



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**PHYSICAL SCIENCE**

**0652/11**

Paper 1 Multiple Choice

**October/November 2012**

**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.

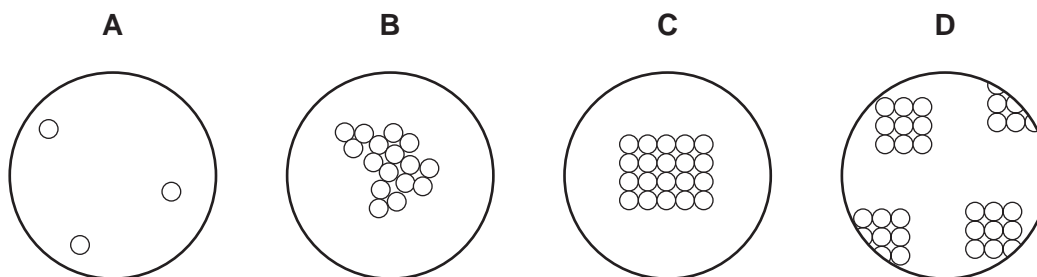
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

This document consists of **15** printed pages and **1** blank page.



1 Which diagram shows the arrangement of particles in a liquid?



2 Which method can be used to obtain crystals from aqueous copper(II) sulfate?

- A diluting
- B dissolving
- C evaporating
- D stirring

3 Statements 1, 2 and 3 are about diamond and graphite.

- 1 They are different solid forms of the same element.
- 2 They each conduct electricity.
- 3 They have atoms that form four equally strong bonds.

Which statements are correct?

- A 1 only
- B 3 only
- C 1 and 3
- D 2 and 3

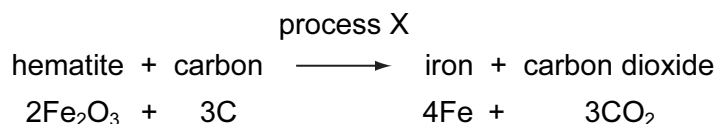
4 What is different for isotopes of the same element?

- A number of electrons
- B number of full shells
- C number of nucleons
- D number of protons

5 Which compound has the largest relative molecular mass,  $M_r$ ?

- A  $\text{CO}_2$
- B  $\text{NO}_2$
- C  $\text{SiO}_2$
- D  $\text{SO}_2$

- 6 The equation below shows the reaction that occurs when hematite is heated with carbon.



What is the chemical name of hematite and what is process X?

|          | chemical name   | process X |
|----------|-----------------|-----------|
| <b>A</b> | iron(II) oxide  | oxidation |
| <b>B</b> | iron(II) oxide  | reduction |
| <b>C</b> | iron(III) oxide | oxidation |
| <b>D</b> | iron(III) oxide | reduction |

- 7 Magnesium reacts with acids to produce hydrogen gas.

Under which set of conditions is hydrogen produced most slowly?

|          | magnesium | acid         | temperature / °C |
|----------|-----------|--------------|------------------|
| <b>A</b> | ribbon    | concentrated | 40               |
| <b>B</b> | ribbon    | dilute       | 20               |
| <b>C</b> | powder    | concentrated | 40               |
| <b>D</b> | powder    | dilute       | 20               |

- 8 The chart shows the colour of Universal Indicator at different pH values.

| colour | red   | orange | green | blue     | violet |
|--------|-------|--------|-------|----------|--------|
| pH     | 1 2 3 | 4 5 6  | 7 8 9 | 10 11 12 | 13 14  |

Lemon juice contains citric acid which is only slightly acidic.

What colour does lemon juice give with Universal Indicator?

- A** blue
- B** green
- C** orange
- D** red

9 Aqueous ammonia is added to a solution of a metal sulfate.

A green precipitate forms that is insoluble in excess of the aqueous ammonia.

Which metal ion is present?

- A**  $\text{Cu}^{2+}$       **B**  $\text{Fe}^{2+}$       **C**  $\text{Fe}^{3+}$       **D**  $\text{Zn}^{2+}$

10 The position of an element, X, in the Periodic Table is shown.

Which correctly describes X?

|          | density ( $\text{g}/\text{dm}^3$ ) | melting point ( $^{\circ}\text{C}$ ) |
|----------|------------------------------------|--------------------------------------|
| <b>A</b> | 0.97                               | 98                                   |
| <b>B</b> | 1.96                               | 119                                  |
| <b>C</b> | 3.12                               | -7                                   |
| <b>D</b> | 8.90                               | 1455                                 |

11 Metal M is formed when its oxide is heated with carbon.

Which deductions from this information are correct?

