



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE

0652/13

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)

* 5 3 0 6 0 1 9 2 3 7 *

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.

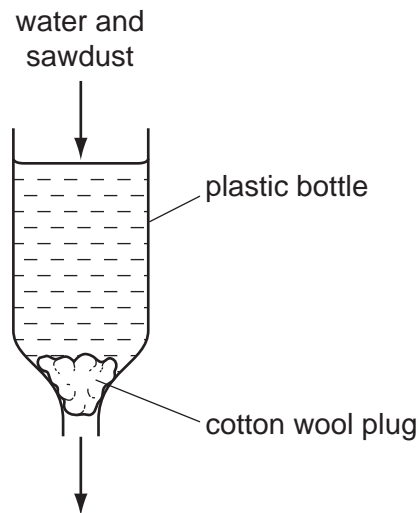
A copy of the Periodic Table is printed on page 20.

This document consists of **17** printed pages and **3** blank pages.



2

- 1 Some water, contaminated with sawdust, is purified as shown.



Which purification method is this?

- A** chlorination
B dissolving
C distillation
D filtration
- 2 Statement 1: During an exothermic reaction, energy in the form of heat is taken in.
Statement 2: When fuel burns, energy in the form of heat is given out.

Which of the following is correct?

- A** Both statements are true and statement 2 explains statement 1.
B Both statements are true, but statement 2 does not explain statement 1.
C Statement 1 is true but statement 2 is untrue.
D Statement 2 is true but statement 1 is untrue.
- 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 Which could be the element helium at room temperature?
- A reactive gas
 B reactive liquid
 C unreactive gas
 D unreactive liquid
- 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

4

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 In which states of matter do particles vibrate about a fixed position?

- A** gas state only
B liquid state only
C solid state only
D gas, liquid and solid states

11 Metal X has to be extracted from its ores using electrolysis.

In which position in the reactivity series is X most likely to be found?

sodium

A

zinc

B

iron

C

copper

D

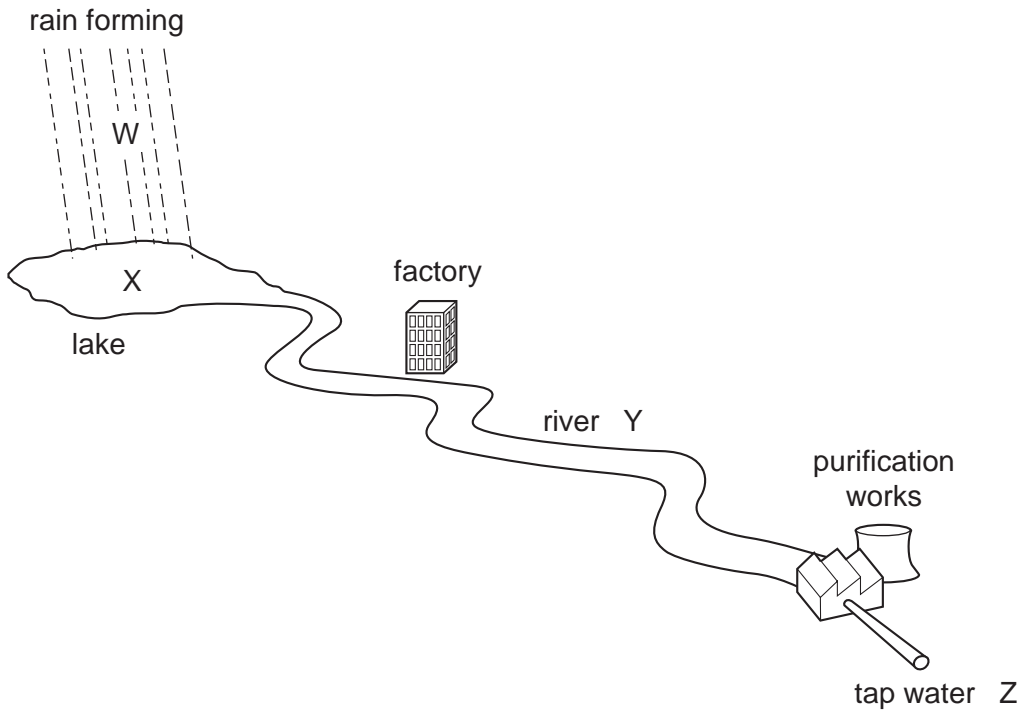
12 Copper, iron and zinc are all used to make things.

