**International General Certificate of Secondary Education**
**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

# COMBINED SCIENCE 0653/1

PAPER 1 Multiple Choice

**OCTOBER/NOVEMBER SESSION 2002**

45 minutes

Additional materials:
Multiple Choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

**TIME** 45 minutes

**INSTRUCTIONS TO CANDIDATES**

**Do not open this booklet until you are told to do so.**

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in 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 very carefully the instructions on the answer sheet.**

**INFORMATION FOR CANDIDATES**

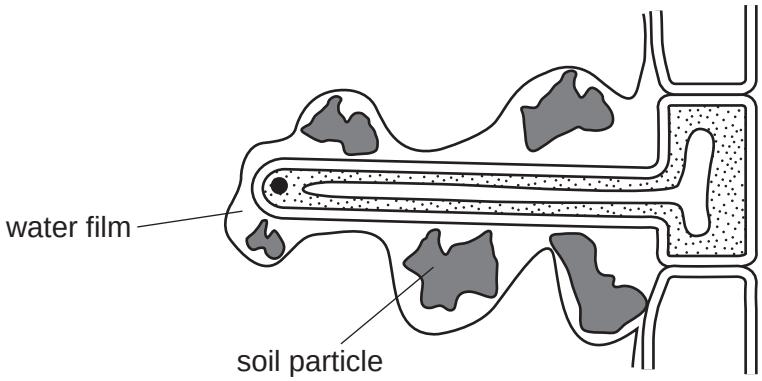
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

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

**1** The diagram shows a root hair cell between soil particles.

By what process does water move into the cell?




**A** diffusion

**B** excretion

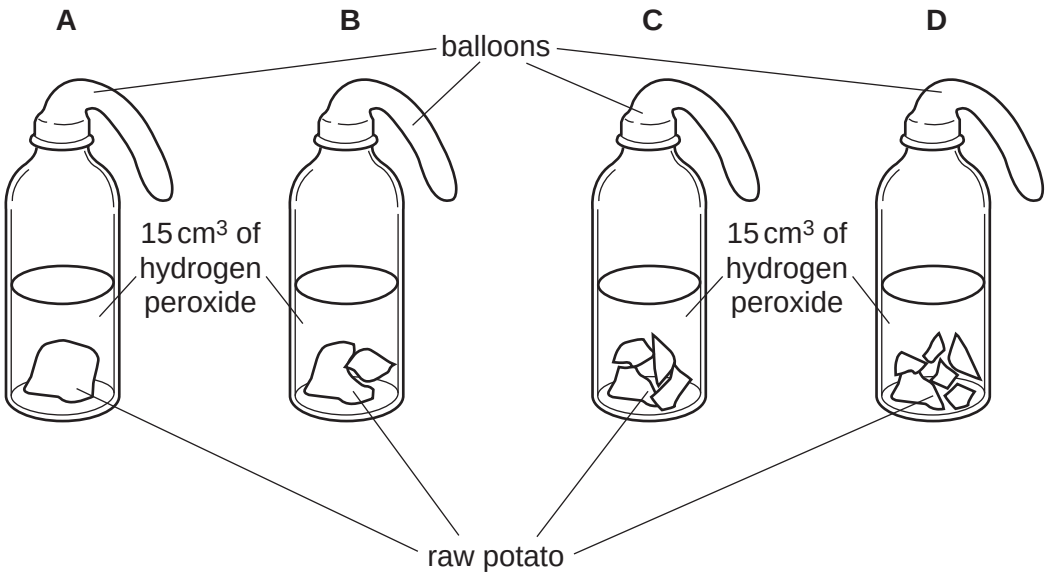
**C** respiration

**D** secretion

**2** The diagram shows an experiment to investigate the reaction of the enzyme catalase, which is found in raw potato.

3 $cm^3$ of raw potato, cut as shown, is added to each jar.

Which balloon will be the first to inflate?



