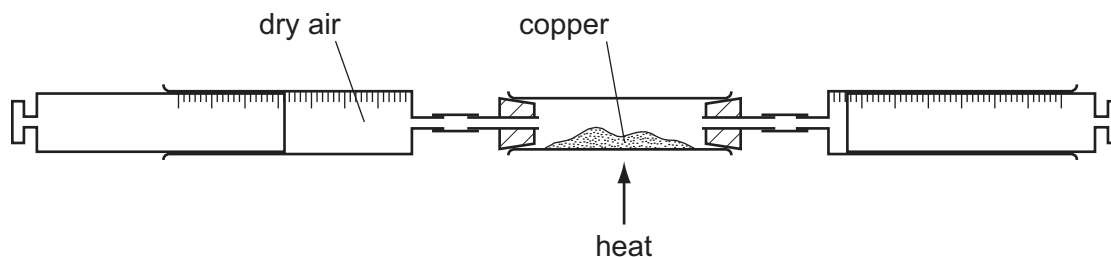


The cathode increases in mass and turns red-brown.

What is X?

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

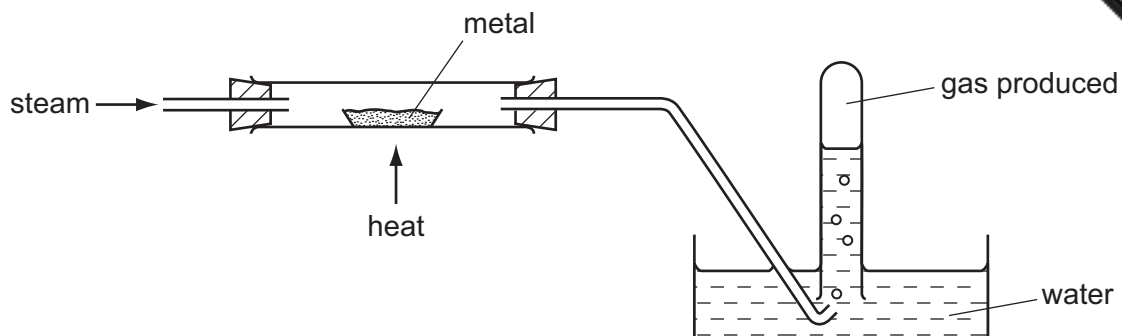
22 60 cm³ of dry air is passed over hot copper until all the oxygen has reacted.



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.



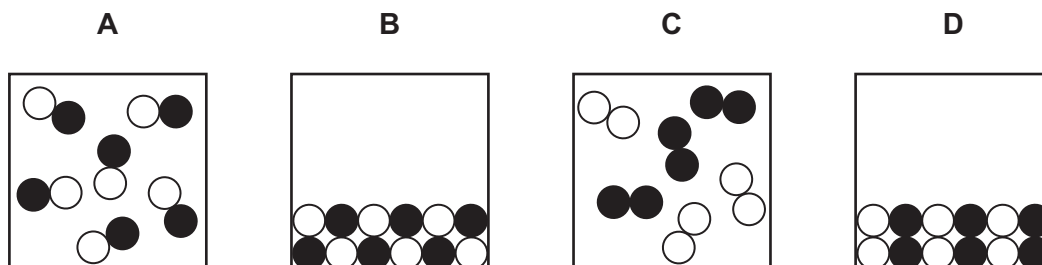
The metal reacts and a gas is produced.

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

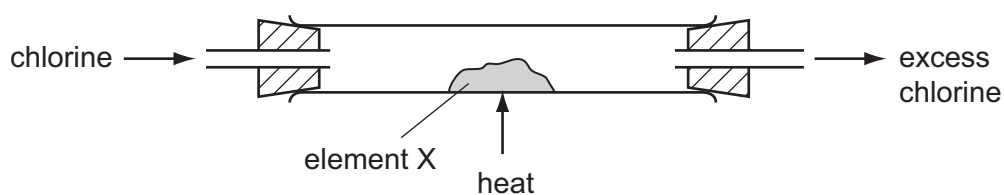
What are the metal and the gas?

| | 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.