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

	copper	iron	zinc
A	✓	✓	✓
B	✓	✓	x
C	x	✓	✓
D	x	x	✓

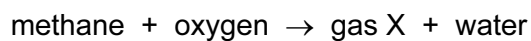
5

13 The diagram shows part of a water supply.



Which statement is **not** correct?

- A Bacteria have been removed from water at Z.
 - B Dissolved carbon dioxide is present in water at W.
 - C Dissolved solids are absent from water at X.
 - D Water at W is purer than water at Y.
- 14 The word equation represents the complete combustion of methane.



What is gas X?

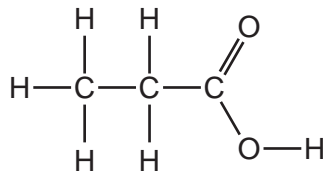
- A carbon dioxide
 - B hydrogen
 - C nitrogen
 - D sulfur dioxide
- 15 Lime is used to treat acidic soil because it is a base.

What is the pH of the solution formed when lime is added to water?

- A 1
- B 4
- C 7
- D 10

6

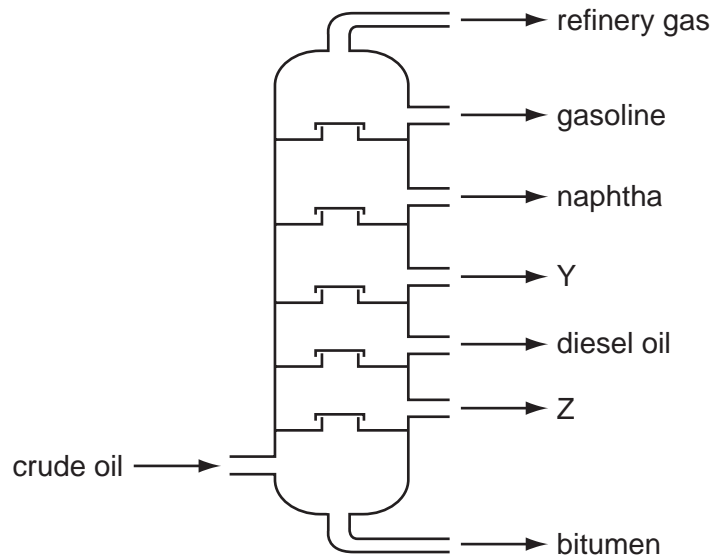
16 The diagram shows the structure of a molecule.



What is the name of this compound?

- A propane
- B propanoic acid
- C propanol
- D propene

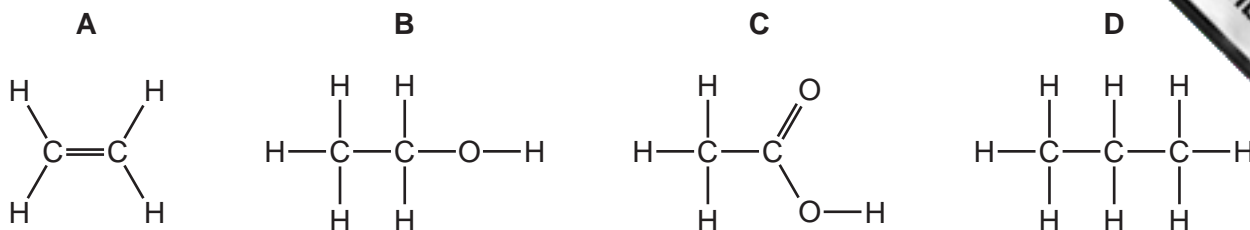
17 The diagram shows the fractional distillation of petroleum.



