UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**COMBINED SCIENCE** **0653/01**

Paper 1 Multiple Choice

October/November 2004

**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.**

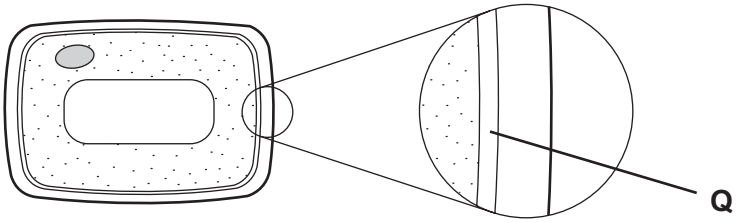
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.



IB04 11_0653_01/2RP


UNIVERSITY of CAMBRIDGE
International Examinations

**1** The diagram shows a plant cell and part of that cell in higher magnification.




What does structure **Q** do during the uptake of water and mineral ions from the soil?

| | allows water to pass freely | allows mineral ions to pass freely |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**2** Which gas is given off when the enzyme catalase is added to a solution of hydrogen peroxide?

**A** carbon dioxide

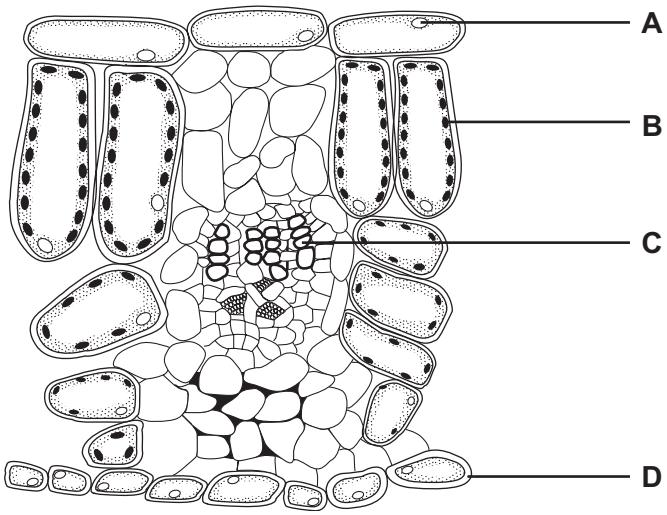
**B** carbon monoxide

**C** hydrogen

**D** oxygen

**3** The diagram shows a section through a leaf.

Where will starch be found?

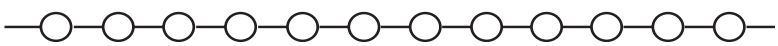


**4** The table shows diets of four different people.

Which diet would cause a person to suffer from scurvy (including bleeding gums) and anaemia (lack of haemoglobin)?

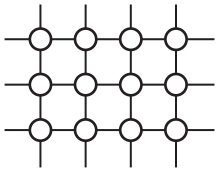
| | carbohydrates | vitamin C | proteins | iron |
|---|---|---|---|---|
| **A** | ✗ | ✓ | ✓ | ✗ |
| **B** | ✓ | ✗ | ✓ | ✗ |
| **C** | ✓ | ✓ | ✗ | ✓ |
| **D** | ✓ | ✗ | ✗ | ✓ |

**5** The diagram shows part of a starch molecule.

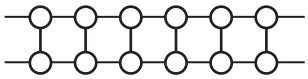


Which diagram shows this molecule after it has been **completely** digested?

**A**

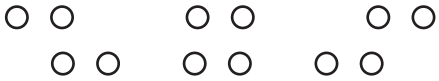


**B**



**C**

**D**



**6** What is the correct word equation for respiration?

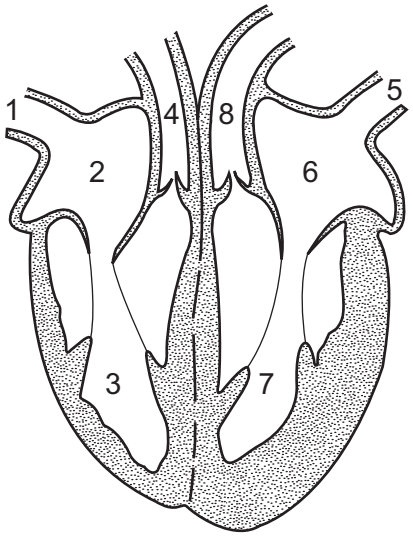
**A** glucose → oxygen + water + carbon dioxide

**B** glucose + carbon dioxide → oxygen + water

**C** glucose + oxygen → water + carbon dioxide

**D** glucose + water → oxygen + carbon dioxide

**7** The diagram shows a section through the human heart.




Which sequence shows the flow of **deoxygenated** blood through the heart?