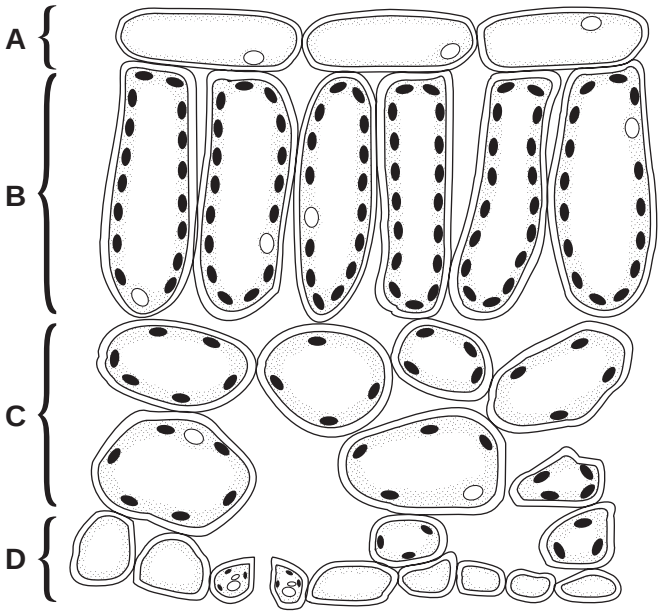
**3** Plants manufacture their own supplies of carbohydrate.

What are the raw materials and waste products of this process?

| | raw materials | waste product |
|---|---|---|
| **A** | carbon dioxide and chlorophyll | oxygen |
| **B** | carbon dioxide and water | oxygen |
| **C** | oxygen and chlorophyll | carbon dioxide |
| **D** | oxygen and water | carbon dioxide |

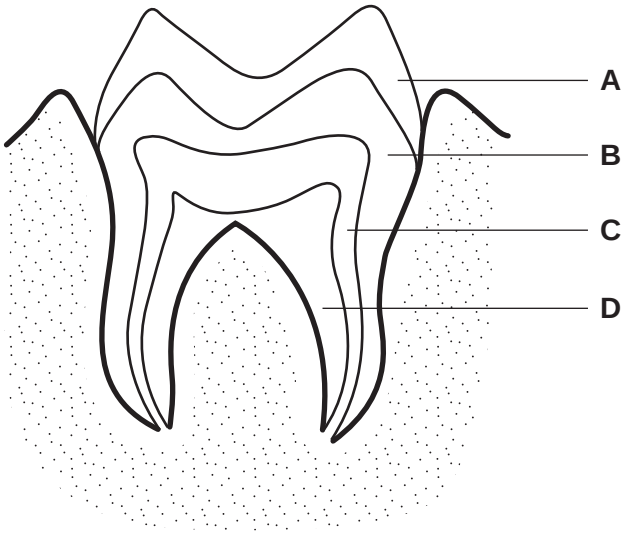
**4** The diagram shows a section through a leaf.

During photosynthesis, where would the greatest conversion of light energy to chemical energy take place?



**5** The diagram shows a section through a human tooth.

Which part contains blood vessels?




**6** The table shows the results of tests carried out on a sample of food.

| test | Benedict's | iodine | biuret |
|---|---|---|---|
| result | orange | brown | purple |

Which nutrients are in the food?

**A** protein and reducing sugar only

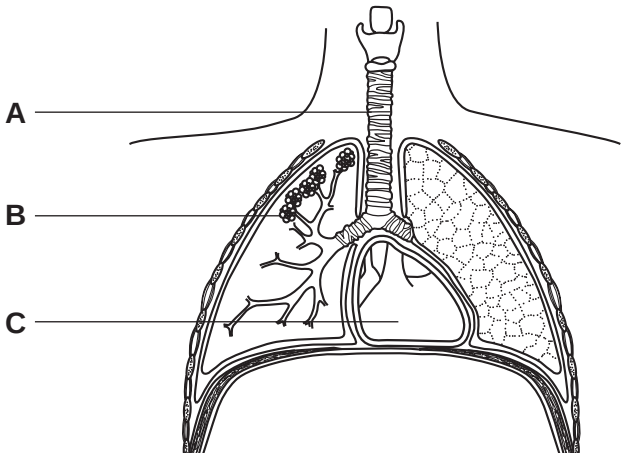
**B** protein and starch only

**C** protein, reducing sugar and starch

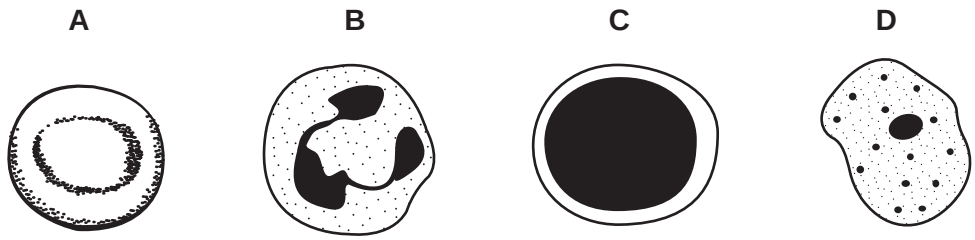
**D** reducing sugar and starch only

**7** The diagram shows some structures in the human thorax (chest).

Into which part does carbon dioxide pass immediately after leaving the blood?

