



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)

* 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.

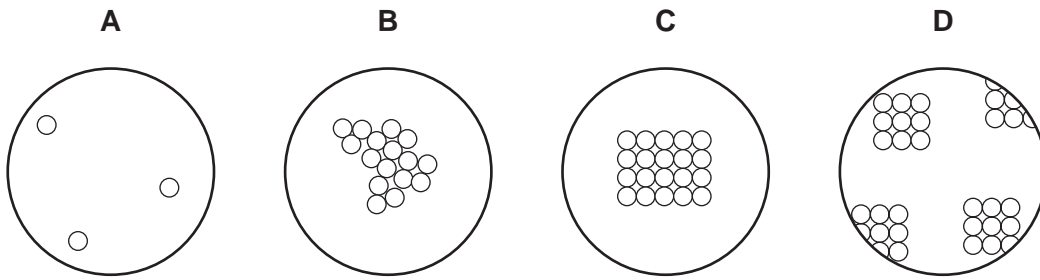
Any rough working should be done in this booklet.

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

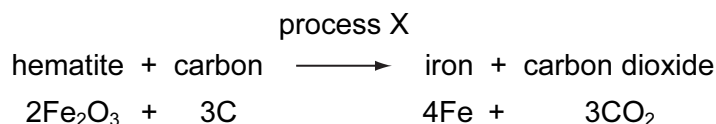
4 What is different for isotopes of the same element?

- 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 CO_2
- B NO_2
- C SiO_2
- D 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
A	iron(II) oxide	oxidation
B	iron(II) oxide	reduction
C	iron(III) oxide	oxidation
D	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
A	ribbon	concentrated	40
B	ribbon	dilute	20
C	powder	concentrated	40
D	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** Cu^{2+} **B** Fe^{2+} **C** Fe^{3+} **D** Zn^{2+}

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

Which correctly describes X?

	density (g/dm^3)	melting point ($^{\circ}\text{C}$)
A	0.97	98
B	1.96	119
C	3.12	-7
D	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.

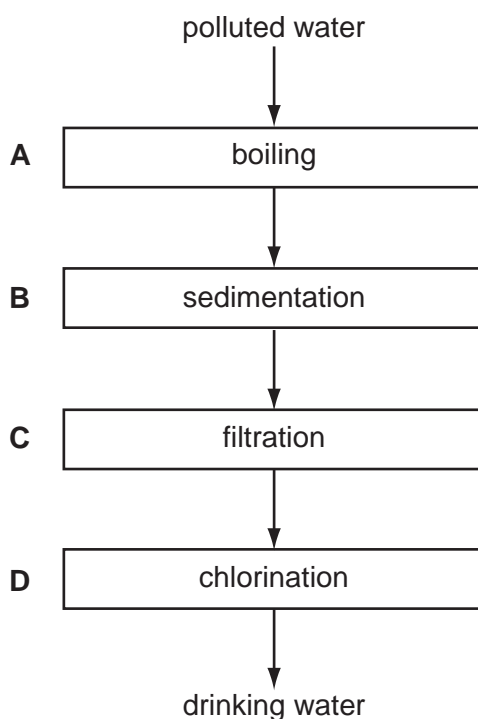
- A** 1 only **B** 1 and 3 only **C** 2 only **D** 2 and 3 only

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
A	✓	✓	✓
B	✓	✓	x
C	x	✓	✓
D	x	x	✓

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



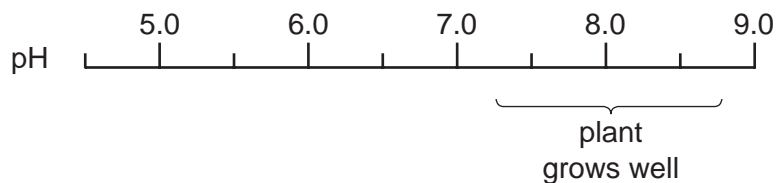
14 In some reactions, carbon dioxide and water are both formed.