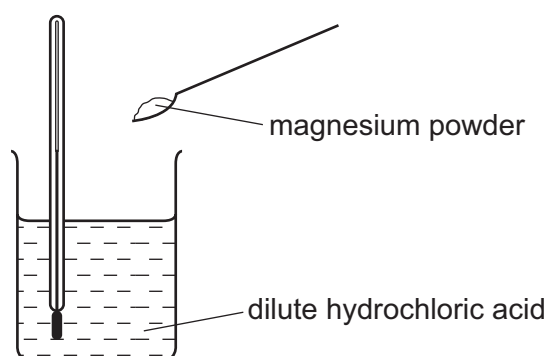
Which row describes element X and its melting point?

| | 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.

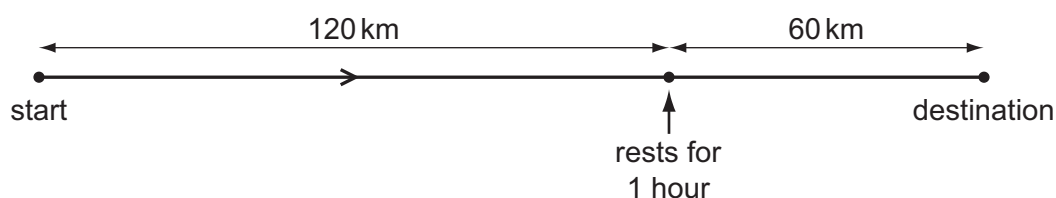


Thermometer reading before adding magnesium powder = 20.6°C

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.

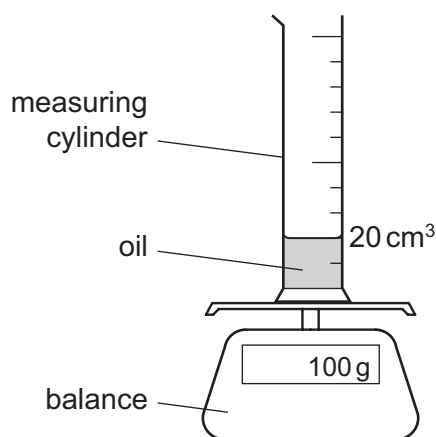


What is the average speed of the car for the whole journey?

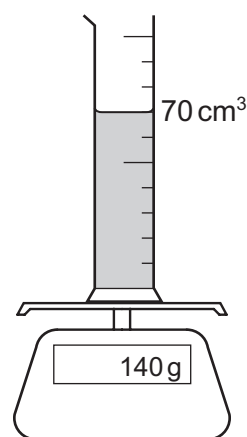
- A 60 km/h
- B 90 km/h
- C 120 km/h
- D 180 km/h

- 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 .



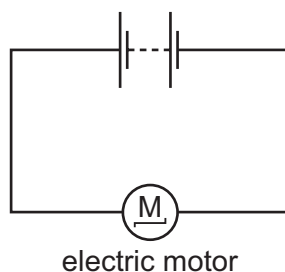
before extra oil is added



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.