- 1 M is similar in reactivity to iron.
- 2 M is more reactive than potassium.
- 3 The oxide of M is acidic.

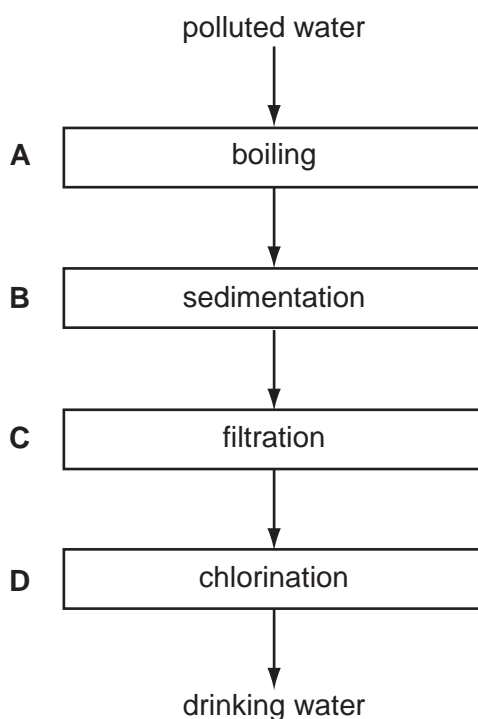
- A** 1 only      **B** 1 and 3 only      **C** 2 only      **D** 2 and 3 only

12 Copper, iron and zinc are all used to make things.

Which of these three metals are also used in the form of alloys?

|          | copper | iron | zinc |
|----------|--------|------|------|
| <b>A</b> | ✓      | ✓    | ✓    |
| <b>B</b> | ✓      | ✓    | x    |
| <b>C</b> | x      | ✓    | ✓    |
| <b>D</b> | x      | x    | ✓    |

13 Which stage is **not** used to obtain the public supply of drinking water from polluted water?



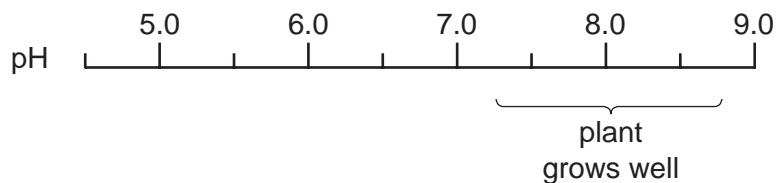
14 In some reactions, carbon dioxide and water are both formed.

For which examples below is this statement correct?

- 1 burning of coal
- 2 reaction between an acid and a carbonate
- 3 respiration

**A** 1 and 2 only    **B** 1, 2 and 3    **C** 1 and 3 only    **D** 2 and 3 only

15 The diagram shows the pH range of soil in which a certain plant grows well.

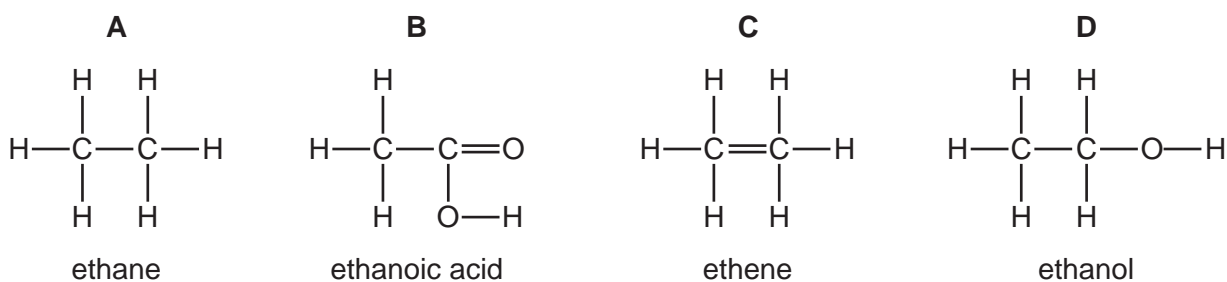


The plant is to be grown in a field with a soil pH of 6.

What can be added to the soil to make the pH suitable?

- A lime
- B litmus
- C nitric acid
- D sodium chloride

16 Which structure is **not** correct?



17 Three carbon-containing fuels are listed below.

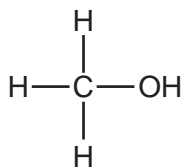
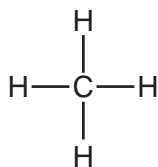
- 1 coal
- 2 natural gas
- 3 petroleum

Which of these fuels are classified as 'fossil fuels' and which are fractionally distilled?

