



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**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)

\* 2 4 9 8 4 3 0 3 1 9 \*

**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.

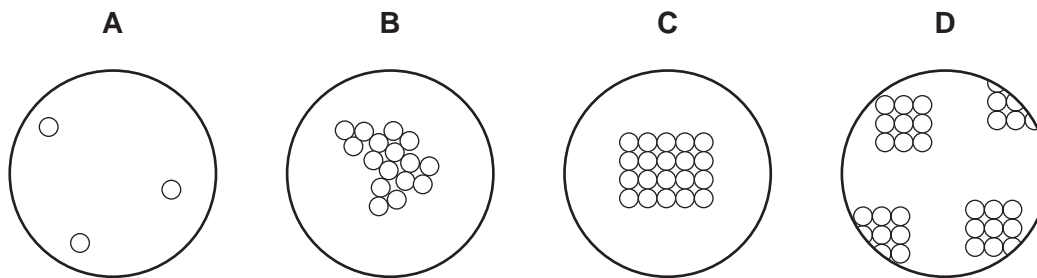
Any rough working should be done in this booklet.

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

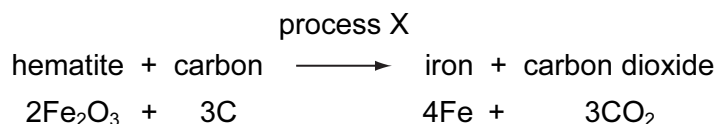
4 What is different for isotopes of the same element?

- 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.

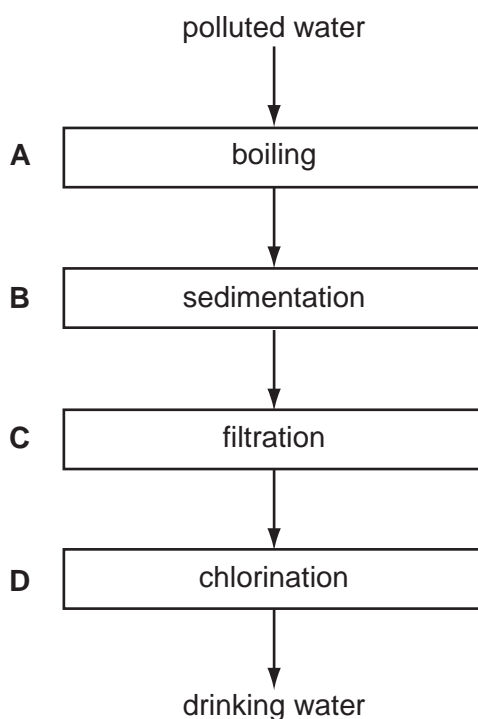
- A** 1 only      **B** 1 and 3 only      **C** 2 only      **D** 2 and 3 only

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?



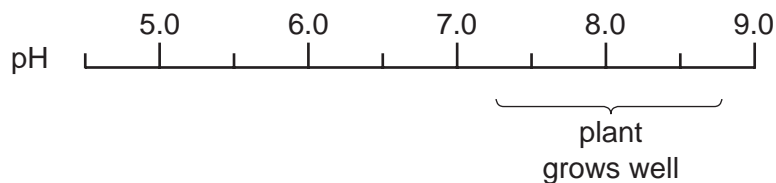
14 In some reactions, carbon dioxide and water are both formed.

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

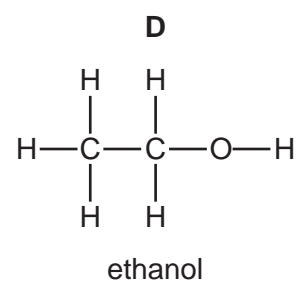
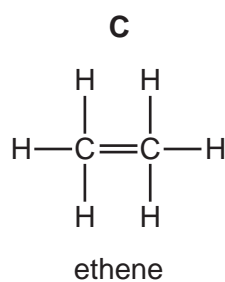
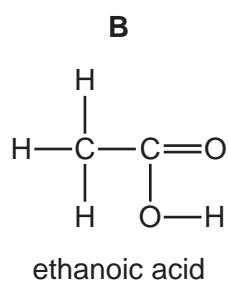
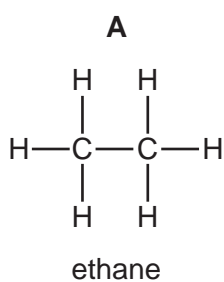
- 15 The diagram shows the pH range of soil in which a certain plant grows well.



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.