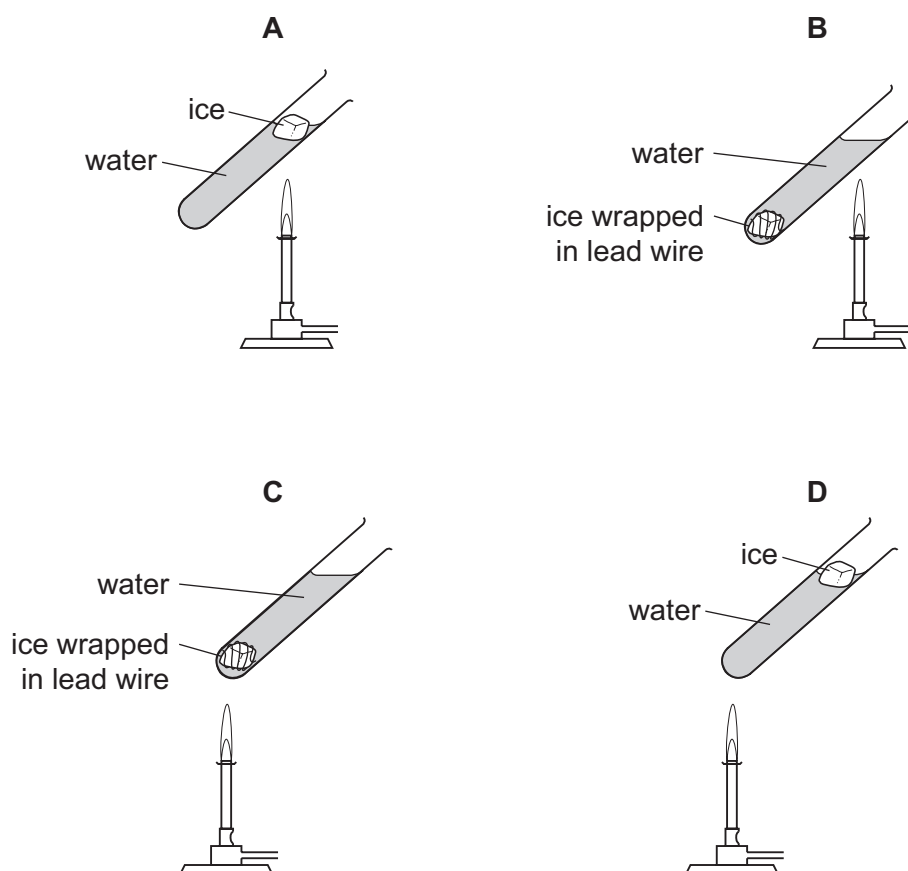
| | melting point | boiling point |
|-----------|---------------|---------------|
| benzene | 5.4 °C | 80 °C |
| glycerine | 18 °C | 290 °C |

At which temperature will both benzene and glycerine be liquid?

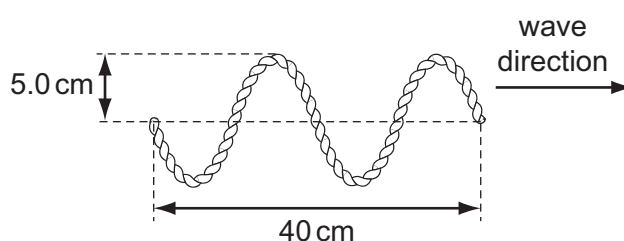
- A** 0 °C **B** 50 °C **C** 100 °C **D** 150 °C

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

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



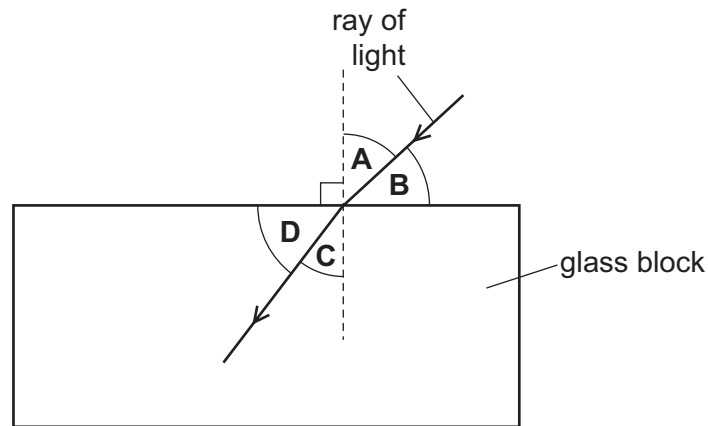
- 34 A student vibrates the end of a horizontal rope and sends a wave along the rope. The wave is shown in the diagram.



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

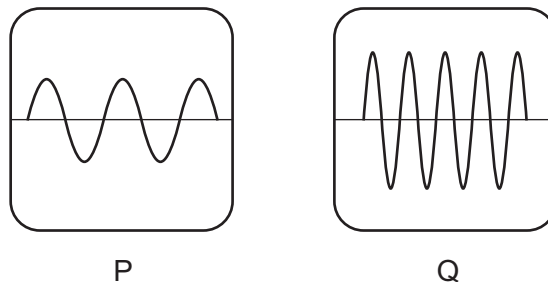
| | amplitude / cm | wavelength / cm |
|----------|----------------|-----------------|
| A | 5.0 | 10 |
| B | 5.0 | 20 |
| C | 10 | 10 |
| D | 10 | 20 |

- 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?