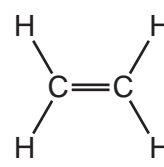
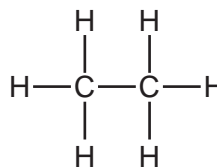
|          | fossil fuels | fractionally distilled |
|----------|--------------|------------------------|
| <b>A</b> | 1, 2 and 3   | 1 and 3 only           |
| <b>B</b> | 1, 2 and 3   | 3 only                 |
| <b>C</b> | 1 and 3 only | 1 and 3 only           |
| <b>D</b> | 1 and 3 only | 3 only                 |

18 Which two substances are in the same homologous series?

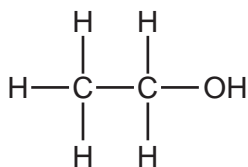
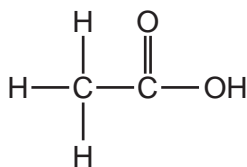
A



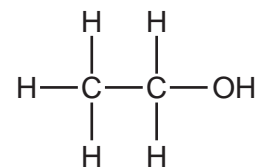
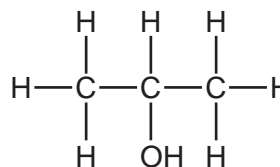
B



C

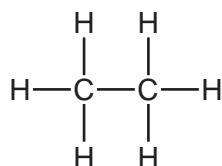


D

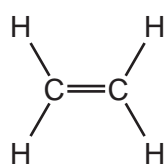


19 Which compound is the monomer used to make poly(ethene)?

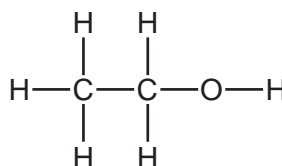
A



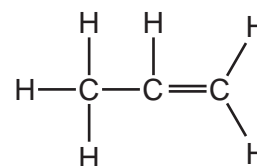
B



C

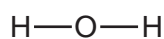


D

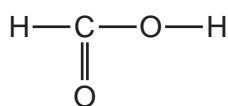


20 Which molecular structure shows an alcohol?

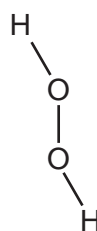
A



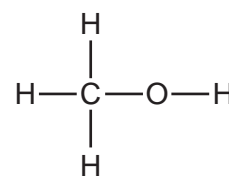
B



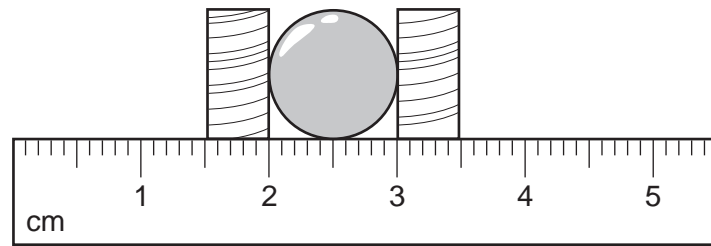
C



D



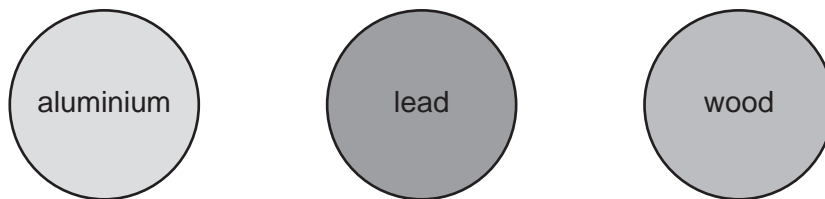
21 A student uses two blocks and a ruler to find the radius of a ball.



What is the radius of the ball?