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.

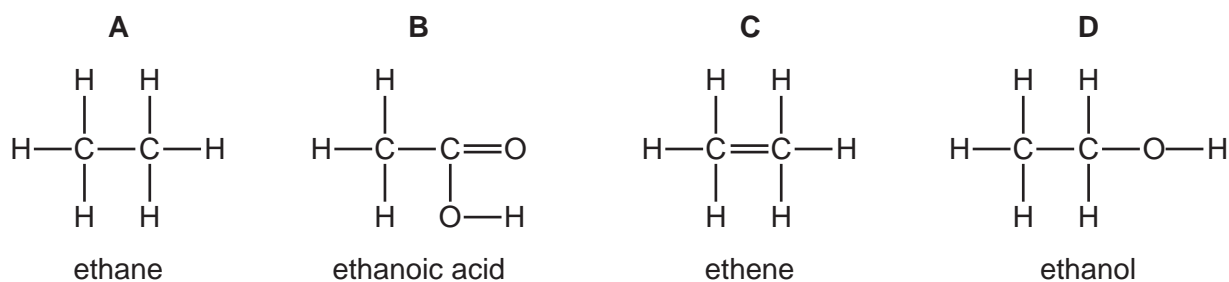


The plant is to be grown in a field with a soil pH of 6.

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.

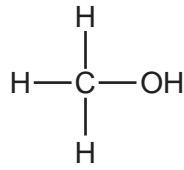
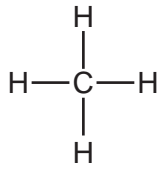
- 1 coal
- 2 natural gas
- 3 petroleum

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

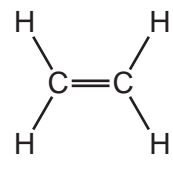
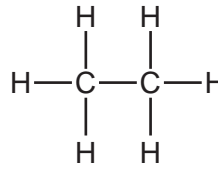
	fossil fuels	fractionally distilled
A	1, 2 and 3	1 and 3 only
B	1, 2 and 3	3 only
C	1 and 3 only	1 and 3 only
D	1 and 3 only	3 only

18 Which two substances are in the same homologous series?

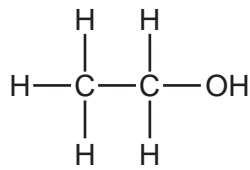
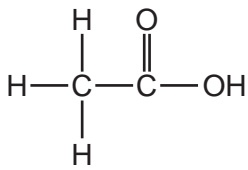
A



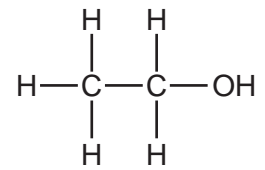
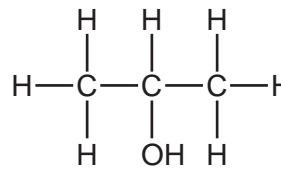
B



