

International General Certificate of Secondary Education  
CAMBRIDGE INTERNATIONAL EXAMINATIONS

COMBINED SCIENCE

PAPER 1 Multiple Choice

0653/1

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.

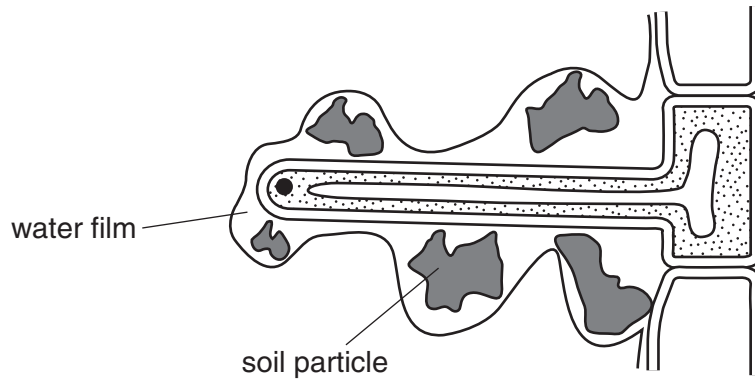
---

**This question paper consists of 17 printed pages and 3 blank pages.**



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

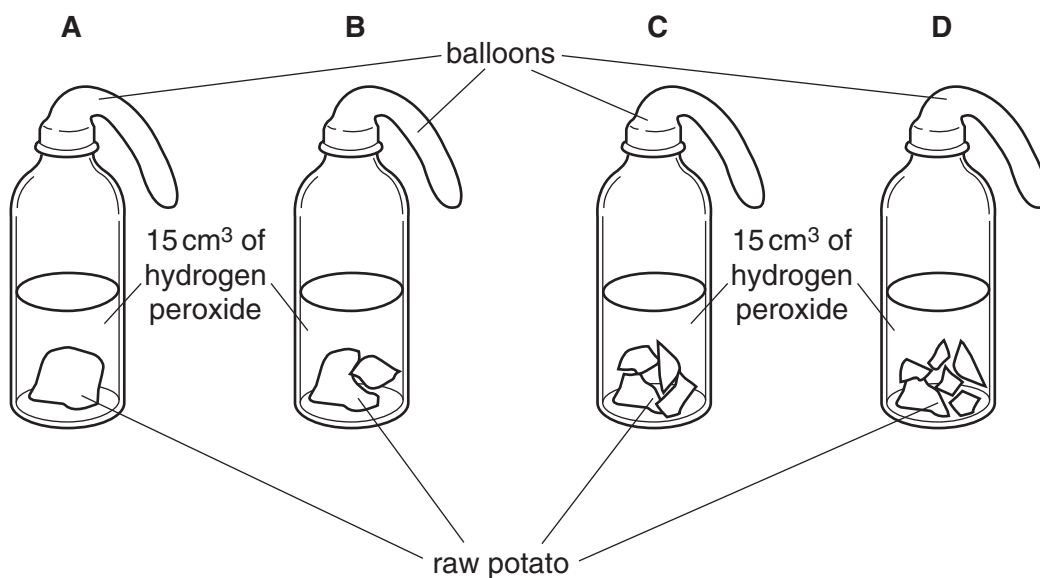
By what process does water move into the cell?



- 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<sup>3</sup> of raw potato, cut as shown, is added to each jar.

Which balloon will be the first to inflate?



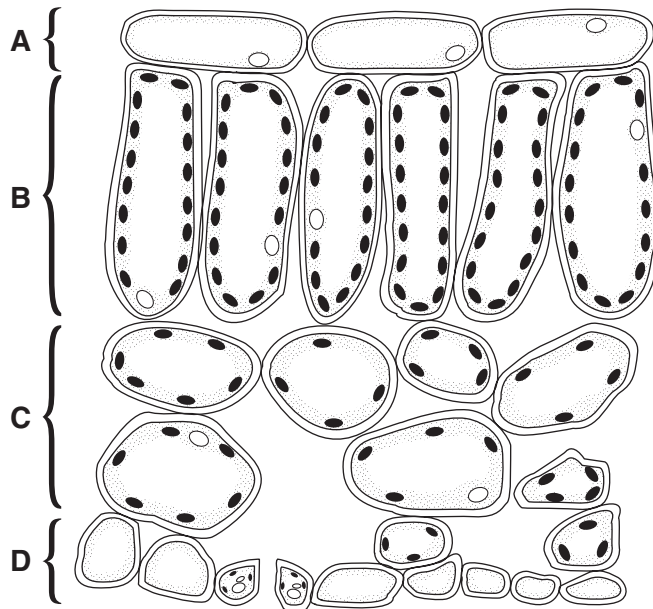
3 Plants manufacture their own supplies of carbohydrate.