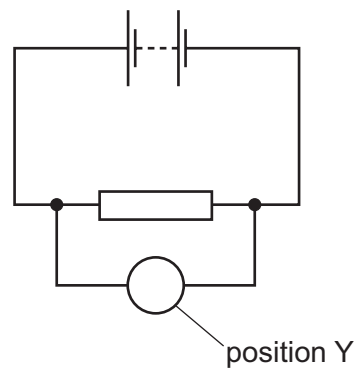
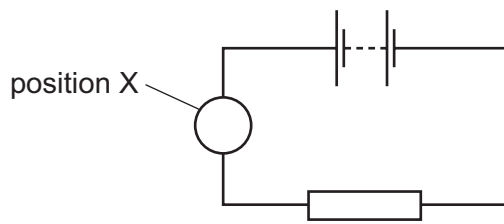
- 36 Which two colours of the visible spectrum of light have the greatest difference in their wavelengths?
- A blue and red
 - B red and green
 - C orange and red
 - D yellow and blue
- 37 Two sound waves P and Q are displayed on an oscilloscope. The settings on the oscilloscope are the same for P and 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?

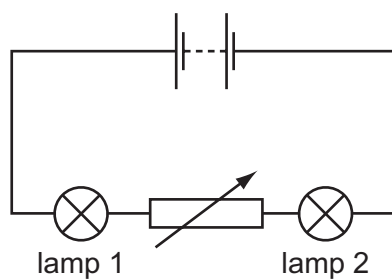
- A** an ammeter in position X
 - B** an ammeter in position Y
 - C** a voltmeter in position X
 - D** a voltmeter in position Y
- 39 When a computer is switched on, the current rises quickly to 3.1 A and then falls slowly to a steady value of 1.0 A whilst the computer is in use.

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 | | | | | | | | | | | | |
| | | <div>1 H Hydrogen</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | | | 11 B Boron 5 | 12 C Carbon 6 | 14 N Nitrogen 7 | 16 O Oxygen 8 | 19 F Fluorine 9 | 20 Ne Neon 10 | | | | | | | | | | | | |
| 23 Na Sodium 11 | 24 Mg Magnesium 12 | | | | | | | | | | | 27 Al Aluminium 13 | 28 Si Silicon 14 | 31 P Phosphorus 15 | 32 S Sulfur 16 | 35.5 Cl Chlorine 17 | 40 Ar Argon 18 | | | | | | | | | | | | |
| 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 | 80 Br Bromine 35 | 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 | | | Rn Radon 86 | | | | | | | | | | | | |
| Fr Francium 87 | 226 Ra Radium 88 | 227 Ac Actinium 89 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 58-71 Lanthanoid series | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 90-103 Actinoid series | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div><div><div>a</div><div>X</div><div>Key</div></div><div>a = relative atomic mass X = atomic symbol b = proton (atomic) number</div></div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 140 Ce Cerium 58 | | 141 Pr Praseodymium 59 | | 144 Nd Neodymium 60 | | 150 Sm Samarium 62 | | 152 Eu Europium 63 | | 157 Gd Gadolinium 64 | | 159 Tb Terbium 65 | | 162 Dy Dysprosium 66 | | 165 Ho Holmium 67 | | 167 Er Erbium 68 | | 169 Tm Thulium 69 | | 173 Yb Ytterbium 70 | | 175 Lu Lutetium 71 | |
| | | 232 Th Thorium 90 | | 238 Pa Protactinium 91 | | 238 U Uranium 92 | | 238 Np Neptunium 93 | | 238 Pu Plutonium 94 | | 238 Am Americium 95 | | 238 Cm Curium 96 | | 238 Bk Berkelium 97 | | 238 Cf Californium 98 | | 238 Es Einsteinium 99 | | 238 Fm Fermium 100 | | 238 Md Mendelevium 101 | | 238 No Nobelium 102 | | 238 Lr Lawrencium 103 | |

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

Key

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

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