C

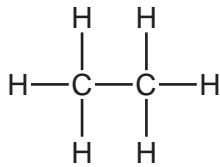


D

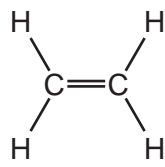


19 Which compound is the monomer used to make poly(ethene)?

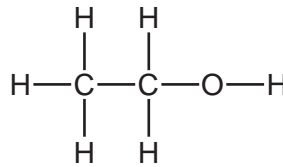
A



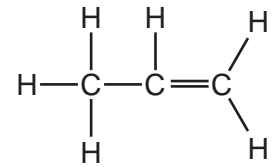
B



C

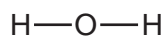


D

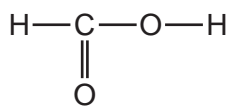


20 Which molecular structure shows an alcohol?

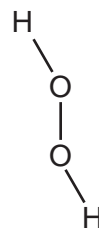
A



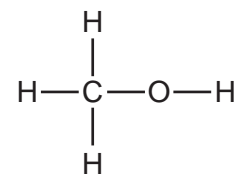
B



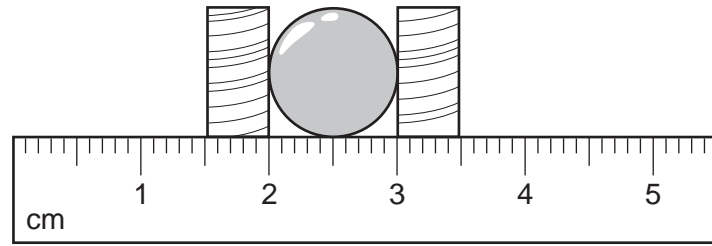
C



D



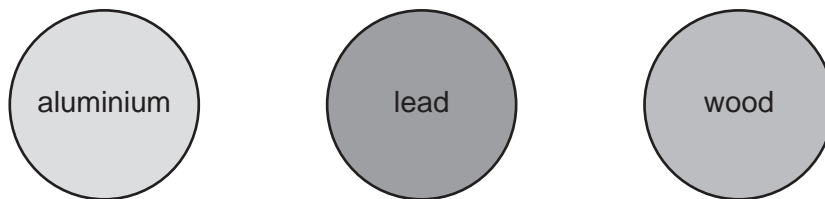
21 A student uses two blocks and a ruler to find the radius of a ball.



What is the radius of the ball?

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

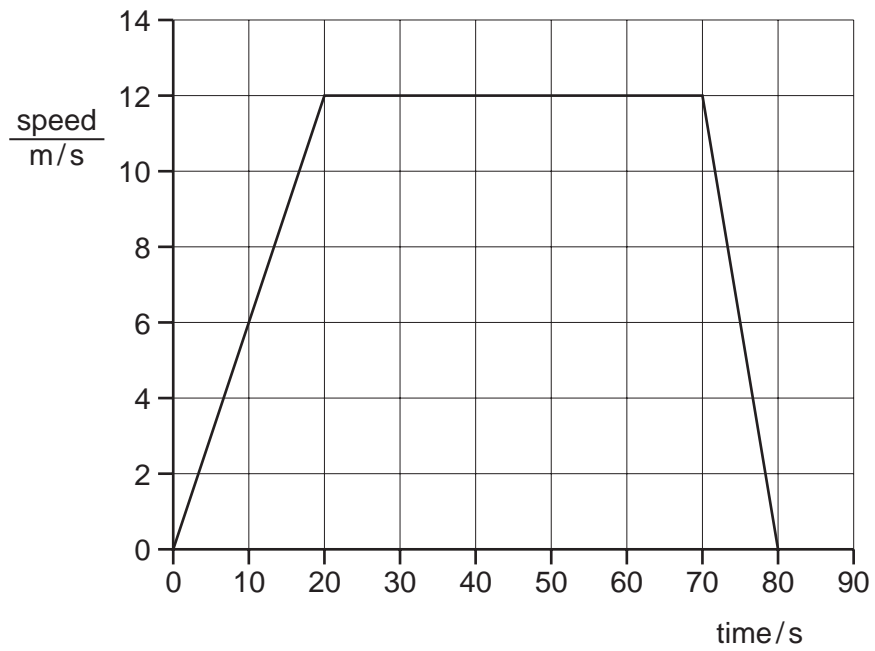
22 Three balls made of different materials are dropped from a bench.



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.



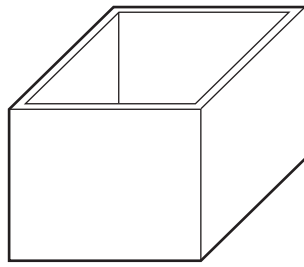
How far apart are the two bus stops?