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

|          | raw materials                  | waste product  |
|----------|--------------------------------|----------------|
| <b>A</b> | carbon dioxide and chlorophyll | oxygen         |
| <b>B</b> | carbon dioxide and water       | oxygen         |
| <b>C</b> | oxygen and chlorophyll         | carbon dioxide |
| <b>D</b> | oxygen and water               | carbon dioxide |

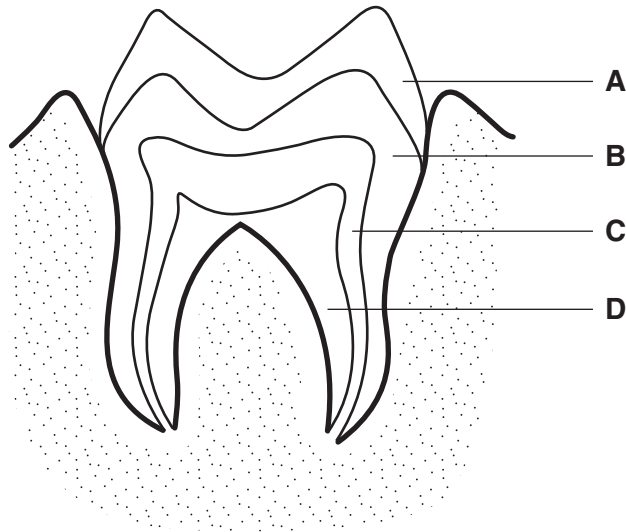
4 The diagram shows a section through a leaf.

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?

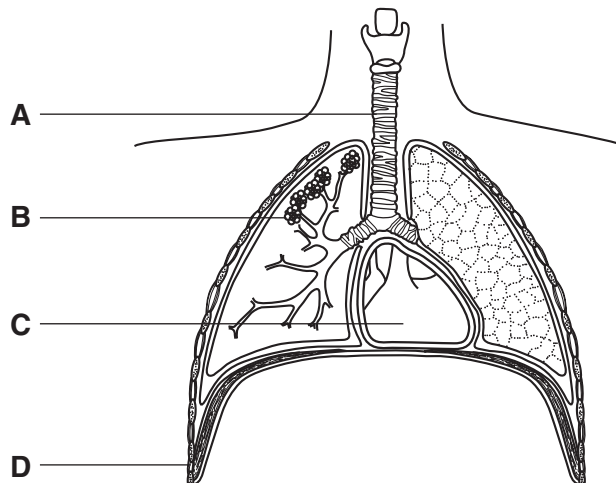


- 6 The table shows the results of tests carried out on a sample of food.

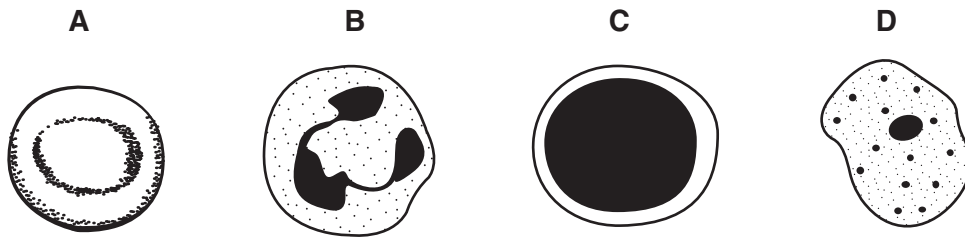
|        |            |        |        |
|--------|------------|--------|--------|
| test   | Benedict's | iodine | biuret |
| result | orange     | brown  | purple |

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?