- A** 0.5 cm      **B** 1.0 cm      **C** 2.0 cm      **D** 3.0 cm

22 Three balls made of different materials are dropped from a bench.

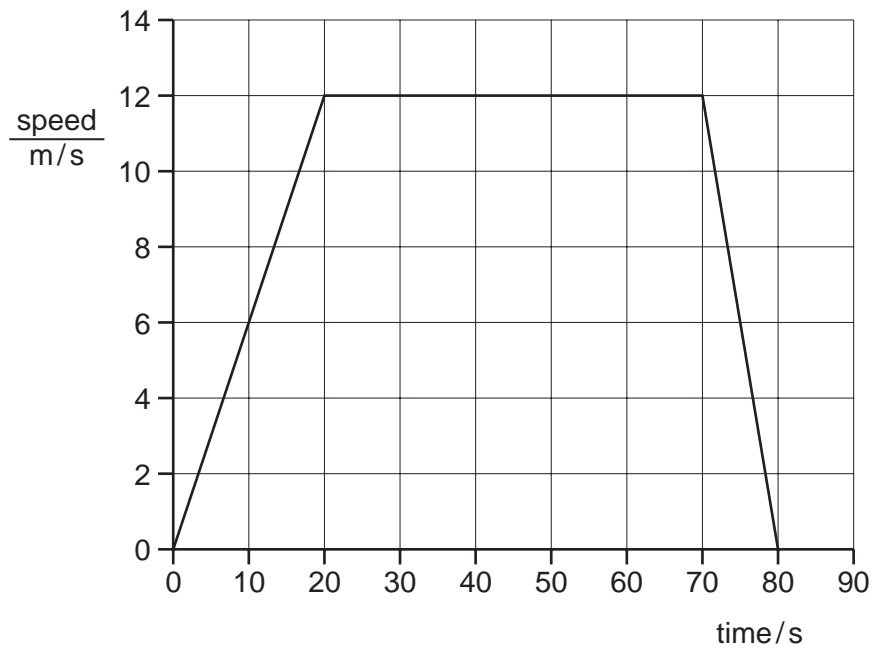


Which balls fall with the same acceleration?

- A** aluminium and lead only  
**B** aluminium and wood only  
**C** lead and wood only  
**D** aluminium, lead and wood



23 The speed/time graph shown is for a bus as it travels from one bus stop to the next.



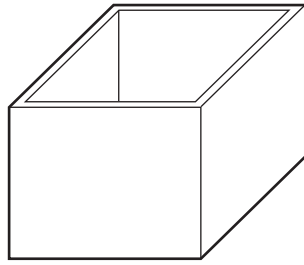
How far apart are the two bus stops?

- A** 120 m      **B** 600 m      **C** 780 m      **D** 960 m

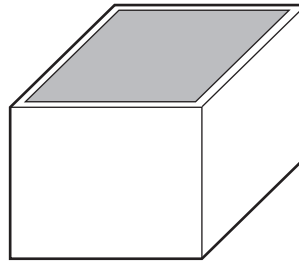
24 What is the unit of weight?

- A** joule  
**B** kilogram  
**C** newton  
**D** watt

25 The diagrams show a rectangular box empty and filled with liquid.



empty box  
mass = 60 g



box filled with liquid  
total mass = 300 g

The box has a mass of 60 g when empty. When filled with a liquid, the total mass of the box and the liquid is 300 g. The density of the liquid is  $1.2 \text{ g/cm}^3$ .

What is the volume of the liquid in the box?

- A  $50 \text{ cm}^3$
  - B  $200 \text{ cm}^3$
  - C  $250 \text{ cm}^3$
  - D  $300 \text{ cm}^3$
- 26 Which property of an object **cannot** be changed by a force?
- A its mass
  - B its motion
  - C its shape
  - D its size
- 27 Which energy source stores gravitational energy?
- A coal
  - B geothermal
  - C hydroelectric
  - D nuclear
- 28 A car starts from rest and climbs a hill.

At the top of the hill, the car has gained 200 000 J of gravitational energy and 25 000 J of energy of motion. The thermal energy of the car and the surroundings has increased by 100 000 J.