**A** $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$

**B** $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$

**C** $5 \rightarrow 6 \rightarrow 7 \rightarrow 8$

**D** $8 \rightarrow 7 \rightarrow 6 \rightarrow 5$

**8** Which part of the blood may be described as 'small colourless fragments of cytoplasm without a nucleus and containing granules'?

**A** plasma

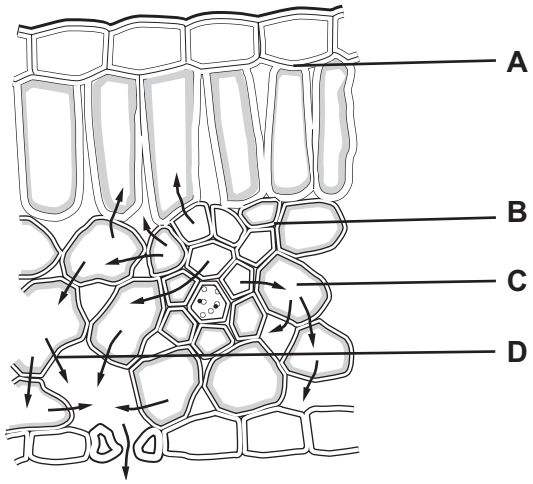
**B** platelets

**C** red blood cells

**D** white blood cells

**9** The diagram shows a section through a leaf. The arrows show water movement.

Where does the water evaporate?




**10** In experiments on transpiration, both the cutting of a leafy shoot and the assembly of the apparatus must be done under water.

What is the reason for this?

**A** to ensure a clean cut

**B** to ensure air-tight seals

**C** to prevent air entering the xylem

**D** to prevent water leaving the shoot

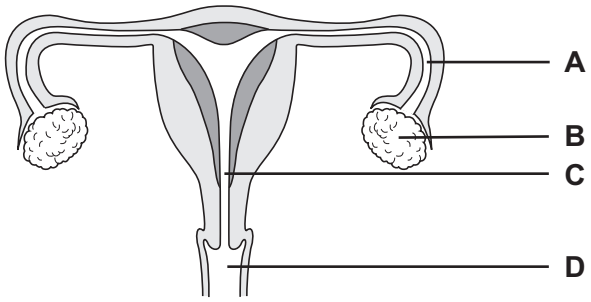
**11** Four drivers have their reaction times measured.

Which driver is the most likely to have been drinking alcohol?

| driver | reaction time / s |
|---|---|
| **A** | 3 |
| **B** | 4 |
| **C** | 8 |
| **D** | 2 |

**12** The diagram shows the human female reproductive system.

Where is the egg fertilised?




**13** The table shows the conditions in which four samples of seeds were kept.

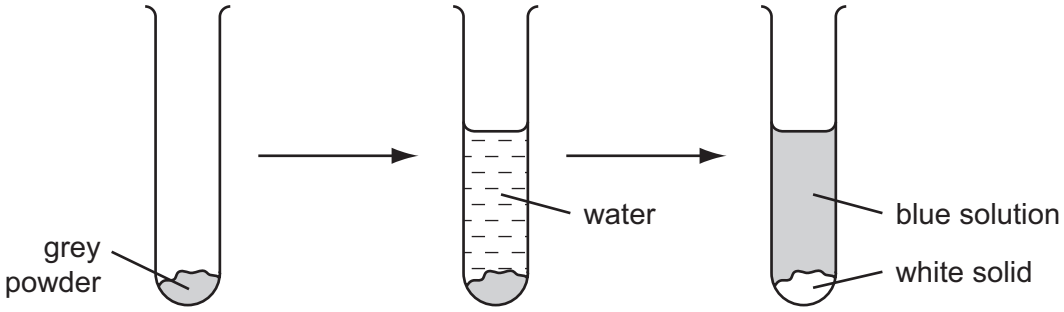
Which sample germinated?

| sample | temperature / °C | water | oxygen |
|---|---|---|---|
| **A** | 0 | present | absent |
| **B** | 10 | absent | absent |
| **C** | 20 | present | present |
| **D** | 40 | absent | present |

**14** Which displayed formulae correctly represent a molecule of carbon dioxide and of nitrogen?

| | carbon dioxide, $CO_2$ | nitrogen, $N_2$ |
|---|---|---|
| **A** | C=O=O | N=N |
| **B** | C=O=O | N≡N |
| **C** | O=C=O | N=N |
| **D** | O=C=O | N≡N |

**15** Some water is added to a grey powder. After shaking, a blue solution and a white solid are seen.




What does the grey powder contain?