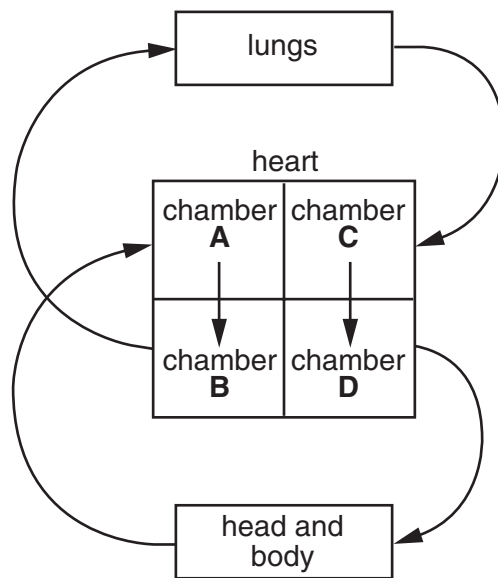


8 Which diagram shows a red blood cell?



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?

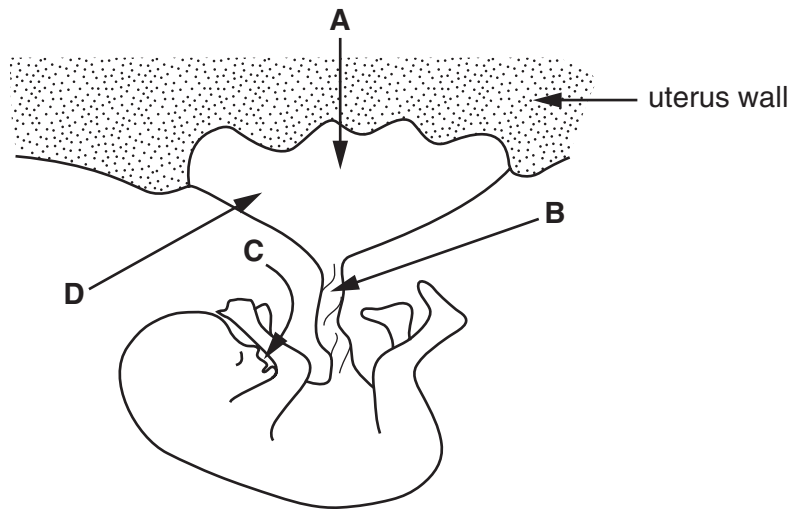
- A mesophyll
- B phloem
- C root hair
- D xylem

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?

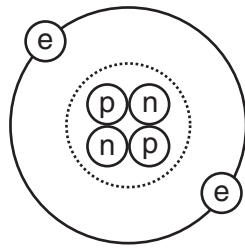
- A fertilisation, pollination, seed formation
- B pollination, fertilisation, seed formation
- C seed formation, fertilisation, pollination
- D seed formation, pollination, fertilisation

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?

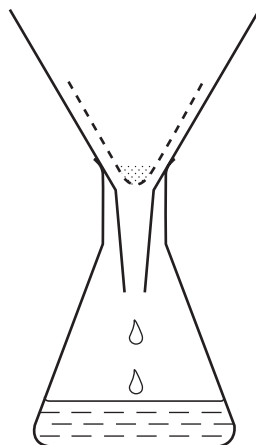
- A** **e** and **p** only
- B** **e** and **n** only
- C** **p** and **n** only
- D** **e** and **p** and **n**

16 The table shows information about four different compounds.

Which compound contains ionic bonds?

|          | formula of compound | elements present in compound |
|----------|---------------------|------------------------------|
| <b>A</b> | CO <sub>2</sub>     | carbon, oxygen               |
| <b>B</b> | HCl                 | hydrogen, chlorine           |
| <b>C</b> | NH <sub>3</sub>     | nitrogen, hydrogen           |
| <b>D</b> | Na <sub>2</sub> O   | sodium, oxygen               |

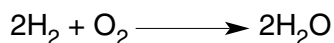
17 The diagram shows apparatus used for filtration.



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.

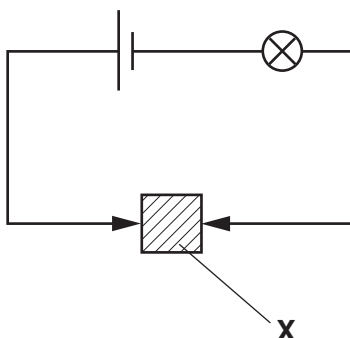
18 The equations for the complete combustion of carbon and hydrogen are shown.



How many molecules of oxygen,  $\text{O}_2$ , are needed for the complete combustion of 1 molecule of the hydrocarbon  $\text{C}_3\text{H}_8$ ?