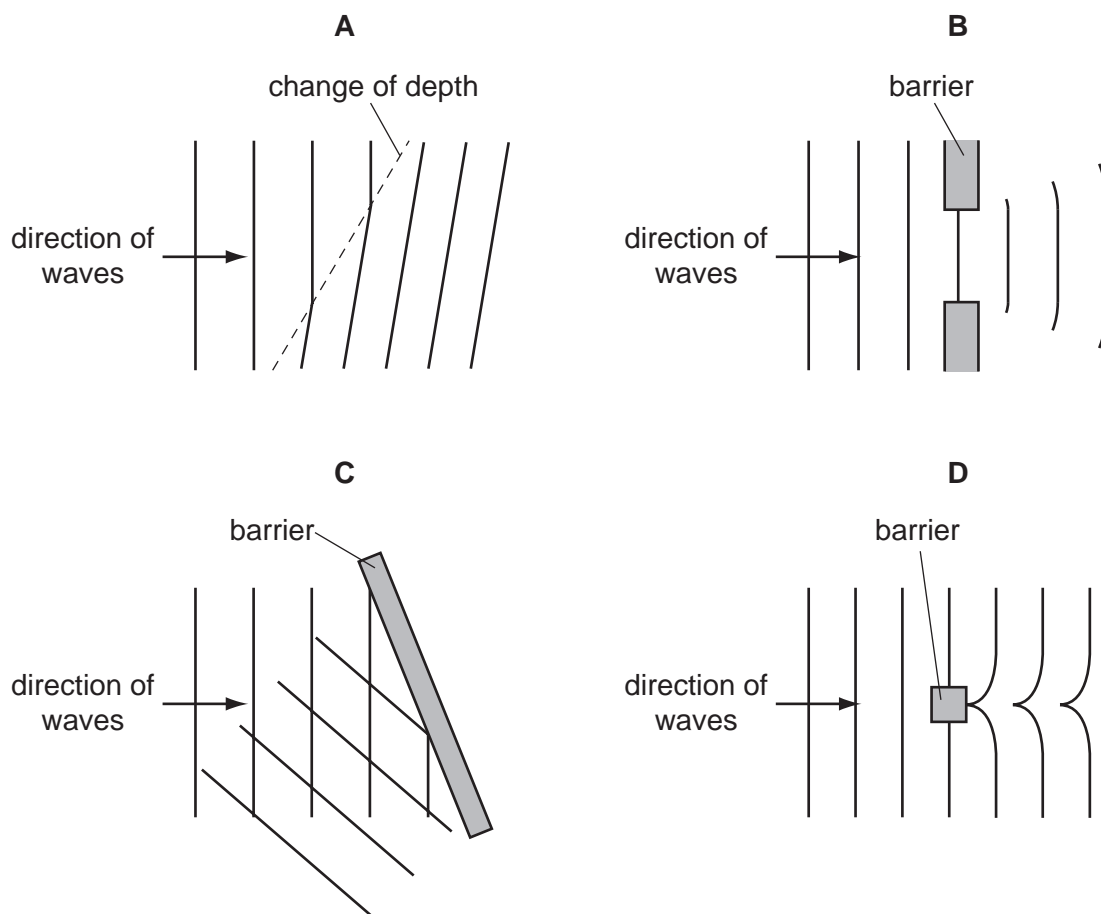
How much chemical energy is used by the car?

- A 125 000 J
- B 225 000 J
- C 300 000 J
- D 325 000 J

29 Which process involves convection?

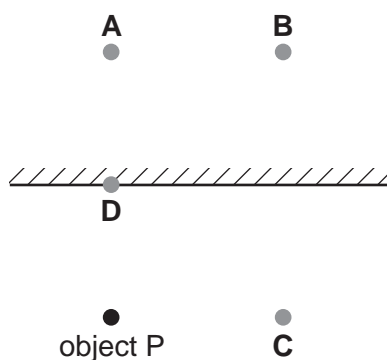
- A bread toasting under a grill
- B heat energy passing through a copper bar
- C heat from the Sun warming a road surface
- D hot air rising to the top of a cool room

30 Which diagram represents the reflection of water waves?

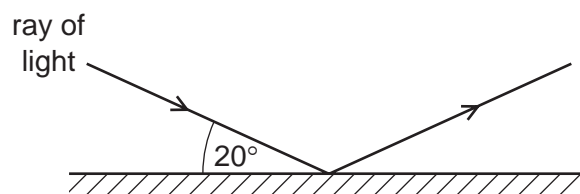


31 A small object P is placed in front of a plane mirror as shown.

Where is the image of P formed?

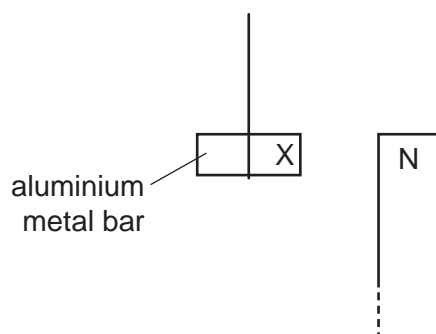


- 32 A ray of light strikes a plane mirror and reflects. The angle between the ray of light and the mirror is  $20^\circ$ .



What is the size of the angle of reflection?