**A** one element

**B** one compound

**C** a mixture of elements

**D** a mixture of compounds

**16** Solid mixtures are made from four salts, as shown.

| mixture **X** | mixture **Y** |
|---|---|
| barium sulphate: white, insoluble<br>iron(III) sulphate: brown, soluble | potassium chromate(VI): yellow, soluble<br>potassium manganate(VII): purple, soluble |

Each mixture is shaken with water.

How can the mixtures be separated?

| | mixture **X** | mixture **Y** |
|---|---|---|
| **A** | chromatography | chromatography |
| **B** | chromatography | filtration |
| **C** | filtration | chromatography |
| **D** | filtration | filtration |

**17** Which formula contains the most elements?

**A** HC*l*O

**B** $PbO_2$

**C** $Rb_2S$

**D** $SiCl_4$

**18** The table below gives information on the properties of four gases.

Which gas is the most suitable for filling an airship?

| | flammability | density |
|---|---|---|
| **A** | high | high |
| **B** | high | low |
| **C** | low | high |
| **D** | low | low |

**19** Which substances explode when mixed together at room temperature?

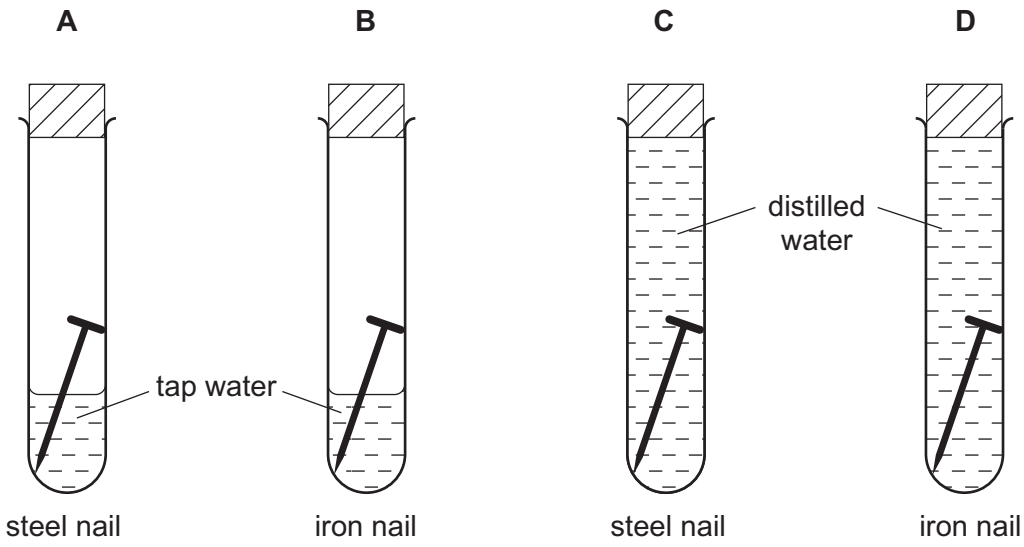
**A** hydrogen and air

**B** magnesium and acid

**C** methane and air

**D** sodium and acid

**20** In which test-tube does rusting occur most quickly?



**21** The results of flame tests on four ores are shown.

| ore | flame colour |
|---|---|
| P | brick red |
| Q | green |
| R | lilac |
| S | yellow |

Which ores contain a metal from Group I?