Which row shows the correct uses of the fractions Y and Z?

	Y	Z
A	fuel for cars	waxes and polishes
B	fuel for cars	mending roads
C	fuel for jets	waxes and polishes
D	fuel for jets	mending roads

18 Which compound belongs to the same homologous series as ethane?

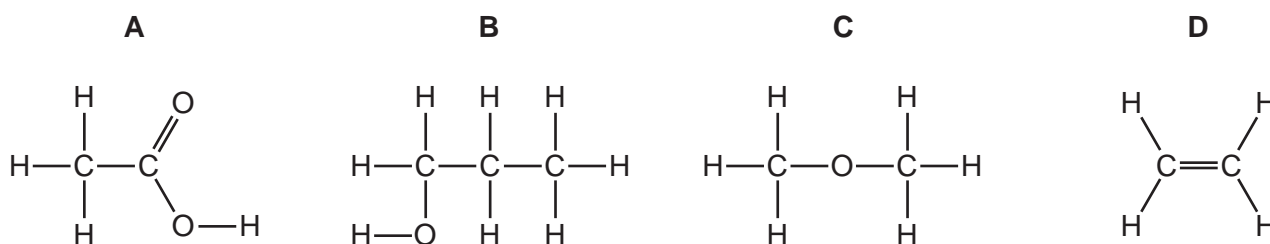


19 A hydrocarbon X burns but does **not** catalytically react with steam.

Which description of X is correct?

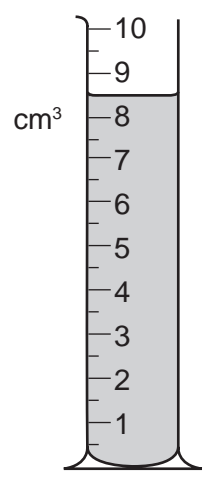
	name	number of single bonds in molecule	number of double bonds in molecule
A	ethane	6	1
B	ethane	7	0
C	ethene	6	1
D	ethene	7	0

20 Which molecular structure shows an alcohol?

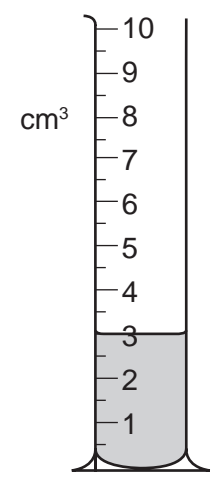


21 Some water is poured from a measuring cylinder.

The diagrams show the measuring cylinder before and after the water was poured from it.



before pouring

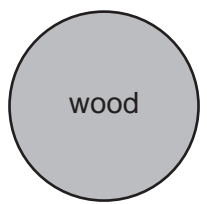
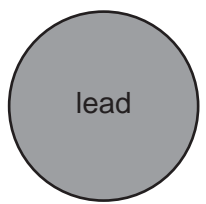
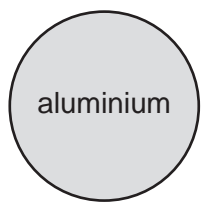


after pouring

What is the volume of the water which was poured out?