- A**  $20^\circ$                       **B**  $70^\circ$                       **C**  $140^\circ$                       **D**  $160^\circ$
- 33 What is the approximate range of frequencies that can be heard by the human ear?
- A** 1 Hz to 1000 Hz  
**B** 1 kHz to 1000 kHz  
**C** 20 Hz to 20 000 Hz  
**D** 20 kHz to 20 000 kHz
- 34 An aluminium bar is suspended near the north pole of a magnet.



What happens to the aluminium bar?

- A** A north pole forms at X and the bar is attracted.  
**B** A north pole forms at X and the bar is repelled.  
**C** A south pole forms at X and the bar is attracted.  
**D** No pole forms at X and the bar is not affected.

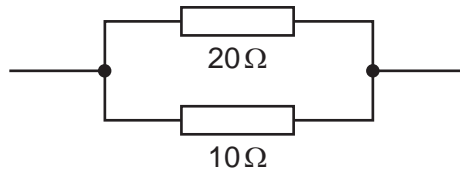
- 35 An electric circuit contains a battery connected to a resistor.



Which values of electromotive force (e.m.f.) and resistance will produce the largest current?

|          | e.m.f./V | resistance/ $\Omega$ |
|----------|----------|----------------------|
| <b>A</b> | 3        | 5                    |
| <b>B</b> | 3        | 10                   |
| <b>C</b> | 12       | 40                   |
| <b>D</b> | 12       | 80                   |

- 36 A  $20\Omega$  resistor and a  $10\Omega$  resistor are connected in parallel.



What is their combined resistance?

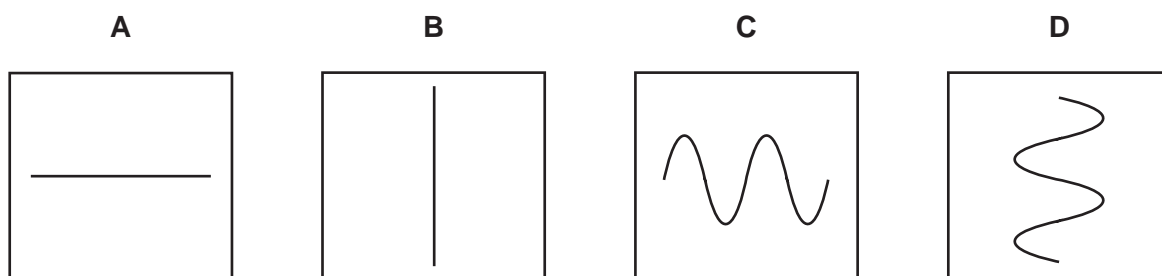
- A** less than  $10\Omega$
  - B**  $10\Omega$
  - C**  $20\Omega$
  - D** more than  $20\Omega$
- 37 The live, neutral and earth wires inside a mains lead are each covered by plastic insulation.

What is one purpose of the plastic?