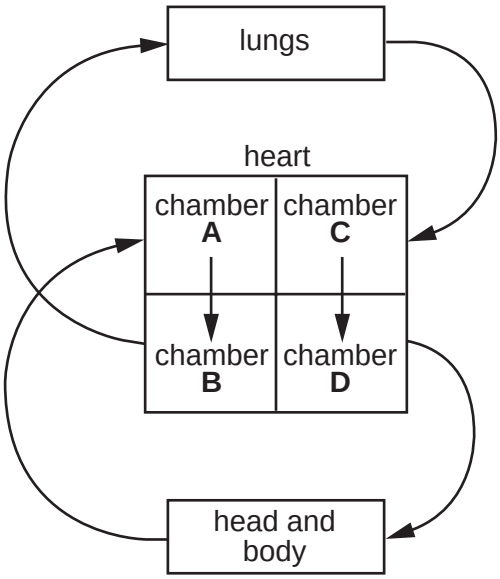


**8** Which diagram shows a red blood cell?




**9** The diagram represents the human blood system.

Which part of the heart is the left ventricle?




**10** In which part of a plant does water normally change from liquid into vapour?

**A** mesophyll

**B** phloem

**C** root hair

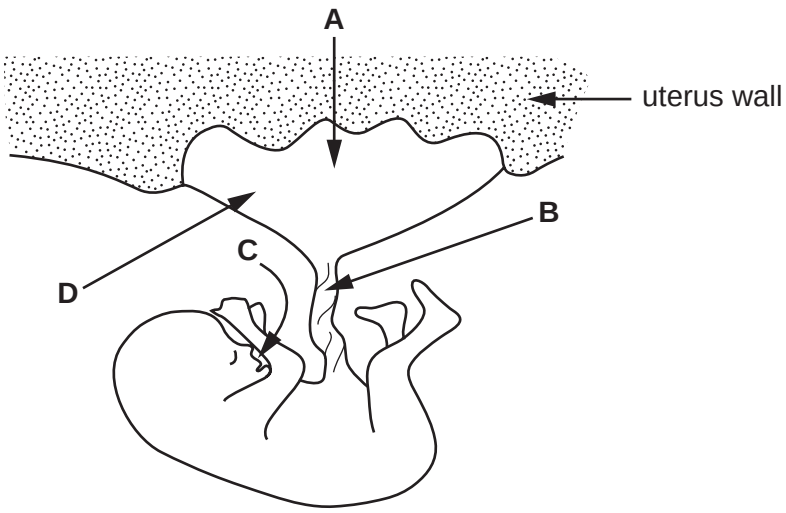
**D** xylem

**11** Where is insulin produced and where does it have its main effect?

| | insulin produced | main effect |
|---|---|---|
| **A** | liver | small intestine |
| **B** | pancreas | liver |
| **C** | small intestine | stomach |
| **D** | stomach | pancreas |

**12** The diagram shows a fetus developing inside a uterus.

Which arrow shows how viruses and drugs may enter the foetus?




**13** After a plant has produced flowers, what is the correct sequence of events leading to reproduction?

**A** fertilisation, pollination, seed formation

**B** pollination, fertilisation, seed formation

**C** seed formation, fertilisation, pollination

**D** seed formation, pollination, fertilisation

**14** It is possible to grow plants that are genetically identical.

What are plants grown in this way called?

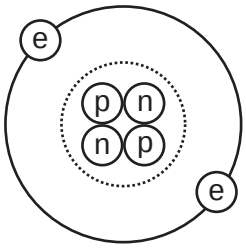
**A** clones

**B** gametes

**C** varieties

**D** zygotes

**15** The diagram shows a helium atom.




**key**

- (p) proton
- (n) neutron
- (e) electron
- nucleus

Which particles in the helium atom have approximately the same mass?