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

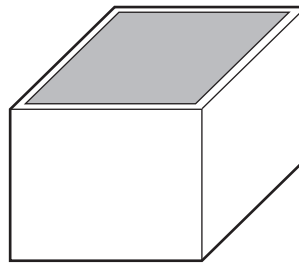
24 What is the unit of weight?

- 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 g/cm^3 .

What is the volume of the liquid in the box?

- A 50 cm^3
 - B 200 cm^3
 - C 250 cm^3
 - D 300 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.

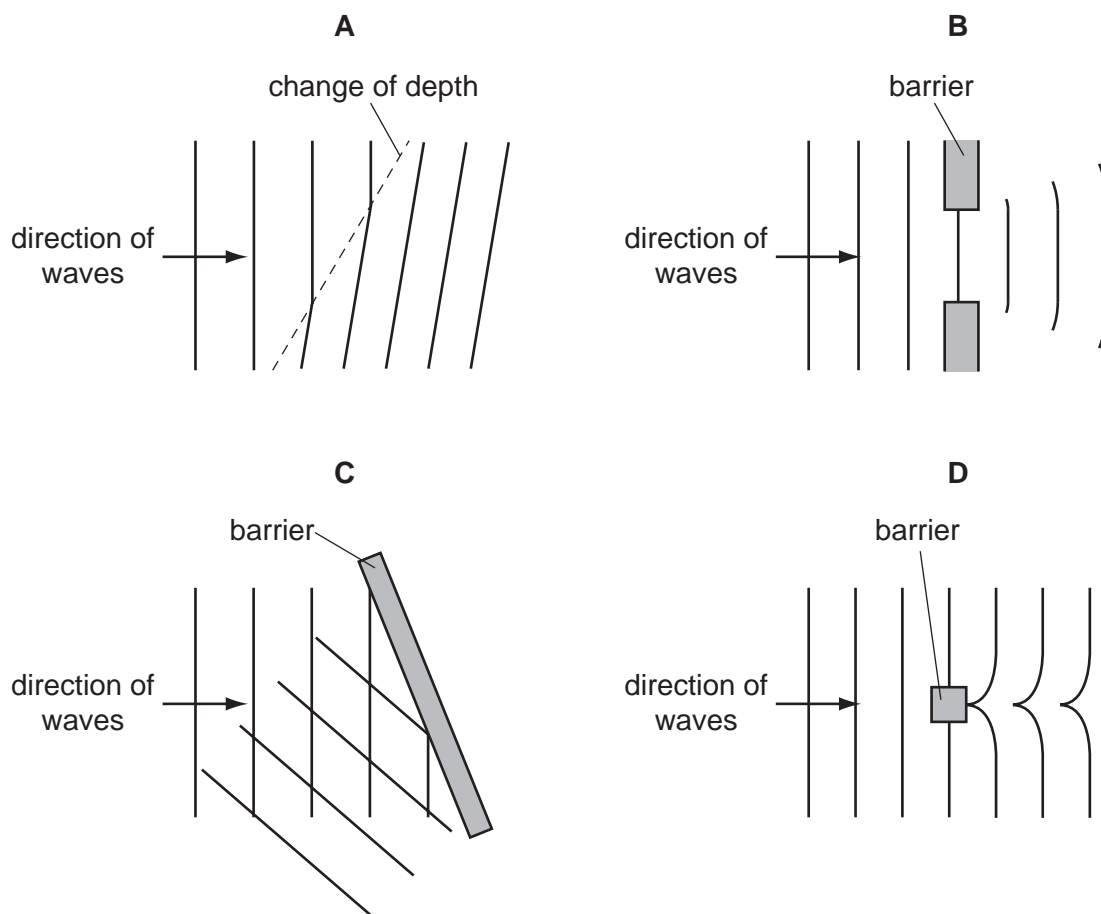
How much chemical energy is used by the car?