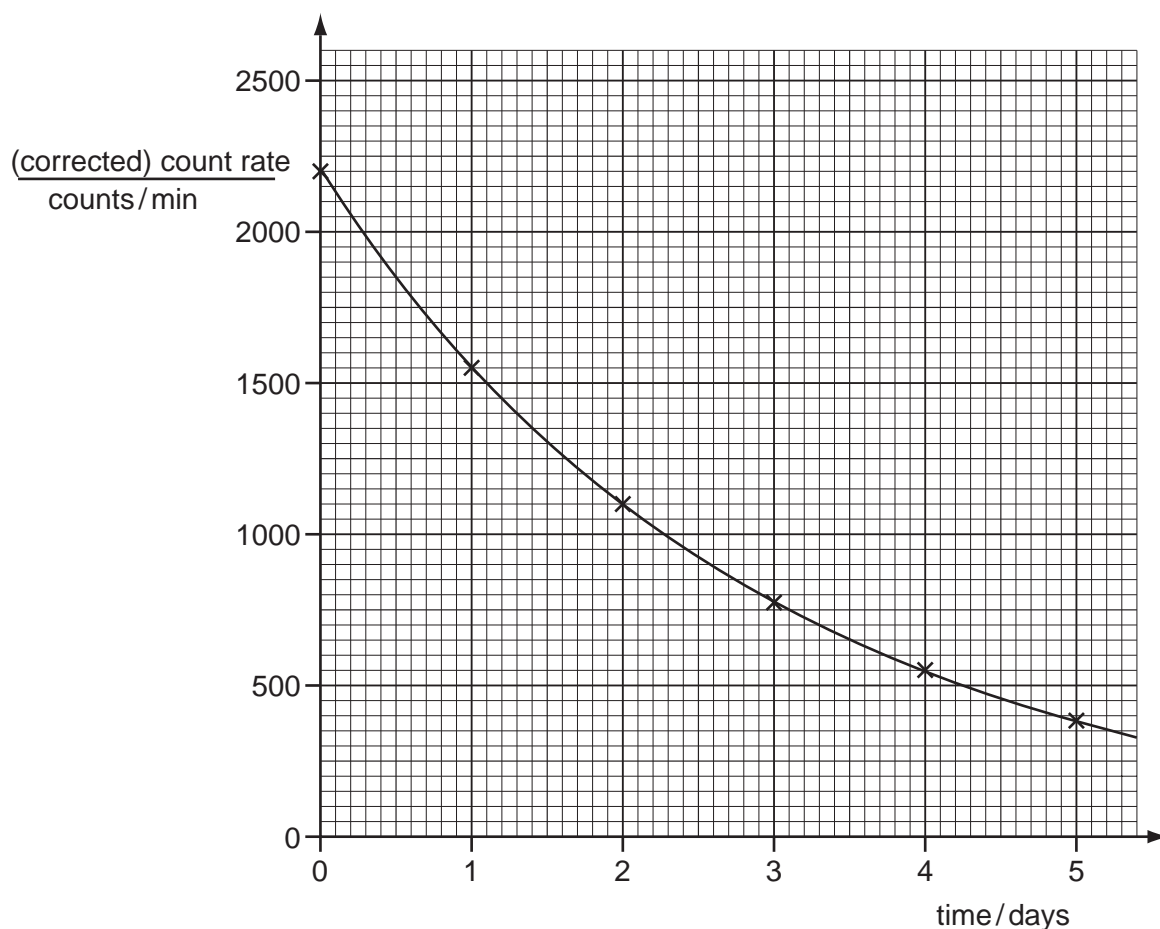
- A** It increases the resistance of the wires.
- B** It makes the wires stronger.
- C** It stops current passing between the wires.
- D** It stops heat escaping from the wires.

38 The diagrams show patterns which you might see on the screen of a cathode-ray oscilloscope.

Which pattern would appear if an alternating potential difference is applied to the Y-plates, with the time-base switched off?



39 The graph shows the decay curve for one particular radioactive isotope.



What is the half-life of this nuclide?

- A** 1.0 day      **B** 1.5 days      **C** 2.0 days      **D** 2.5 days

40 A radium nuclide is represented by  ${}_{88}^{226}\text{Ra}$ .

How many nucleons are there in this nuclide?