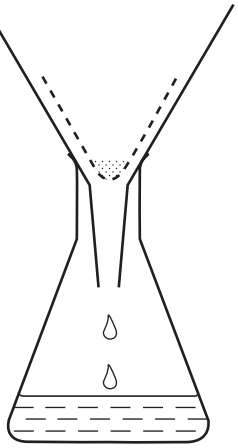
**A** (e) and (p) only
**B** (e) and (n) only
**C** (p) and (n) only
**D** (e) and (p) and (n)

**16** The table shows information about four different compounds.

Which compound contains ionic bonds?

| | formula of compound | elements present in compound |
|---|---|---|
| **A** | $CO_2$ | carbon, oxygen |
| **B** | HC*l* | hydrogen, chlorine |
| **C** | $NH_3$ | nitrogen, hydrogen |
| **D** | $Na_2O$ | sodium, oxygen |

**17** The diagram shows apparatus used for filtration.



Why can sugar and salt **not** be separated by using this apparatus?

**A** They are both solid.

**B** They are both white.

**C** They both dissolve in water.

**D** They both have the same size particles.

**18** The equations for the complete combustion of carbon and hydrogen are shown.

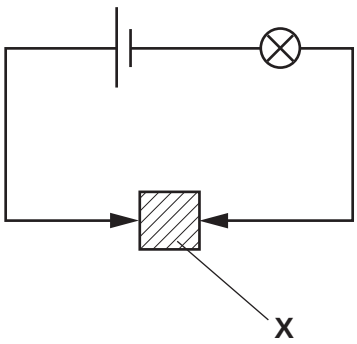
$$C + O_2 \longrightarrow CO_2$$

$$2H_2 + O_2 \longrightarrow 2H_2O$$

How many molecules of oxygen, $O_2$, are needed for the complete combustion of 1 molecule of the hydrocarbon $C_3H_8$?

**A** 2 **B** 5 **C** 7 **D** 11

**19** A solid **X** is placed in the circuit shown. The lamp lights.




What is solid **X**?

**A** an alloy

**B** a compound

**C** an electrolyte

**20** Which of the following correctly compares iron with stainless steel?

| | | brittle | rusts |
|---|---|---|---|
| **A** | iron | ✘ | ✔ |
| **B** | iron | ✔ | ✘ |
| **C** | stainless steel | ✘ | ✘ |
| **D** | stainless steel | ✔ | ✘ |

**21** A firework gives a bright flame in which yellow and red colours are seen.

Which two metals are present in the firework?

**A** calcium and copper

**B** copper and potassium

**C** potassium and sodium

**D** sodium and calcium

**22** Potassium is a very reactive metal.

How is potassium obtained from its ore?

**A** by oxidation using air

**B** by oxidation using coke

**C** by reduction using coke

**D** by reduction using electrolysis

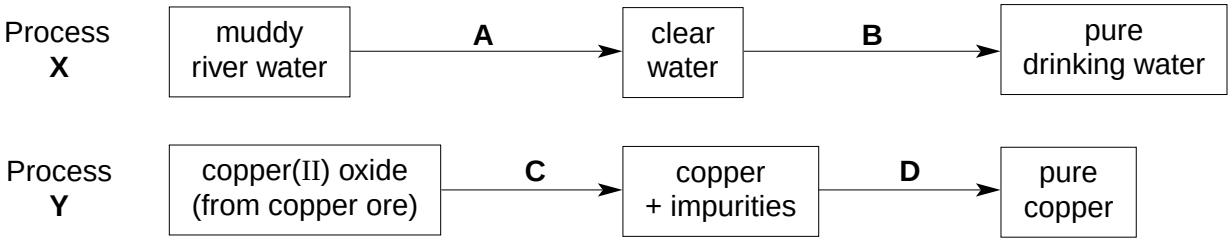
**23** The table shows the properties of four substances.

Which substance could be an alkali?