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

29 Which process involves convection?

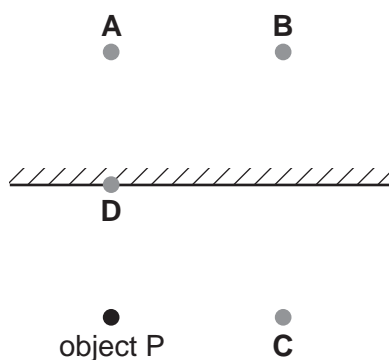
- A bread toasting under a grill
- B heat energy passing through a copper bar
- C heat from the Sun warming a road surface
- D hot air rising to the top of a cool room

30 Which diagram represents the reflection of water waves?

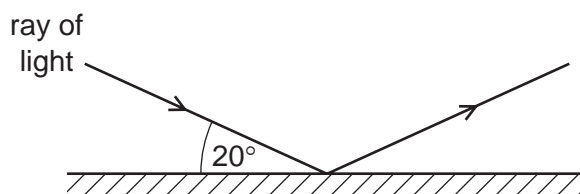


31 A small object P is placed in front of a plane mirror as shown.

Where is the image of P formed?

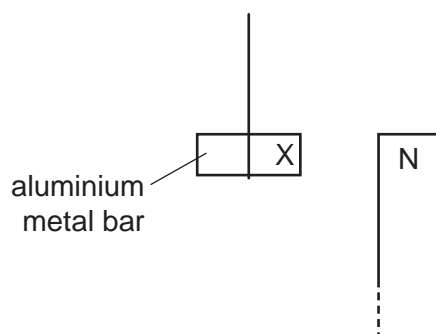


- 32 A ray of light strikes a plane mirror and reflects. The angle between the ray of light and the mirror is 20° .



What is the size of the angle of reflection?

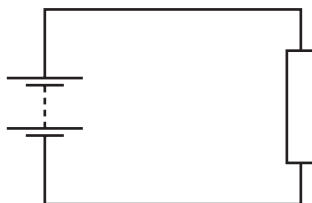
- A** 20° **B** 70° **C** 140° **D** 160°
- 33 What is the approximate range of frequencies that can be heard by the human ear?
- A** 1 Hz to 1000 Hz
B 1 kHz to 1000 kHz
C 20 Hz to 20 000 Hz
D 20 kHz to 20 000 kHz
- 34 An aluminium bar is suspended near the north pole of a magnet.



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.

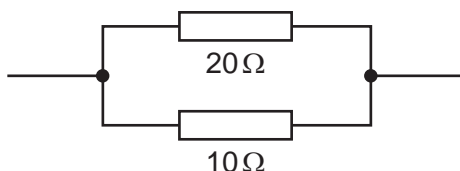
- 35 An electric circuit contains a battery connected to a resistor.



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

	e.m.f./V	resistance/ Ω
A	3	5
B	3	10
C	12	40
D	12	80

- 36 A 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

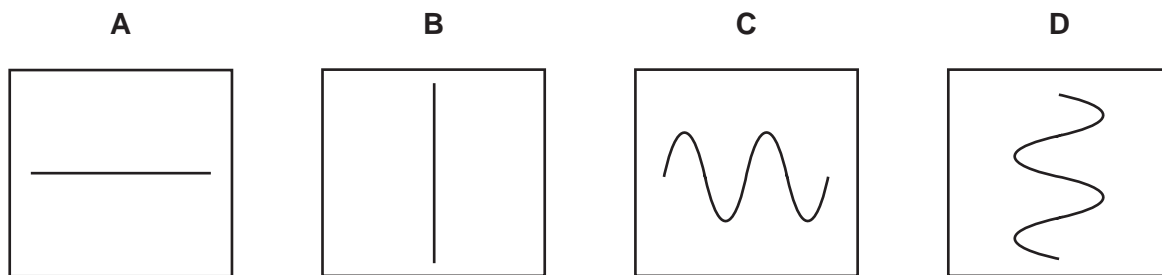
- A** less than 10Ω
B 10Ω
C 20Ω
D more than 20Ω
- 37 The live, neutral and earth wires inside a mains lead are each covered by plastic insulation.