- A 3.0 cm³
- B 5.5 cm³
- C 6.5 cm³
- D 8.5 cm³

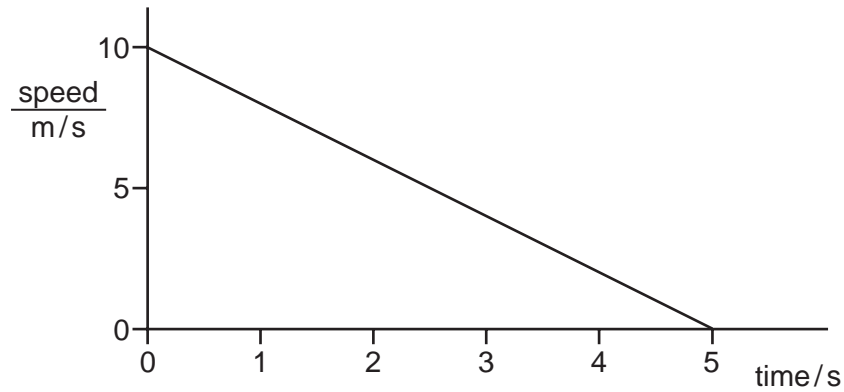
22 Three balls made of different materials are dropped from a bench.



Which balls fall with the same acceleration?

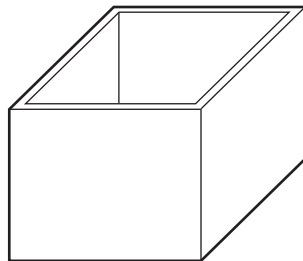
- A aluminium and lead only
- B aluminium and wood only
- C lead and wood only
- D aluminium, lead and wood

- 23 The graph shows the speed of a car changing while the driver uses the brakes to stop.

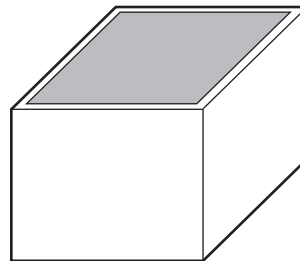


How far did the car travel in five seconds?

- A** 5 m **B** 10 m **C** 25 m **D** 50 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 = 120 g



box filled with liquid
total mass = 600 g

The box has a mass of 120 g when empty. When filled with a liquid, the total mass of the box and the liquid is 600 g. The density of the liquid is 1.2 g/cm^3 .

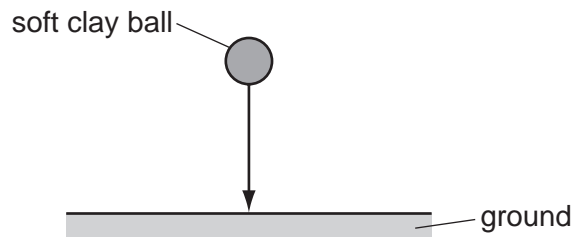
What is the volume of the liquid in the box?

- A** 600 cm^3
B 500 cm^3
C 400 cm^3
D 100 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 A ball made of soft clay is dropped and hits the ground. It does not bounce.



What are the energy changes that take place as the ball drops and hits the ground?

- A energy of motion → gravitational → thermal
- B energy of motion → thermal → gravitational
- C gravitational → energy of motion → thermal
- D gravitational → thermal → energy of motion

28 A radio uses a battery as its source of energy.

Which energy changes take place when the radio is being used?

- A chemical to electrical to sound
- B electrical to chemical to sound
- C electrical to sound to chemical
- D sound to chemical to electrical

29 Which row shows what happens to the temperature of a solid as it melts, and to the temperature of a liquid as it boils?

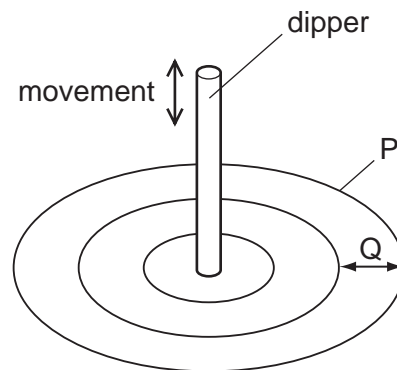
	temperature of a solid as it melts	temperature of a liquid as it boils
A	increases	increases
B	no change	increases
C	increases	no change
D	no change	no change

- 30 The table lists four physical properties P, Q, R and S of some substances and states how each property varies as the temperature rises.

	physical property of substance	variation as temperature rises
P	pressure of helium	increases
Q	volume of mercury	increases
R	radioactivity of uranium-238	does not change
S	resistance of silicon	decreases

Which properties could be used as the basis for the measurement of temperature?