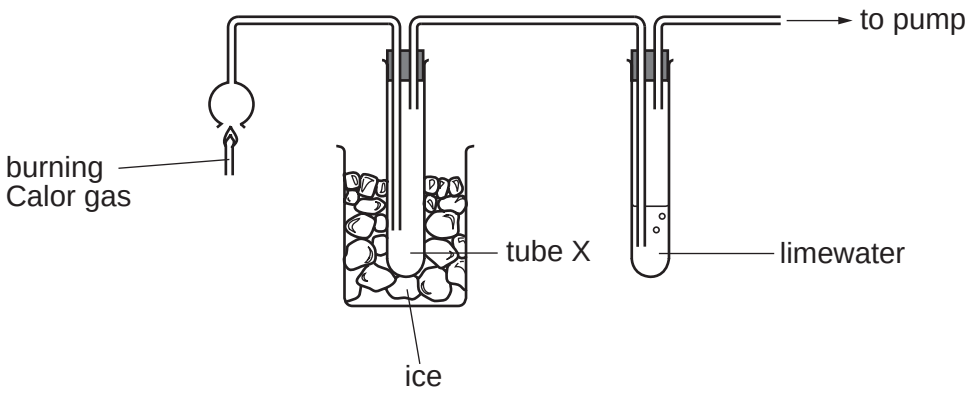
| | solubility in water | reaction with an acid |
|---|---|---|
| **A** | insoluble | reacts |
| **B** | insoluble | does not react |
| **C** | soluble | reacts |
| **D** | soluble | does not react |

**24** The diagrams show the steps in two industrial processes, **X** and **Y**, to produce pure [illegible]. In one step in one process, electrolysis is used.

Which step is this?




**25** The diagram shows how to test the products of complete combustion of Calor gas (a hydrocarbon fuel).




The limewater turns cloudy.

What is collected in tube X?

**A** a liquid that boils at 100 °C

**B** a liquid that burns easily

**C** particles of carbon

**D** solid carbon dioxide

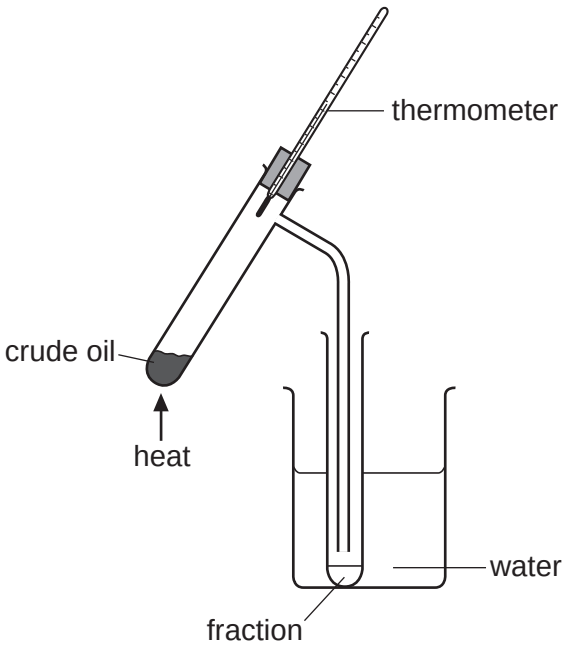
**26** Coal , hydrogen, methane and gasoline (petrol) are commonly used as fuels.

How many of these fuels are solids, liquids or gases?

| | solids | liquids | gases |
|---|---|---|---|
| **A** | 0 | 2 | 2 |
| **B** | 1 | 1 | 2 |
| **C** | 2 | 1 | 1 |
| **D** | 2 | 2 | 0 |

**27** Crude oil (petroleum) is heated, using the apparatus shown.

Four fractions, with different boiling point ranges, are collected.




Which term best describes crude oil?

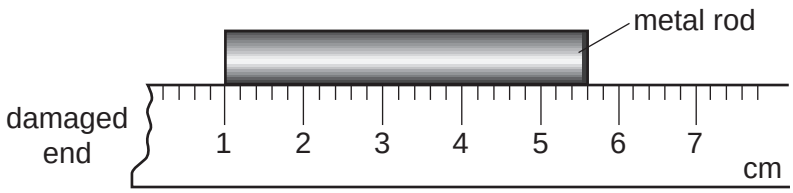
**A** a compound

**B** an element

**C** a mixture

**D** a plastic

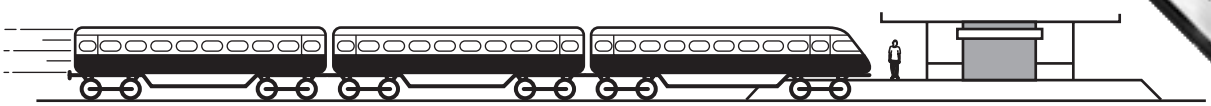
**28** A girl uses a rule to measure the length of a metal rod. Because the end of the rule is damaged, she places one end of the rod at the 1 cm mark as shown.