What is one purpose of the plastic?

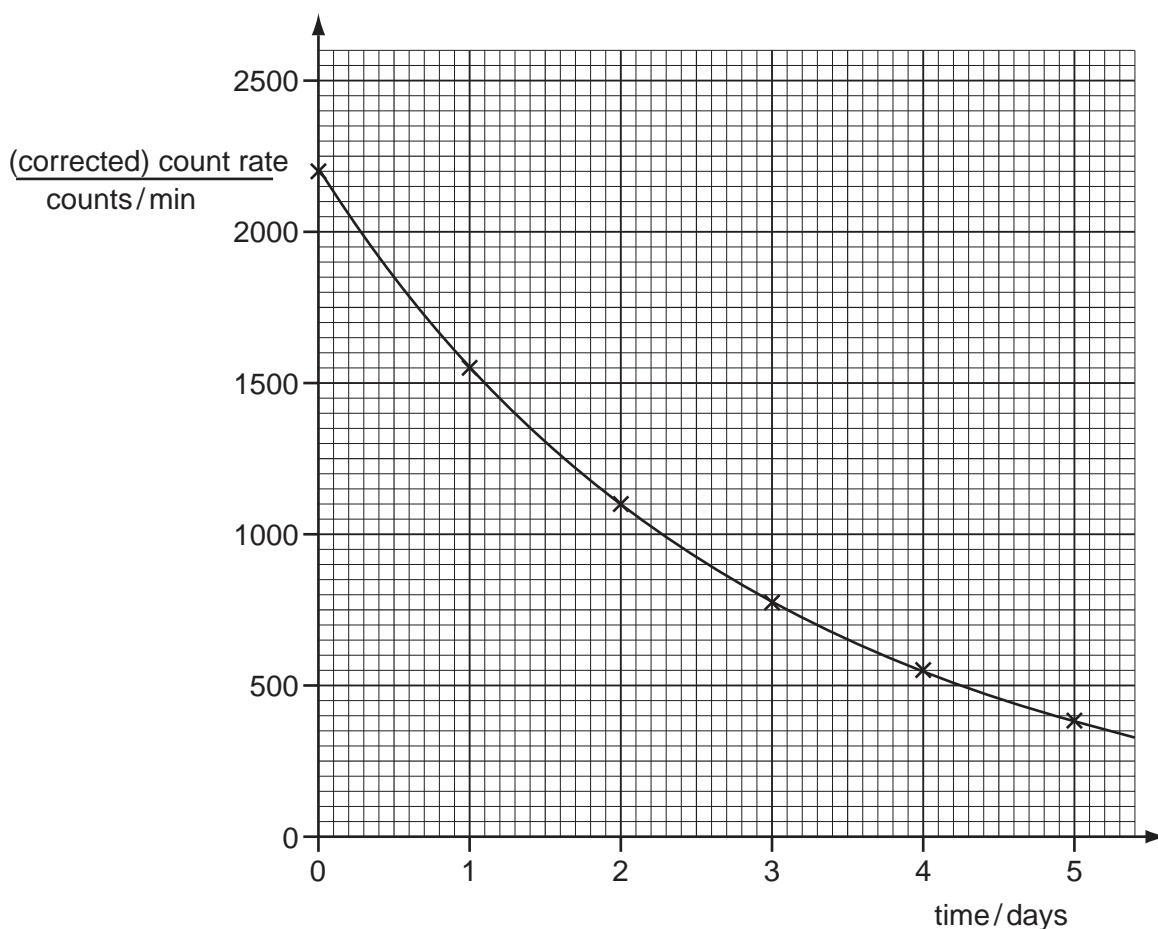
- A** It increases the resistance of the wires.
B It makes the wires stronger.
C It stops current passing between the wires.
D It stops heat escaping from the wires.

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 ${}^{226}_{88}\text{Ra}$.