**A** P and Q

**B** Q and R

**C** R and S

**D** S and P

**22** In which reaction is carbon dioxide **not** formed?

**A** adding hydrochloric acid to calcium

**B** adding hydrochloric acid to calcium carbonate

**C** burning coke in air

**D** burning methane in air

**23** What are the correct numbers of atoms in one molecule of nitric acid?

| | hydrogen | nitrogen | oxygen |
|---|---|---|---|
| **A** | 1 | 1 | 3 |
| **B** | 1 | 3 | 1 |
| **C** | 2 | 1 | 3 |
| **D** | 2 | 3 | 1 |

**24** Are aluminium, iron and sodium hydroxide obtained by electrolysis?

| | aluminium | iron | sodium hydroxide |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | ✗ |
| **C** | ✗ | ✓ | ✓ |
| **D** | ✓ | ✗ | ✓ |



**[Turn over**

**25** Octane may undergo, under suitable conditions, either thermal decomposition or combustion.

Which information is correct for these two processes?

| | thermal decomposition | | combustion | |
|---|---|---|---|---|
| | oxygen needed | products | oxygen needed | products |
| **A** | yes | simpler | no | simpler |
| **B** | yes | more complex | no | more complex |
| **C** | no | simpler | yes | simpler |
| **D** | no | more complex | yes | more complex |

**26** Which equation represents a redox reaction?

**A** $CaCO_3 \rightarrow CaO + CO_2$

**B** $2H_2 + O_2 \rightarrow 2H_2O$

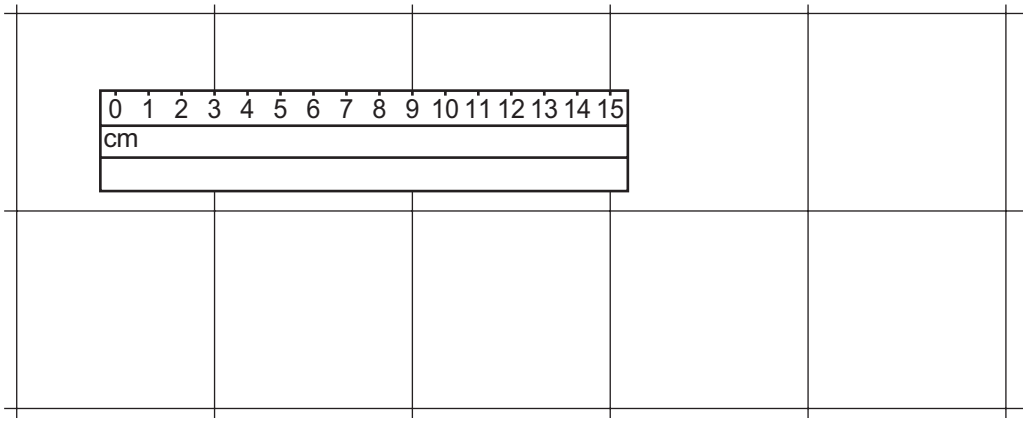
**C** $Na_2CO_3 + ZnSO_4 \rightarrow Na_2SO_4 + Z_2CO_3$

**D** $NaOH + HCl \rightarrow NaCl + H_2O$

**27** Which of hydrogen, petroleum and wood are fossil fuels?

| | hydrogen | petroleum | wood |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✗ | ✗ |
| **C** | ✗ | ✓ | ✗ |
| **D** | ✗ | ✗ | ✓ |

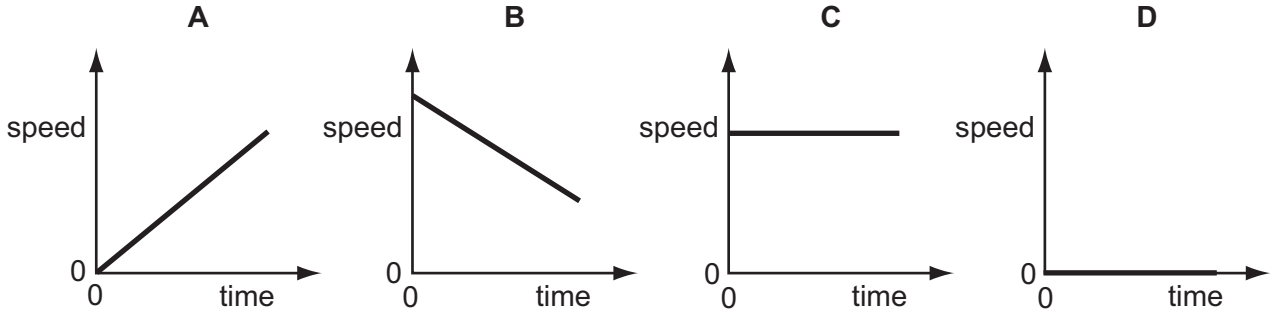
**28** A floor is covered with square tiles. The diagram shows a ruler on the tiles.