How long is the metal rod?

**A** 43 mm **B** 46 mm **C** 53 mm **D** 56 mm

**29** A child is standing on the platform of a station, watching the trains.



A train travelling at 30 m/s takes 3 s to pass the child.

What is the length of the train?

**A** 10 m **B** 30 m **C** 90 m **D** 270 m

**30** Which of the following statements is correct?

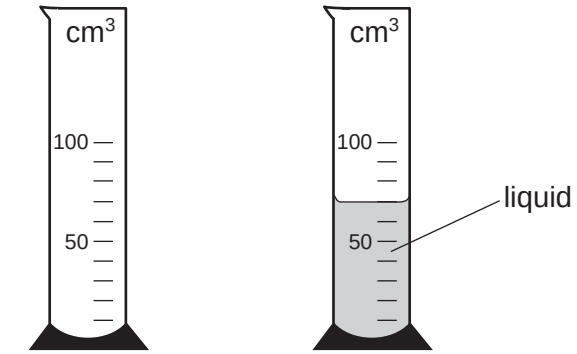
**A** Mass and weight are different names for the same thing.

**B** The mass of an object is different if the object is taken to the Moon.

**C** The weight of a car is one of the forces acting on the car.

**D** The weight of a chocolate bar is measured in kilograms.

**31** The masses of a measuring cylinder before and after pouring some liquid are shown in the diagram.




What is the density of the liquid?

**A** $\frac{217}{52}$ g / cm$^3$ **B** $\frac{217}{70}$ g / cm$^3$ **C** $\frac{77}{52}$ g / cm$^3$ **D** $\frac{77}{70}$ g / cm$^3$

**32** In which of these situations is no resultant force needed?

**A** a car changing direction

**B** a car moving in a straight line at a steady speed

**C** a car slowing down

**D** a car speeding up

**33** In a car engine, energy stored in the fuel is converted into thermal energy (heat energy) and energy of motion (kinetic energy).

In which form is the energy stored in the fuel?

**A** chemical

**B** geothermal

**C** hydroelectric

**D** nuclear

**34** How does thermal energy (heat energy) travel through the vacuum between the Earth and the Sun?

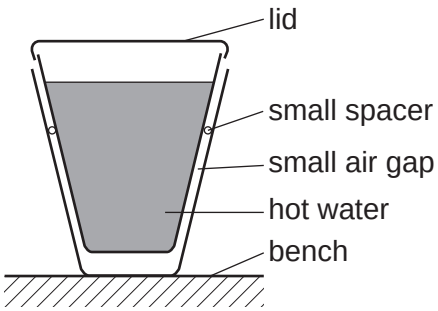
**A** by conduction

**B** by convection

**C** by radiation

**D** by radioactive decay

**35** Two plastic cups are placed one inside the other. Hot water is poured into the inner cup and a lid is put on top as shown.




Which statement is correct?

**A** Heat loss by radiation is prevented by the small air gap.

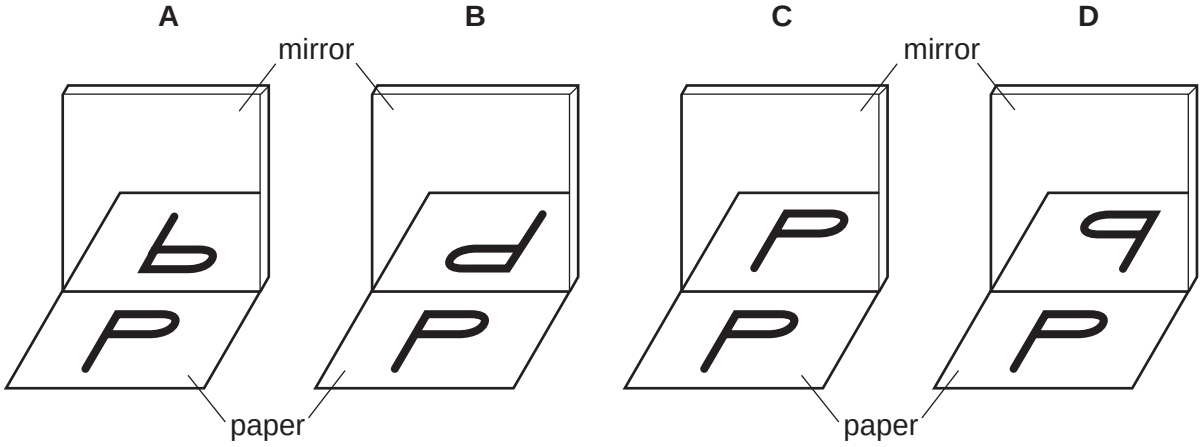
**B** No heat passes through the sides of either cup.