- A** 88      **B** 138      **C** 226      **D** 314



**DATA SHEET**  
**The Periodic Table of the Elements**

|                             |                                  | Group  |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
|-----------------------------|----------------------------------|--|------------------------------|------------------------------|--------------------------------|--------------------------------|------------------------------|----------------------------|------------------------------|-------------------------------|------------------------------|-----------------------------|------------------------------|---------------------------------|------------------------------|------------------------------|----------------------------|------------------------------|--------------------------------|--------------------------------|-----------------------------|---------------------------------|------------------------------|--------------------------------|
| I                           | II                               | III  | IV                           | V                            | VI                             | VII                            | O                            |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
| 1<br><b>H</b><br>Hydrogen   | 2<br><b>He</b><br>Helium         |  |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
| 3<br><b>Li</b><br>Lithium   | 4<br><b>Be</b><br>Beryllium      |  |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
| 5<br><b>B</b><br>Boron      | 6<br><b>C</b><br>Carbon          | 7<br><b>N</b><br>Nitrogen  | 8<br><b>O</b><br>Oxygen      | 9<br><b>F</b><br>Fluorine    | 10<br><b>Ne</b><br>Neon        |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
| 11<br><b>Na</b><br>Sodium   | 12<br><b>Mg</b><br>Magnesium     | 13<br><b>Al</b><br>Aluminium   | 14<br><b>Si</b><br>Silicon   | 15<br><b>P</b><br>Phosphorus | 16<br><b>S</b><br>Sulfur       | 17<br><b>Cl</b><br>Chlorine    | 18<br><b>Ar</b><br>Argon     |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
| 19<br><b>K</b><br>Potassium | 20<br><b>Ca</b><br>Calcium       | 21<br><b>Sc</b><br>Scandium  | 22<br><b>Ti</b><br>Titanium  | 23<br><b>V</b><br>Vanadium   | 24<br><b>Cr</b><br>Chromium    | 25<br><b>Mn</b><br>Manganese   | 26<br><b>Fe</b><br>Iron      | 27<br><b>Co</b><br>Cobalt  | 28<br><b>Ni</b><br>Nickel    | 29<br><b>Cu</b><br>Copper     | 30<br><b>Zn</b><br>Zinc      | 31<br><b>Ga</b><br>Gallium  | 32<br><b>Ge</b><br>Germanium | 33<br><b>As</b><br>Arsenic      | 34<br><b>Se</b><br>Selenium  | 35<br><b>Br</b><br>Bromine   | 36<br><b>Kr</b><br>Krypton |                              |                                |                                |                             |                                 |                              |                                |
| 37<br><b>Rb</b><br>Rubidium | 38<br><b>Sr</b><br>Strontium     | 39<br><b>Y</b><br>Yttrium  | 40<br><b>Zr</b><br>Zirconium | 41<br><b>Nb</b><br>Niobium   | 42<br><b>Mo</b><br>Molybdenum  | 43<br><b>Tc</b><br>Technetium  | 44<br><b>Ru</b><br>Ruthenium | 45<br><b>Rh</b><br>Rhodium | 46<br><b>Pd</b><br>Palladium | 47<br><b>Ag</b><br>Silver     | 48<br><b>Cd</b><br>Cadmium   | 49<br><b>In</b><br>Indium   | 50<br><b>Sn</b><br>Tin       | 51<br><b>Sb</b><br>Antimony     | 52<br><b>Te</b><br>Tellurium | 53<br><b>I</b><br>Iodine     | 54<br><b>Xe</b><br>Xenon   |                              |                                |                                |                             |                                 |                              |                                |
| 55<br><b>Cs</b><br>Caesium  | 56<br><b>Ba</b><br>Barium        | 57<br><b>La</b><br>Lanthanum   | 72<br><b>Hf</b><br>Hafnium   | 73<br><b>Ta</b><br>Tantalum  | 74<br><b>W</b><br>Tungsten     | 75<br><b>Re</b><br>Rhenium     | 76<br><b>Os</b><br>Osmium    | 77<br><b>Ir</b><br>Iridium | 78<br><b>Pt</b><br>Platinum  | 79<br><b>Au</b><br>Gold       | 80<br><b>Hg</b><br>Mercury   | 81<br><b>Tl</b><br>Thallium | 82<br><b>Pb</b><br>Lead      | 83<br><b>Bi</b><br>Bismuth      | 84<br><b>Po</b><br>Polonium  | 85<br><b>At</b><br>Astatine  | 86<br><b>Rn</b><br>Radon   |                              |                                |                                |                             |                                 |                              |                                |
| 87<br><b>Fr</b><br>Francium | 88<br><b>Ra</b><br>Radium        | 89<br><b>Ac</b><br>Actinium  |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
|                             |                                  | *58-71 Lanthanoid series   |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
|                             |                                  | †90-103 Actinoid series  |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
|                             |                                  | Key<br>a = relative atomic mass<br>X = atomic symbol<br>b = proton (atomic) number |                              |                              |                                |                                |                              |                            |                              |                               |                              |                             |                              |                                 |                              |                              |                            |                              |                                |                                |                             |                                 |                              |                                |
| 140<br><b>Ce</b><br>Cerium  | 141<br><b>Pr</b><br>Praseodymium | 144<br><b>Nd</b><br>Neodymium  | 150<br><b>Sm</b><br>Samarium | 152<br><b>Eu</b><br>Europium | 157<br><b>Gd</b><br>Gadolinium | 162<br><b>Dy</b><br>Dysprosium | 165<br><b>Ho</b><br>Holmium  | 167<br><b>Er</b><br>Erbium | 169<br><b>Tm</b><br>Thulium  | 173<br><b>Yb</b><br>Ytterbium | 175<br><b>Lu</b><br>Lutetium | 232<br><b>Th</b><br>Thorium | 238<br><b>U</b><br>Uranium   | 91<br><b>Pa</b><br>Protactinium | 93<br><b>Np</b><br>Neptunium | 94<br><b>Pu</b><br>Plutonium | 96<br><b>Cm</b><br>Curium  | 97<br><b>Bk</b><br>Berkelium | 98<br><b>Cf</b><br>Californium | 99<br><b>Es</b><br>Einsteinium | 100<br><b>Fm</b><br>Fermium | 101<br><b>Md</b><br>Mendelevium | 102<br><b>No</b><br>Nobelium | 103<br><b>Lr</b><br>Lawrencium |

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

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