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	XI																													
		1 H Hydrogen 1																																							
		4 He Helium 2																																							
7	9	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																						
Li Lithium	Be Beryllium	B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon	Na Sodium	Mg Magnesium	Al Aluminium	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon	K Potassium	Ca Calcium	Sc Scandium	Ti Titanium	V Vanadium	Cr Chromium	Mn Manganese	Fe Iron	Co Cobalt	Ni Nickel	Cu Copper	Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Kr Krypton								
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54						
Rb Rubidium	Sr Strontium	Y Yttrium	Zr Zirconium	Nb Niobium	Mo Molybdenum	Tc Technetium	Ru Ruthenium	Rh Rhodium	Pd Palladium	Ag Silver	Cd Cadmium	In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Xe Xenon	Cs Caesium	Ba Barium	La Lanthanum	Ce Cerium	Pr Praseodymium	Nd Neodymium	Pm Promethium	Sm Samarium	Eu Europium	Gd Gadolinium	Tb Terbium	Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium							
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103							
Fr Francium	Ra Radium	Ac Actinium	Rf Rutherfordium	Ta Tantalum	W Tungsten	Re Rhenium	Os Osmium	Ir Iridium	Pt Platinum	Au Gold	Hg Mercury	Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon	Fr Francium	Ra Radium	La Lanthanum	Ce Cerium	Pr Praseodymium	Nd Neodymium	Pm Promethium	Sm Samarium	Eu Europium	Gd Gadolinium	Tb Terbium	Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium							
87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136						
U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium	Rf Rutherfordium	Db Dubnium	Sg Seaborgium	Bh Bohrium	Hs Hassium	Mt Meitnerium	Ds Darmstadtium	Rg Roentgenium	Cn Copernicium	Nh Nihonium	Fl Flerovium	Mc Moscovium	Lv Livermorium	Ts Tennessine	Og Oganesson	Uu Ununium	Uub Unubium	Uut Ununtrium	Uuq Ununquadium	Uup Ununpentium	Uuq Ununhexium	Uus Ununseptium	Uuo Ununoctium	Uuh Ununhennium	Uuq Ununquadium	Uup Ununpentium	Uus Ununseptium	Uuo Ununoctium		
90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128			
Th Thorium	Pa Protactinium	U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium	Rf Rutherfordium	Db Dubnium	Sg Seaborgium	Bh Bohrium	Hs Hassium	Mt Meitnerium	Ds Darmstadtium	Rg Roentgenium	Cn Copernicium	Nh Nihonium	Fl Flerovium	Mc Moscovium	Lv Livermorium	Ts Tennessine	Og Oganesson	Uu Ununium	Uub Unubium	Uut Ununtrium	Uuq Ununquadium	Uup Ununpentium	Uuq Ununhexium	Uus Ununseptium	Uuo Ununoctium	Uuh Ununhennium	Uuq Ununquadium	Uup Ununpentium	Uus Ununseptium	Uuo Ununoctium
90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128			
Th Thorium	Pa Protactinium	U Uranium	Np Neptunium	Pu Plutonium	Am Americium	Cm Curium	Bk Berkelium	Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium	Rf Rutherfordium	Db Dubnium	Sg Seaborgium	Bh Bohrium	Hs Hassium	Mt Meitnerium	Ds Darmstadtium	Rg Roentgenium	Cn Copernicium	Nh Nihonium	Fl Flerovium	Mc Moscovium	Lv Livermorium	Ts Tennessine	Og Oganesson	Uu Ununium	Uub Unubium	Uut Ununtrium	Uuq Ununquadium	Uup Ununpentium	Uuq Ununhexium	Uus Ununseptium	Uuo Ununoctium	Uuh Ununhennium	Uuq Ununquadium	Uup Ununpentium	Uus Ununseptium	Uuo Ununoctium

*58-71 Lanthanoid series
†90-103 Actinoid series

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.