- 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
- D a salt



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

|          |                 | brittle  | rusts    |
|----------|-----------------|----------|----------|
| <b>A</b> | iron            | <b>x</b> | <b>✓</b> |
| <b>B</b> | iron            | <b>✓</b> | <b>x</b> |
| <b>C</b> | stainless steel | <b>x</b> | <b>x</b> |
| <b>D</b> | stainless steel | <b>✓</b> | <b>x</b> |

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

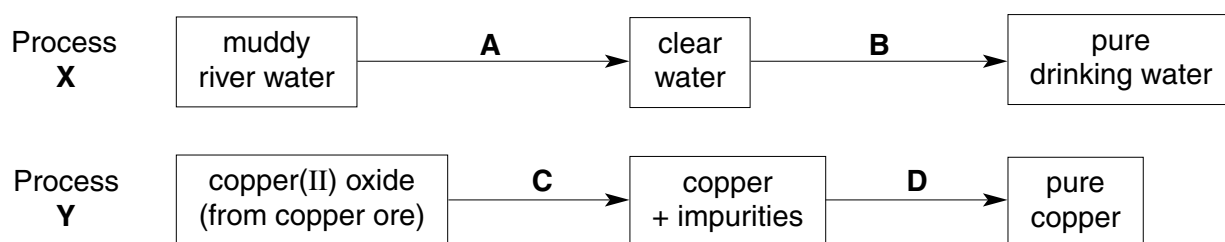
23 The table shows the properties of four substances.

Which substance could be an alkali?

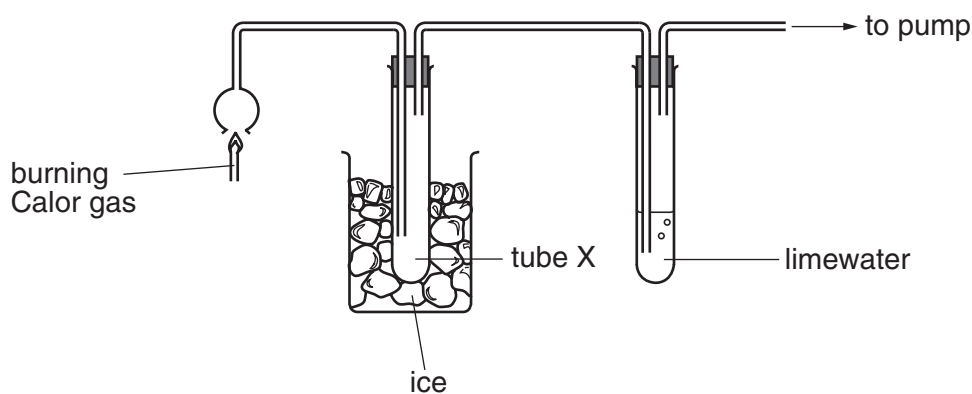
|          | solubility in water | reaction with an acid |
|----------|---------------------|-----------------------|
| <b>A</b> | insoluble           | reacts                |
| <b>B</b> | insoluble           | does not react        |
| <b>C</b> | soluble             | reacts                |
| <b>D</b> | soluble             | does not react        |

- 24 The diagrams show the steps in two industrial processes, **X** and **Y**, to produce pure products. 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?

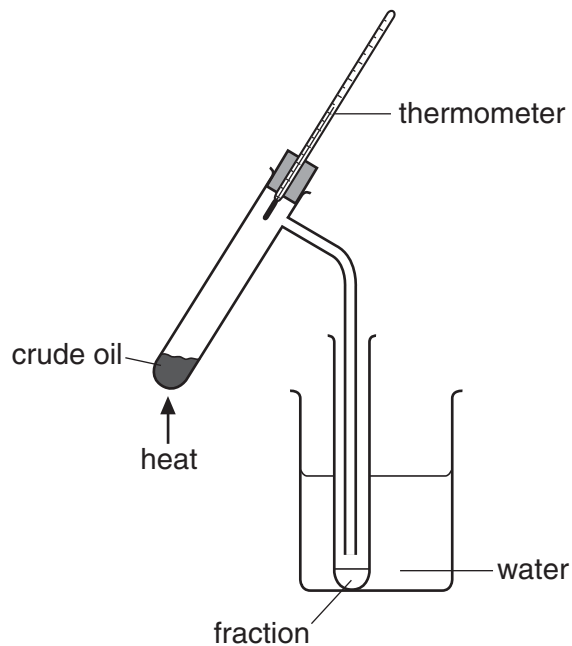
- A** a liquid that boils at 100 °C  
**B** a liquid that burns easily  
**C** particles of carbon  
**D** solid carbon dioxide
- 26 Coal, hydrogen, methane and gasoline (petrol) are commonly used as fuels.