- A** P, Q and R
B P, Q and S
C P, R and S
D Q, R and S
- 31 Circular waves can be made on the surface of water by moving a dipper up and down.



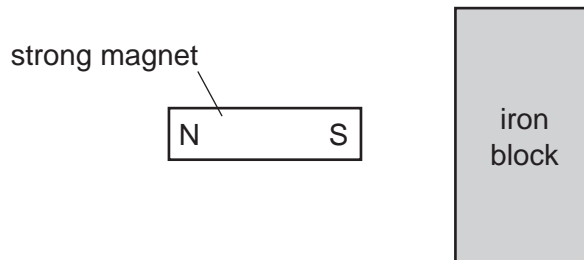
What does the line P represent and what is the distance Q called?

	line P	distance Q
A	amplitude	wavefront
B	wavefront	amplitude
C	wavefront	wavelength
D	wavelength	amplitude

32 Which row shows how the speed of infra-red waves and the speed of X-rays compare with the speed of light *in vacuo* (in a vacuum)?

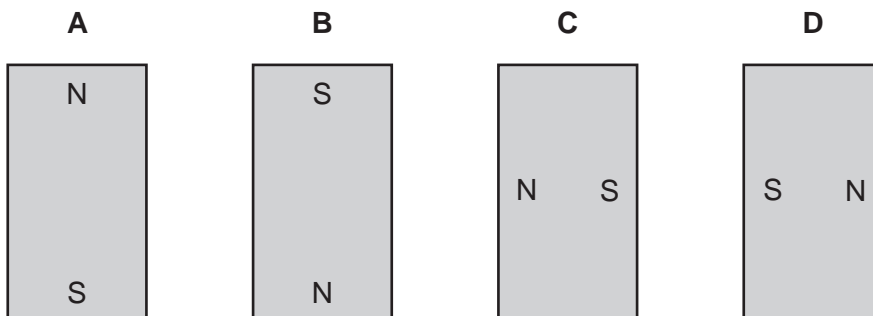
	speed of infra-red waves	speed of X-rays
A	greater than light	less than light
B	the same as light	greater than light
C	less than light	greater than light
D	the same as light	the same as light