**C** The bench is heated by convection from the bottom of the outer cup.

**D** The lid is used to reduce heat loss by convection.

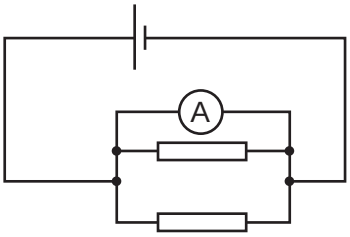
**36** A student looks at the letter P on a piece of paper, and at its reflection in a mirror.

What does he see?

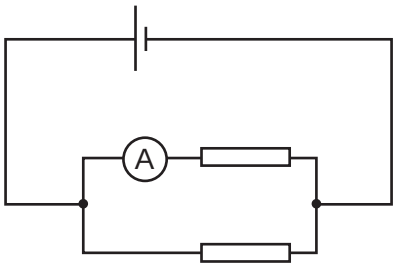


**37** In which circuit does the ammeter read the total current through both resistors?

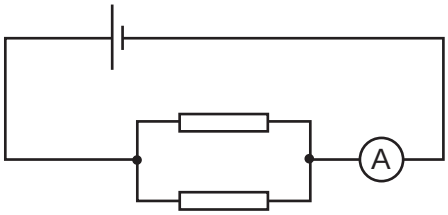
**A**



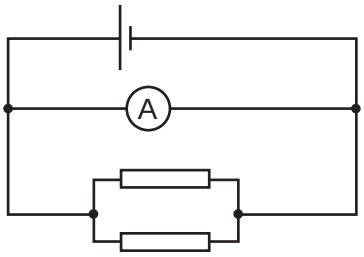

**B**




**C**




**D**

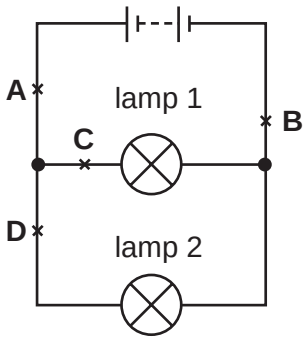



**38** The table shows the voltage and current ratings for four light bulbs.

Which bulb has the greatest resistance when used normally?

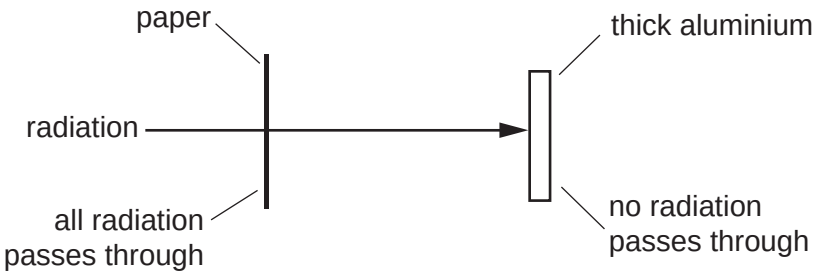
| | voltage / V | current / A |
|---|---|---|
| **A** | 2 | 0.5 |
| **B** | 3 | 0.2 |
| **C** | 6 | 12 |
| **D** | 12 | 1.0 |

**39** The diagram shows a circuit, with four possible positions to place a switch.




At which labelled point should a switch be placed so that lamp 1 remains on all the time and lamp 2 can be switched on and off?

**40** A radioactive source emits radiation that can pass through a sheet of paper but not through thick aluminium.




What does this show about the radiation?

**A** It is alpha-particles.

**B** It is beta-particles.

**C** It is gamma-rays.

**D** It is a mixture of alpha-particles and gamma-rays.

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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 | | | | | | | | | 4 He Helium 2 |
| 7 Li Lithium | 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 | 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 otassium | 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 | 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 | 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 | 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 Lawr 10 |

3-71 Lanthanoid series
0-103 Actinoid series

y

a
X
b

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

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