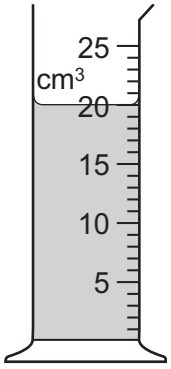

How long is one tile?

**A** 3 cm **B** 6 cm **C** 9 cm **D** 12 cm

**29** Which speed / time graph applies to an object at rest?



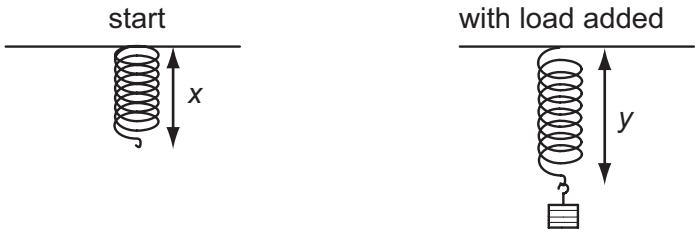

**30** The diagram shows some liquid in a measuring cylinder. The mass of the liquid is 16 g.




What is the density of the liquid?

**A** 320 g / cm$^3$ **B** 36 g / cm$^3$ **C** 1.25 g / cm$^3$ **D** 0.8 g / cm$^3$

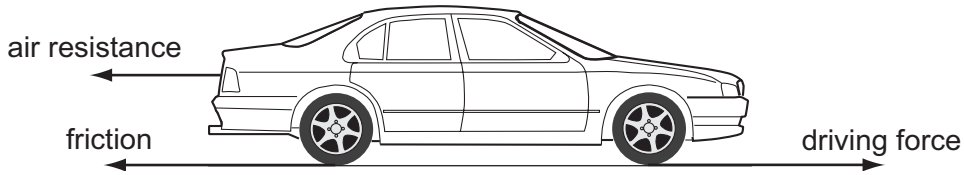
**31** A student carries out an experiment to plot an extension / load graph for a spring. The diagrams show the apparatus at the start of the experiment and with a load added.




What is the extension caused by the load?

**A** $x$ **B** $y$ **C** $y + x$ **D** $y - x$

**32** Three horizontal forces act on a car that is moving along a straight, level road.




Which combination of forces would result in the car moving at constant speed?

| | air resistance | friction | driving force |
|---|---|---|---|
| **A** | 200 N | 1000 N | 800 N |
| **B** | 800 N | 1000 N | 200 N |
| **C** | 800 N | 200 N | 1000 N |
| **D** | 1000 N | 200 N | 800 N |

**33** A child pushes a toy car along a level floor and then lets it go.

As the car slows down, what is the main energy change?

**A** from chemical to heat

**B** from chemical to kinetic

**C** from kinetic to gravitational (potential)

**D** from kinetic to heat

**34** A beaker of water is heated at its base.

Why does the water at the base rise?