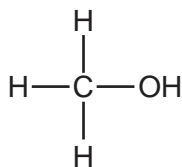
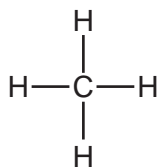
- 1 coal
- 2 natural gas
- 3 petroleum

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

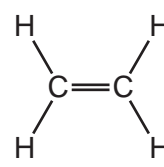
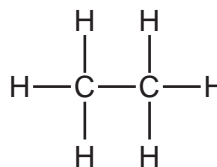
	fossil fuels	fractionally distilled
<b>A</b>	1, 2 and 3	1 and 3 only
<b>B</b>	1, 2 and 3	3 only
<b>C</b>	1 and 3 only	1 and 3 only
<b>D</b>	1 and 3 only	3 only

18 Which two substances are in the same homologous series?

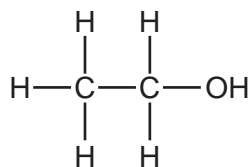
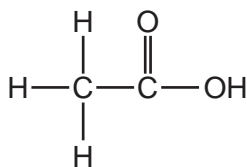
A



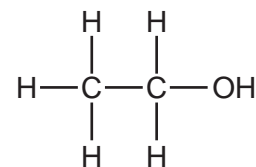
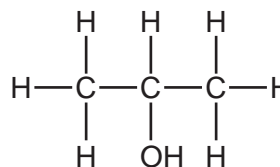
B



C

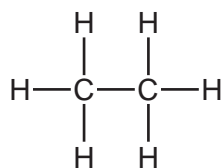


D

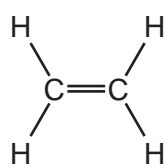


19 Which compound is the monomer used to make poly(ethene)?

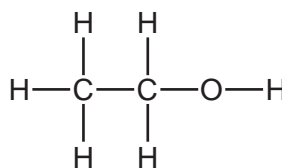
A



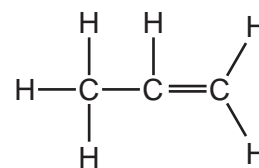
B



C

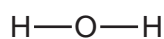


D

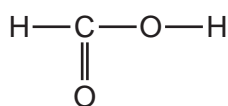


20 Which molecular structure shows an alcohol?

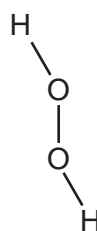
A



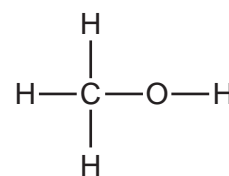
B



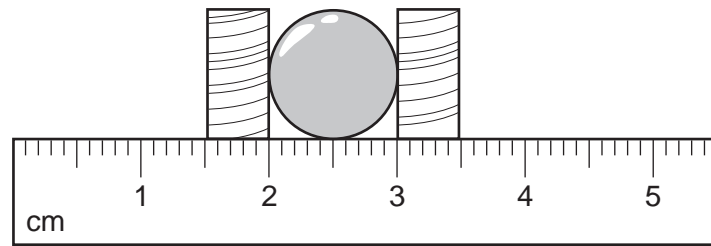
C



D



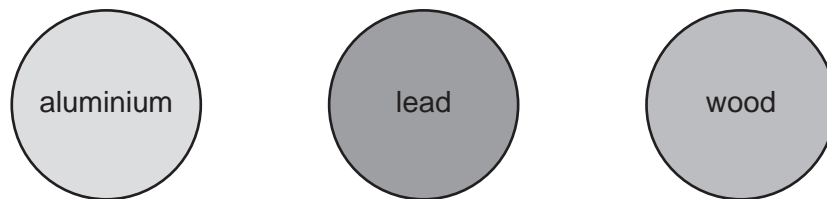
21 A student uses two blocks and a ruler to find the radius of a ball.



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.