33 A strong permanent magnet is placed close to a large block of iron, as shown in the diagram.

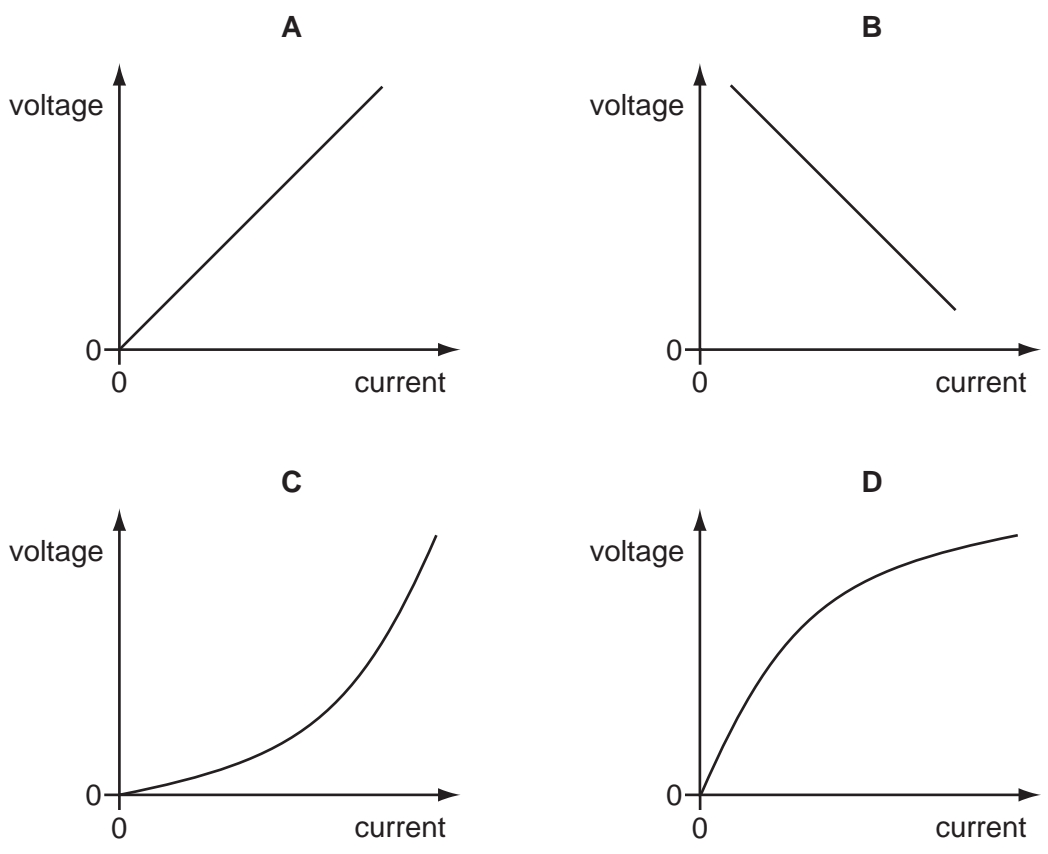


The iron block becomes an induced magnet.

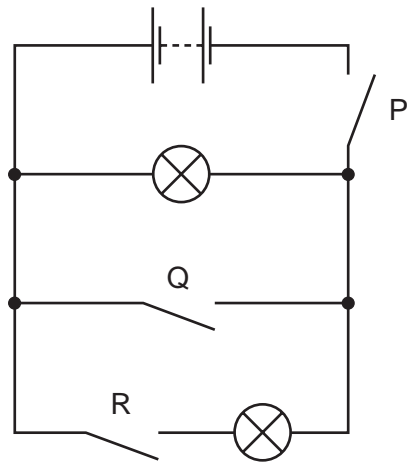
What is the arrangement of its poles?



34 Which diagram is the voltage / current graph for a metallic conductor at constant temperature



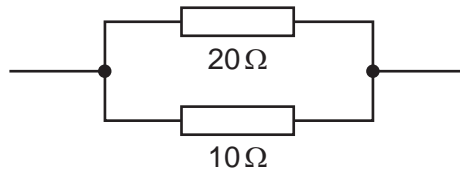
35 The diagram shows a circuit with three switches P, Q and R.



Which switches must be closed so that both lamps will light?