**A** It contracts and becomes less dense.

**B** It contracts and becomes more dense.

**C** It expands and becomes less dense.

**D** It expands and becomes more dense.

**35** Which type of radiation lies between visible light and microwaves in the electromagnetic spectrum?

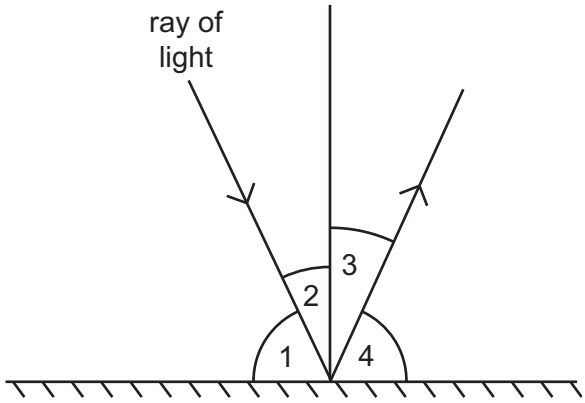
**A** infra-red

**B** radio waves

**C** ultra-violet

**D** X-rays

**36** The diagram shows the path of a ray of light which has been reflected from a smooth surface.

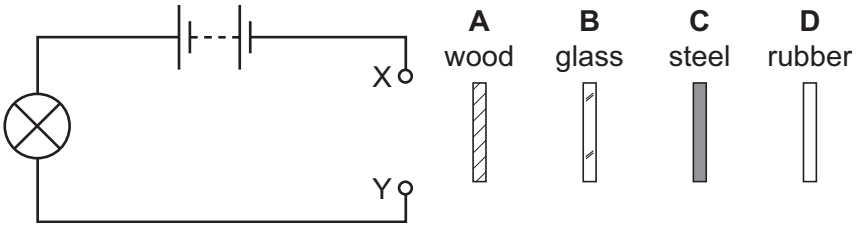



Which angles are the angles of incidence and reflection?

| | angle of incidence | angle of reflection |
|---|---|---|
| **A** | 1 | 4 |
| **B** | 2 | 3 |
| **C** | 3 | 2 |
| **D** | 4 | 1 |

**37** A circuit is set up with a gap between two terminals X and Y. The four strips of material shown in the diagram are connected in turn across the gap.

Which strip completes the circuit so that the lamp lights?




**38** A pupil measures the voltage across a device and the current in it.

Which calculation gives the resistance of the device?

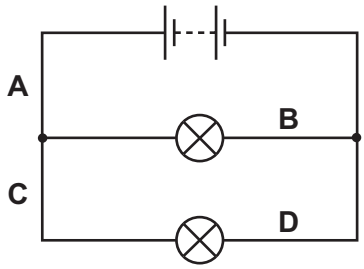
**A** current + voltage

**B** current ÷ voltage

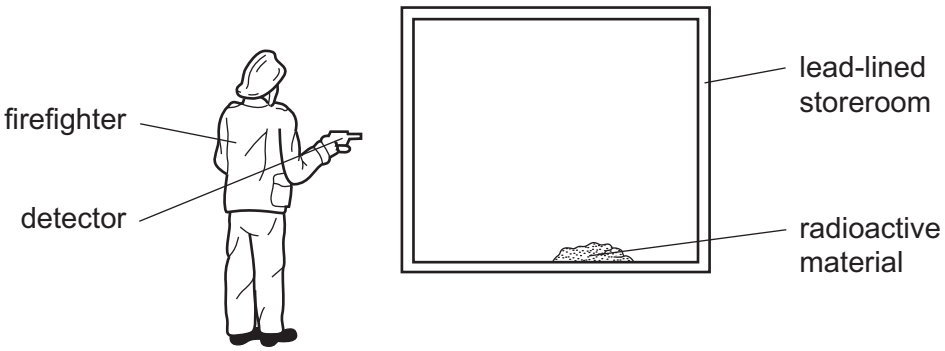
**C** voltage ÷ current

**D** voltage x current

**39** In which position in the circuit shown should a switch be placed so that both lamps can be switched on or off at the same time?



**40** During a fire in a laboratory storeroom, some radioactive material was spilled. A firefighter detected radiation through the lead-lined walls of the storeroom. The radiation was emitted by the radioactive material.




Which type of radiation was being detected?

**A** alpha-particles

**B** beta-particles

**C** gamma-rays

**D** X-rays

# DATA SHEET
## The Periodic Table of the Elements

| Group | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | II | | | | | | | | | | | III | IV | V | VI | VII | 0 |
| | | | | | | | 1 H Hydrogen 1 | | | | | | | | | | 4 He Helium 2 |
| 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 Sulphur 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 | Tc Technetium 43 | 101 Ru Ruthenium 44 | 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 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 | Po Polonium 84 | At Astatine 85 | Rn Radon 86 |
| Fr Francium 87 | 226 Ra Radium 88 | 227 Ac Actinium 89 | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 140 Ce Cerium 58 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | Pm Promethium 61 | 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 | Pa Protactinium 91 | 238 U Uranium 92 | Np Neptunium 93 | Pu Plutonium 94 | Am Americium 95 | Cm Curium 96 | Bk Berkelium 97 | Cf Californium 98 | Es Einsteinium 99 | Fm Fermium 100 | Md Mendelevium 101 | No Nobelium 102 | Lr Lawrencium 103 |

*58-71 Lanthanoid series
90-103 Actinoid series

Key

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

The volume of one mole of any gas is 24 $dm^3$ at room temperature and pressure (r.t.p.).