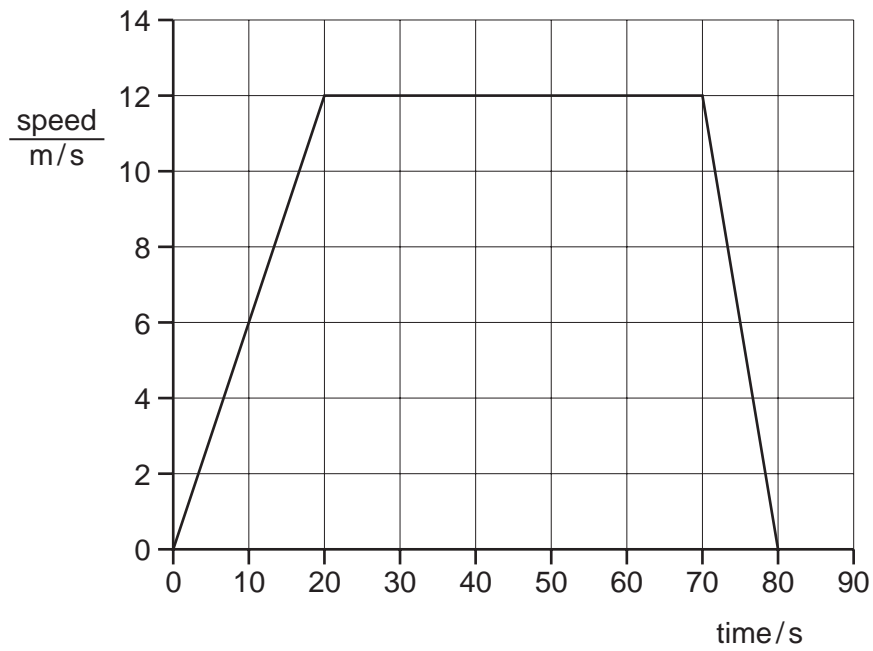


Which balls fall with the same acceleration?

- 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.



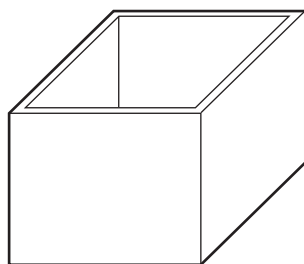
How far apart are the two bus stops?

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

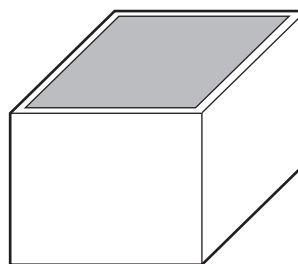
24 What is the unit of weight?

- 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.

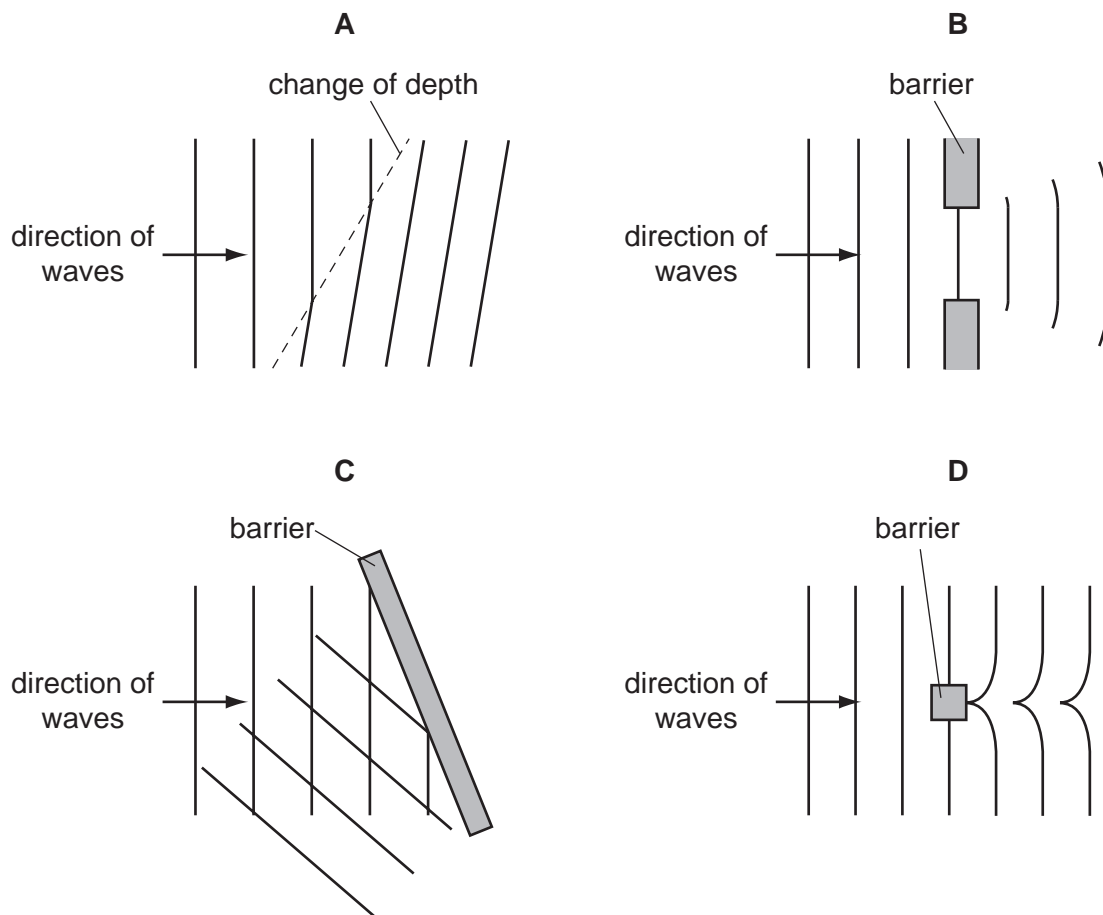
How much chemical energy is used by the car?