- A P and Q only
- B P and R only
- C Q and R only
- D P, Q and R

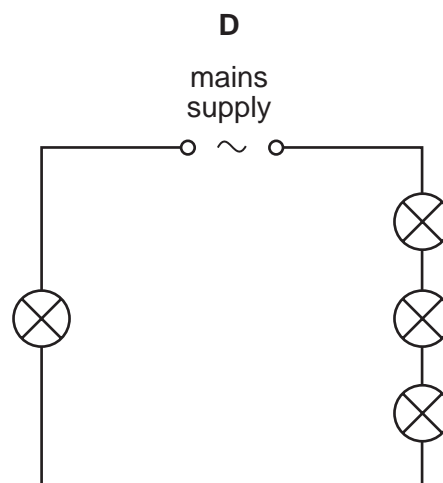
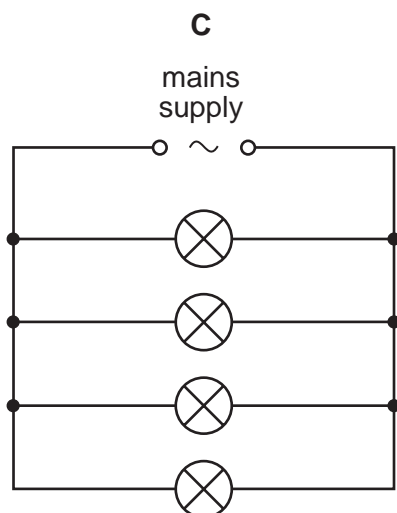
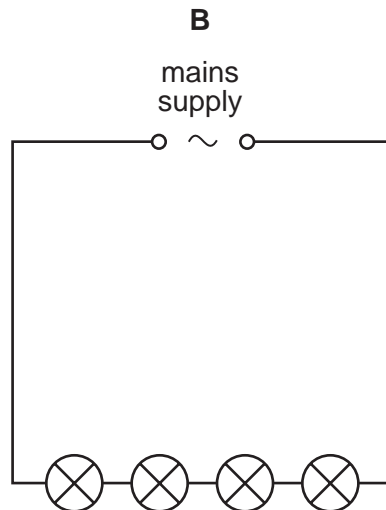
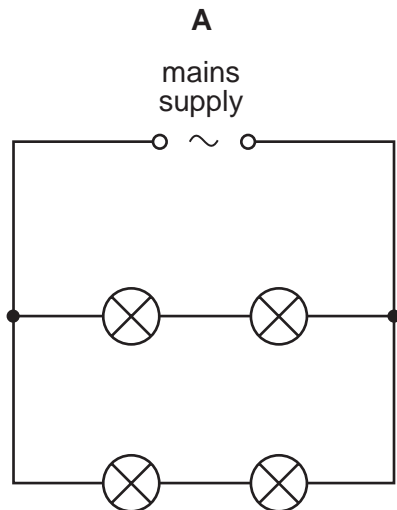
- 36 A 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

- A** less than 10Ω
B 10Ω
C 20Ω
D more than 20Ω
- 37 Four lamps are connected to a mains supply in a house. If one lamp fails, the other three lamps will continue to operate.

Which diagram shows how the lamps should be connected?