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

|          | solids | liquids | gases |
|----------|--------|---------|-------|
| <b>A</b> | 0      | 2       | 2     |
| <b>B</b> | 1      | 1       | 2     |
| <b>C</b> | 2      | 1       | 1     |
| <b>D</b> | 2      | 2       | 0     |

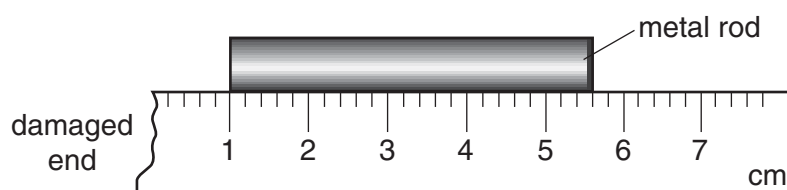
27 Crude oil (petroleum) is heated, using the apparatus shown.

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



Which term best describes crude oil?

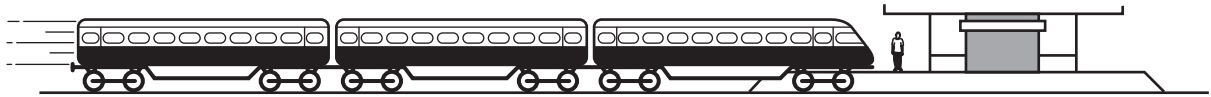
- A a compound
  - B an element
  - C a mixture
  - D a plastic
- 28 A girl uses a rule to measure the length of a metal rod. Because the end of the rule is damaged, she places one end of the rod at the 1 cm mark as shown.



How long is the metal rod?

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

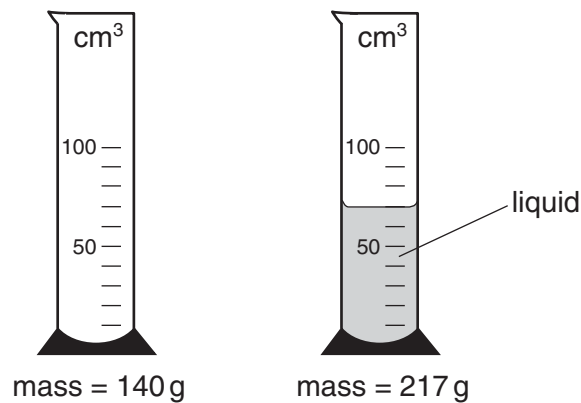
- 29 A child is standing on the platform of a station, watching the trains.



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<sup>3</sup>    B  $\frac{217}{70}$  g/cm<sup>3</sup>    C  $\frac{77}{52}$  g/cm<sup>3</sup>    D  $\frac{77}{70}$  g/cm<sup>3</sup>

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).

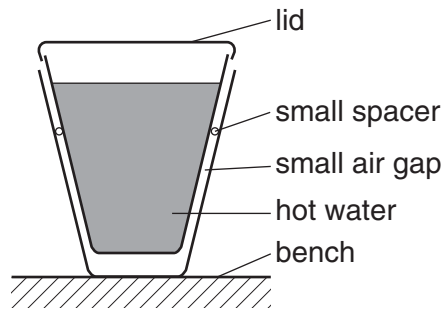
In which form is the energy stored in the fuel?

- 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?