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

29 Which process involves convection?

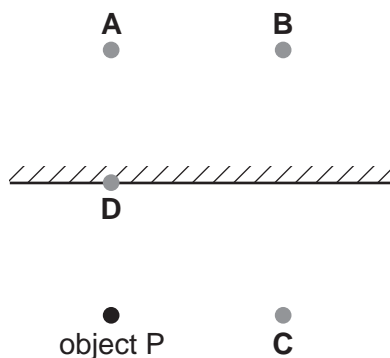
- A bread toasting under a grill
- B heat energy passing through a copper bar
- C heat from the Sun warming a road surface
- D hot air rising to the top of a cool room

30 Which diagram represents the reflection of water waves?

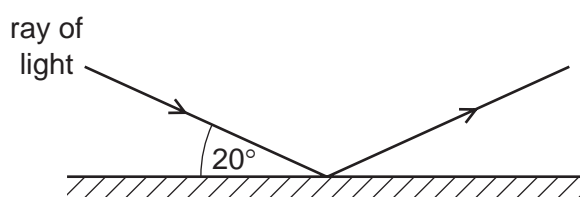


31 A small object P is placed in front of a plane mirror as shown.

Where is the image of P formed?

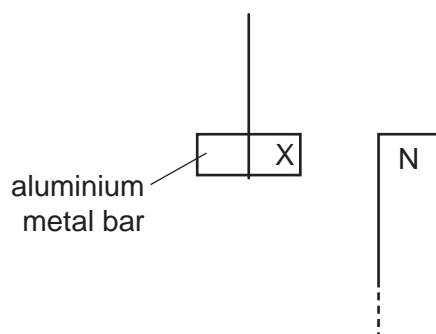


- 32 A ray of light strikes a plane mirror and reflects. The angle between the ray of light and the mirror is  $20^\circ$ .



What is the size of the angle of reflection?

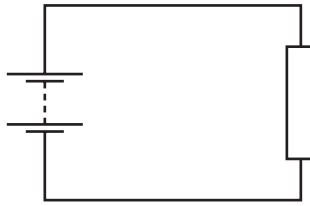
- A**  $20^\circ$                       **B**  $70^\circ$                       **C**  $140^\circ$                       **D**  $160^\circ$
- 33 What is the approximate range of frequencies that can be heard by the human ear?
- A** 1 Hz to 1000 Hz  
**B** 1 kHz to 1000 kHz  
**C** 20 Hz to 20 000 Hz  
**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.

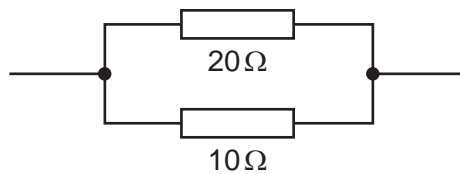
- 35 An electric circuit contains a battery connected to a resistor.



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.



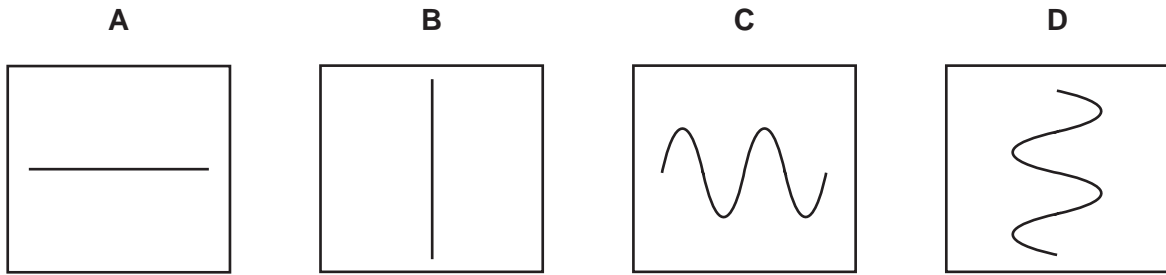
What is their combined resistance?

- 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.