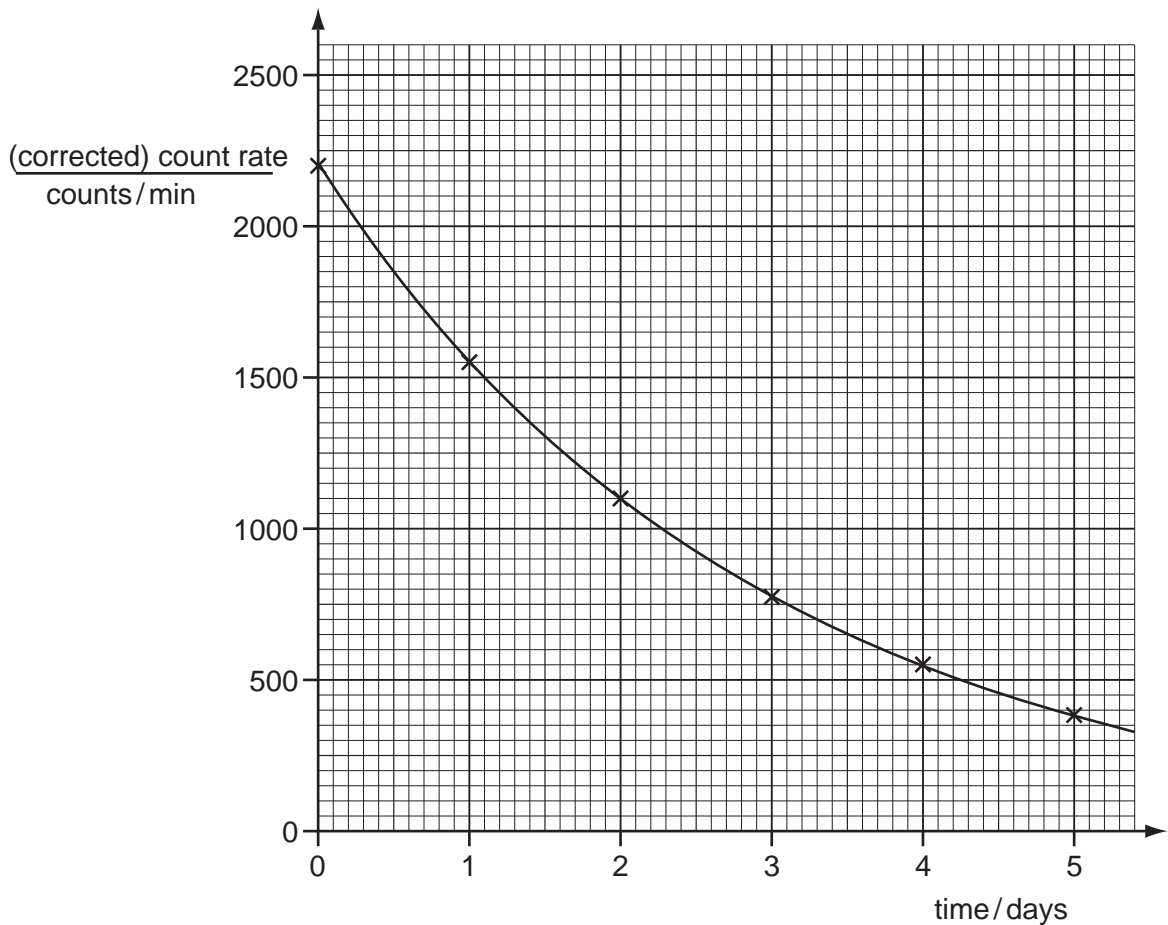


38 When a tungsten filament is heated in a vacuum, thermionic emission occurs.

Which particles are given off during thermionic emission?

- A alpha-particles
- B electrons
- C ions
- D protons

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 The table gives information about an atom.

number of protons	10
number of neutrons	12
number of electrons	10

What is its nucleon number?

- A** 10 **B** 12 **C** 22 **D** 32

DATA SHEET
The Periodic Table of the Elements

		Group																																																																																																																																											
		I	II	III	IV	V	VI	VII	0																																																																																																																																				
		1 H Hydrogen 1																																																																																																																																											
7	9	Li Lithium 3	Be Beryllium 4																																																																																																																																										
23	24	Na Sodium 11	Mg Magnesium 12																																																																																																																																										
39	40	K Potassium 19	Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36																																																																																																																										
85	88	Rb Rubidium 37	Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54																																																																																																																												
133	137	Cs Caesium 55	Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	190 Os Osmium 76	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86																																																																																																																												
	226	Fr Francium 87	Ra Radium 88	227 Ac Actinium 89																																																																																																																																									
		*58-71 Lanthanoid series										†90-103 Actinoid series																																																																																																																																	
		140 Ce Cerium 58										141 Pr Praseodymium 59										144 Nd Neodymium 60										150 Sm Samarium 62										152 Eu Europium 63										157 Gd Gadolinium 64										162 Dy Dysprosium 66										165 Ho Holmium 67										167 Er Erbium 68										169 Tm Thulium 69										173 Yb Ytterbium 70										175 Lu Lutetium 71																													
		232 Th Thorium 90										238 U Uranium 92										238 Pa Protactinium 91										238 Np Neptunium 93										238 Pu Plutonium 94										238 Am Americium 95										238 Cm Curium 96										238 Bk Berkelium 97										238 Cf Californium 98										238 Es Einsteinium 99										238 Fm Fermium 100										238 Md Mendelevium 101										238 No Nobelium 102										238 Lr Lawrencium 103									

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

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

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