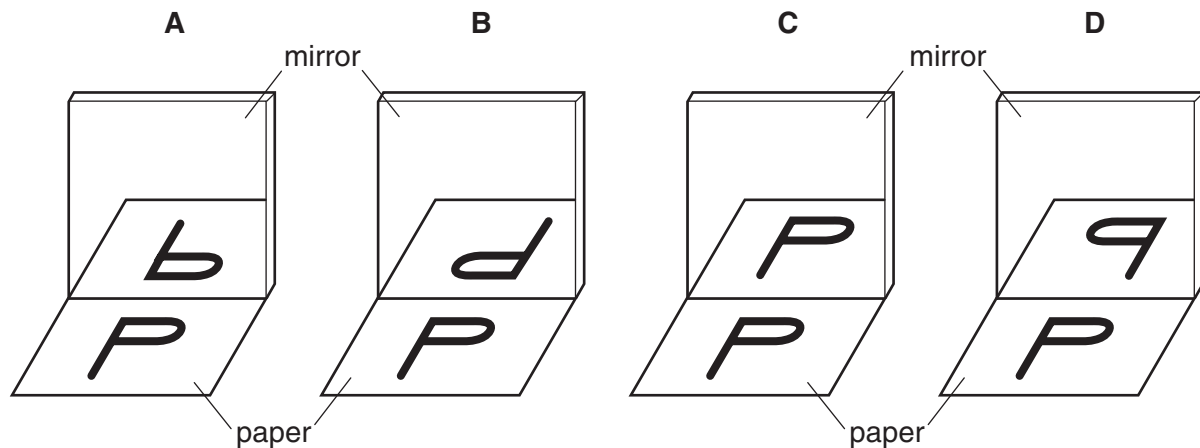
- A by conduction
- B by convection
- C by radiation
- D by radioactive decay

- 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.

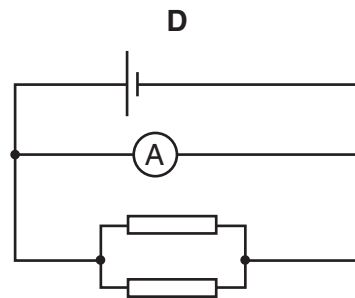
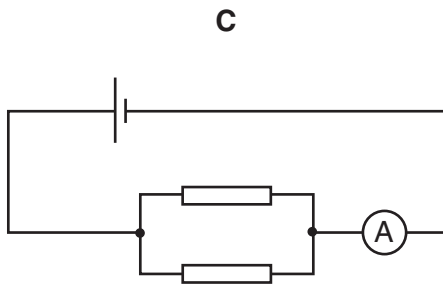
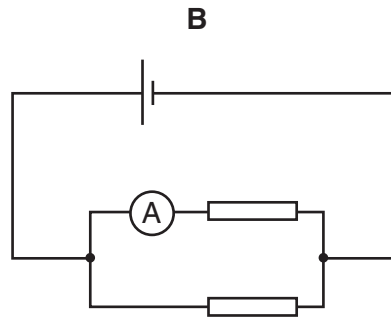
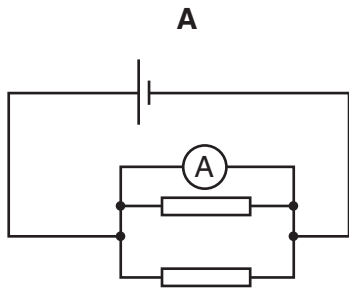


Which statement is correct?

- 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.



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

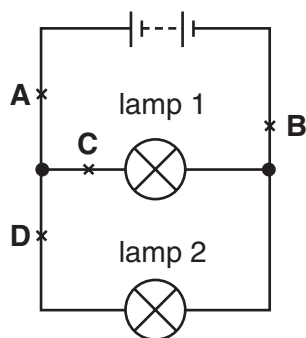


38 The table shows the voltage and current ratings for four light bulbs.

Which bulb has the greatest resistance when used normally?

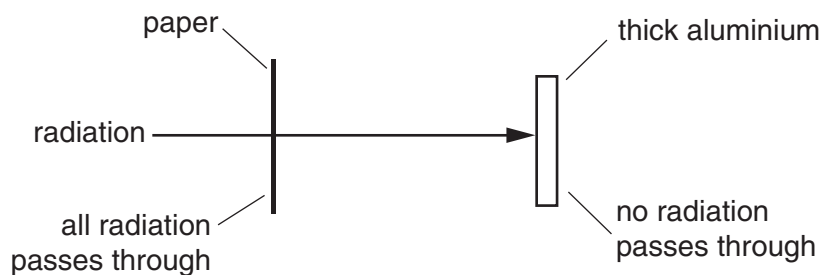
|          | voltage / V | current / A |
|----------|-------------|-------------|
| <b>A</b> | 2           | 0.5         |
| <b>B</b> | 3           | 0.2         |
| <b>C</b> | 6           | 12          |
| <b>D</b> | 12          | 1.0         |

- 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.