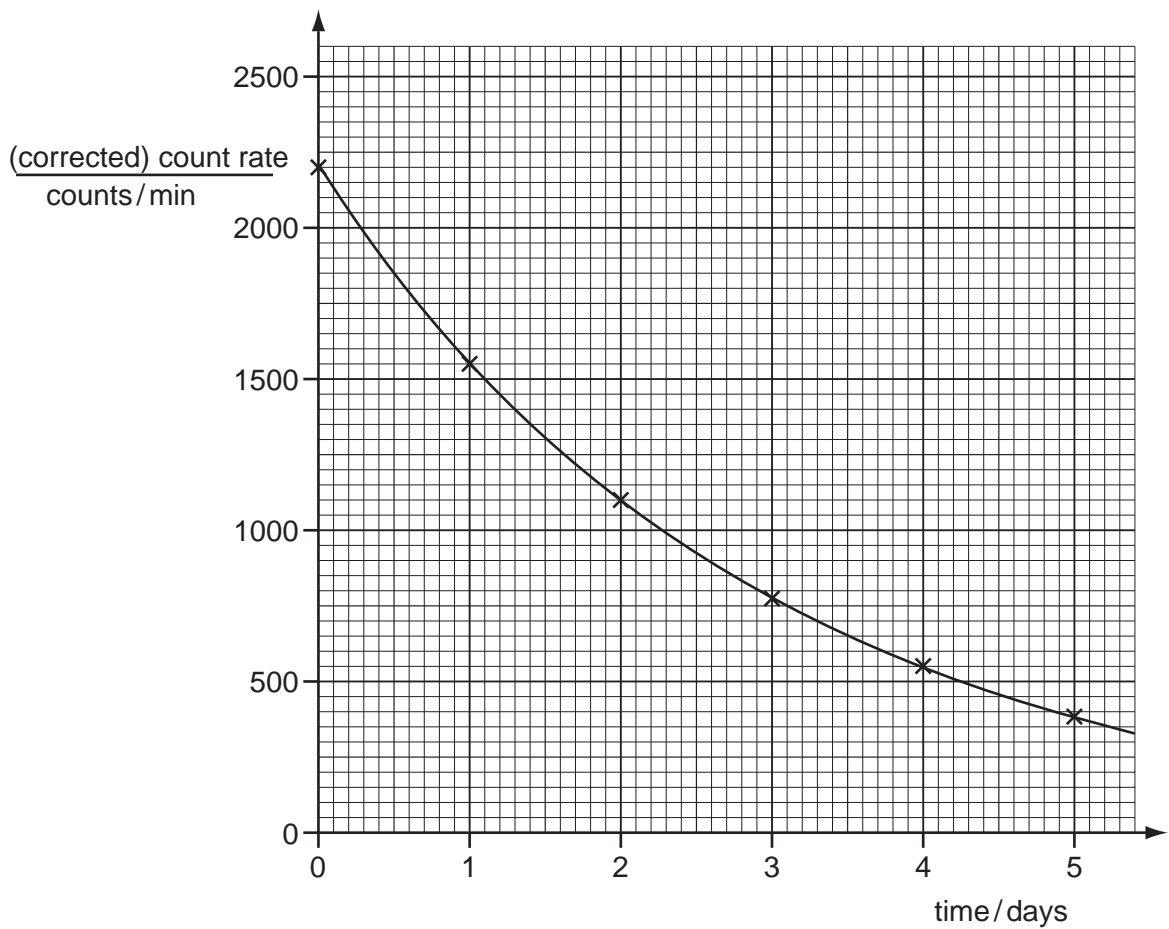
What is one purpose of the plastic?

- 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 and 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	VIII	IX	X						
		1 <b>H</b> Hydrogen 1															
7	9	<b>Li</b> Lithium 3	<b>Be</b> Beryllium 4									<b>He</b> Helium 2					
23	24	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12									<b>Ne</b> Neon 10					
39	40	<b>K</b> Potassium 19	<b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36		
85	88	<b>Rb</b> Rubidium 37	<b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54		
133	137	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	209 <b>Pb</b> Lead 82	210 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86
87	226	<b>Fr</b> Francium 87	<b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89													
		*58-71 Lanthanoid series †90-103 Actinoid series															
		<table border="1" style="display: inline-table; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10px;">a</td> <td style="width: 10px;"><b>X</b></td> </tr> <tr> <td style="width: 10px;">b</td> <td style="width: 10px;"></td> </tr> </table>										a	<b>X</b>	b			
a	<b>X</b>																
b																	
		a = relative atomic mass X = atomic symbol b = proton (atomic) number															
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	146 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	163 <b>Tb</b> Terbium 65	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	103 <b>Lr</b> Lawrencium 103	

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