# DATA SHEET

## The Periodic Table of the Elements

|                                                                                                                                                                                                                                                                                                                                                       |                                        | Group                                 |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    |                                     |                                    |                                        |   |          |   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------|-------------------------------------|----------------------------------------|--------------------------------------|---------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|------------------------------------|-------------------------------------|------------------------------------|----------------------------------------|---|----------|---|
| I                                                                                                                                                                                                                                                                                                                                                     | II                                     | III                                   | IV                                  | V                                      | VI                                   | VII                                   | O                                  |                                     |                                     |                                      |                                    |                                     |                                    |                                        |   |          |   |
|                                                                                                                                                                                                                                                                                                                                                       |                                        | 1<br><b>H</b><br>Hydrogen<br>1        |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    | 4<br><b>He</b><br>Helium<br>2       |                                    |                                        |   |          |   |
| 7<br><b>Li</b><br>Lithium<br>3                                                                                                                                                                                                                                                                                                                        | 9<br><b>Be</b><br>Beryllium<br>4       |                                       |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    | 20<br><b>Ne</b><br>Neon<br>10       |                                    |                                        |   |          |   |
| 23<br><b>Na</b><br>Sodium<br>11                                                                                                                                                                                                                                                                                                                       | 24<br><b>Mg</b><br>Magnesium<br>12     |                                       |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    | 35.5<br><b>Cl</b><br>Chlorine<br>17 |                                    |                                        |   |          |   |
| 39<br><b>K</b><br>Potassium<br>19                                                                                                                                                                                                                                                                                                                     | 40<br><b>Ca</b><br>Calcium<br>20       | 51<br><b>V</b><br>Vanadium<br>23      | 52<br><b>Cr</b><br>Chromium<br>24   | 55<br><b>Mn</b><br>Manganese<br>25     | 56<br><b>Fe</b><br>Iron<br>26        | 59<br><b>Co</b><br>Cobalt<br>27       | 59<br><b>Ni</b><br>Nickel<br>28    | 64<br><b>Cu</b><br>Copper<br>29     | 65<br><b>Zn</b><br>Zinc<br>30       | 70<br><b>Ga</b><br>Gallium<br>31     | 73<br><b>Ge</b><br>Germanium<br>32 | 75<br><b>As</b><br>Arsenic<br>33    | 79<br><b>Se</b><br>Selenium<br>34  | 84<br><b>Kr</b><br>Krypton<br>36       |   |          |   |
| 85<br><b>Rb</b><br>Rubidium<br>37                                                                                                                                                                                                                                                                                                                     | 88<br><b>Sr</b><br>Strontium<br>38     | 91<br><b>Zr</b><br>Zirconium<br>40    | 96<br><b>Mo</b><br>Molybdenum<br>42 | 101<br><b>Ru</b><br>Ruthenium<br>44    | 103<br><b>Rh</b><br>Rhodium<br>45    | 106<br><b>Pd</b><br>Palladium<br>46   | 108<br><b>Ag</b><br>Silver<br>47   | 112<br><b>Cd</b><br>Cadmium<br>48   | 115<br><b>In</b><br>Indium<br>49    | 119<br><b>Sn</b><br>Tin<br>50        | 122<br><b>Sb</b><br>Antimony<br>51 | 127<br><b>I</b><br>Iodine<br>53     | 131<br><b>Xe</b><br>Xenon<br>54    |                                        |   |          |   |
| 133<br><b>Cs</b><br>Caesium<br>55                                                                                                                                                                                                                                                                                                                     | 137<br><b>Ba</b><br>Barium<br>56       | 181<br><b>Ta</b><br>Tantalum<br>73    | 184<br><b>W</b><br>Tungsten<br>74   | 186<br><b>Re</b><br>Rhenium<br>75      | 190<br><b>Os</b><br>Osmium<br>76     | 192<br><b>Ir</b><br>Iridium<br>77     | 195<br><b>Pt</b><br>Platinum<br>78 | 197<br><b>Au</b><br>Gold<br>79      | 201<br><b>Hg</b><br>Mercury<br>80   | 204<br><b>Tl</b><br>Thallium<br>81   | 207<br><b>Pb</b><br>Lead<br>82     | 209<br><b>Bi</b><br>Bismuth<br>83   | 210<br><b>Po</b><br>Polonium<br>84 | 210<br><b>Rn</b><br>Radon<br>86        |   |          |   |
| 87<br><b>Fr</b><br>Francium                                                                                                                                                                                                                                                                                                                           | 88<br><b>Ra</b><br>Radium              | 226<br><b>Ac</b><br>Actinium          |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    |                                     | 89<br><b>†</b>                     |                                        |   |          |   |
| *58-71 Lanthanoid series                                                                                                                                                                                                                                                                                                                              |                                        |                                       |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    |                                     |                                    |                                        |   |          |   |
| †90-103 Actinoid series                                                                                                                                                                                                                                                                                                                               |                                        |                                       |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    |                                     |                                    |                                        |   |          |   |
| <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">a</td> <td style="border: 1px solid black; padding: 2px;"><b>X</b></td> <td style="border: 1px solid black; padding: 2px;">b</td> </tr> </table> <p>a = relative atomic mass<br/>X = atomic symbol<br/>b = proton (atomic) number</p> |                                        |                                       |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    |                                     |                                    |                                        | a | <b>X</b> | b |
| a                                                                                                                                                                                                                                                                                                                                                     | <b>X</b>                               | b                                     |                                     |                                        |                                      |                                       |                                    |                                     |                                     |                                      |                                    |                                     |                                    |                                        |   |          |   |
| 140<br><b>Ce</b><br>Cerium<br>58                                                                                                                                                                                                                                                                                                                      | 141<br><b>Pr</b><br>Praseodymium<br>59 | 144<br><b>Nd</b><br>Neodymium<br>60   | 150<br><b>Sm</b><br>Samarium<br>62  | 152<br><b>Eu</b><br>Europium<br>63     | 157<br><b>Gd</b><br>Gadolinium<br>64 | 162<br><b>Dy</b><br>Dysprosium<br>66  | 165<br><b>Ho</b><br>Holmium<br>67  | 167<br><b>Er</b><br>Erbium<br>68    | 169<br><b>Tm</b><br>Thulium<br>69   | 173<br><b>Yb</b><br>Ytterbium<br>70  | 175<br><b>Lu</b><br>Lutetium<br>71 | 232<br><b>Th</b><br>Thorium<br>90   | 238<br><b>U</b><br>Uranium<br>92   | 238<br><b>Pa</b><br>Protactinium<br>91 |   |          |   |
| 159<br><b>Tb</b><br>Terbium<br>65                                                                                                                                                                                                                                                                                                                     | 159<br><b>Bk</b><br>Berkelium<br>97    | 159<br><b>Cm</b><br>Curium<br>96      | 159<br><b>Am</b><br>Americium<br>95 | 159<br><b>Pu</b><br>Plutonium<br>94    | 159<br><b>Np</b><br>Neptunium<br>93  | 159<br><b>Pm</b><br>Promethium<br>61  | 159<br><b>Sm</b><br>Samarium<br>62 | 159<br><b>Pu</b><br>Plutonium<br>94 | 159<br><b>Np</b><br>Neptunium<br>93 | 159<br><b>Pm</b><br>Promethium<br>61 | 159<br><b>Sm</b><br>Samarium<br>62 | 159<br><b>Bk</b><br>Berkelium<br>97 | 159<br><b>Cm</b><br>Curium<br>96   | 159<br><b>Am</b><br>Americium<br>95    |   |          |   |
| 162<br><b>Dy</b><br>Dysprosium<br>66                                                                                                                                                                                                                                                                                                                  | 162<br><b>Cf</b><br>Californium<br>98  | 162<br><b>Es</b><br>Einsteinium<br>99 | 162<br><b>Fm</b><br>Fermium<br>100  | 162<br><b>Md</b><br>Mendelevium<br>101 | 162<br><b>No</b><br>Nobelium<br>102  | 162<br><b>Lr</b><br>Lawrencium<br>103 | 162<br><b>Lu</b><br>Lutetium<br>71 | 162<br><b>Yb</b><br>Ytterbium<br>70 | 162<br><b>Er</b><br>Erbium<br>68    | 162<br><b>Tm</b><br>Thulium<br>69    | 162<br><b>Pb</b><br>Lead<br>82     | 162<br><b>Bi</b><br>Bismuth<br>83   | 162<br><b>Po</b><br>Polonium<br>84 | 162<br><b>At</b><br>Astatine<br>85     |   |          |   |

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