



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.

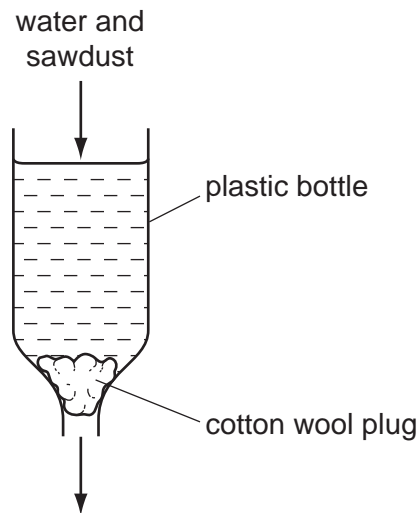
Read the instructions on the Answer Sheet very carefully.

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.



- 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

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

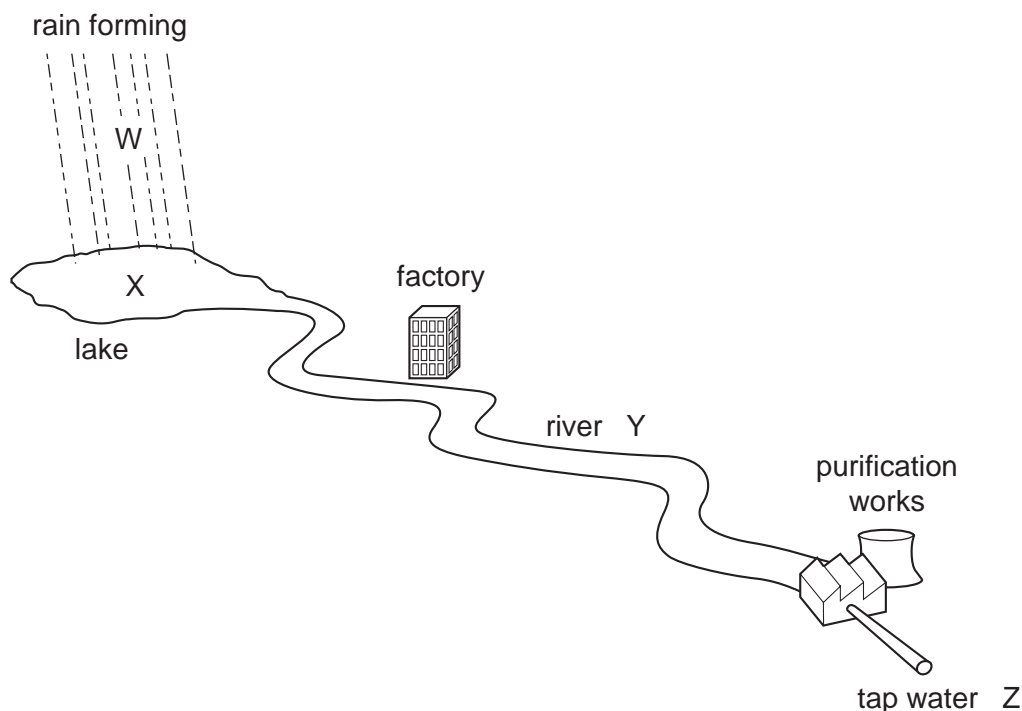
D

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	✓

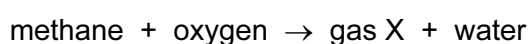
13 The diagram shows part of a water supply.



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?

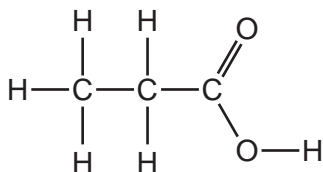
- A carbon dioxide
- B hydrogen
- C nitrogen
- D sulfur dioxide

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

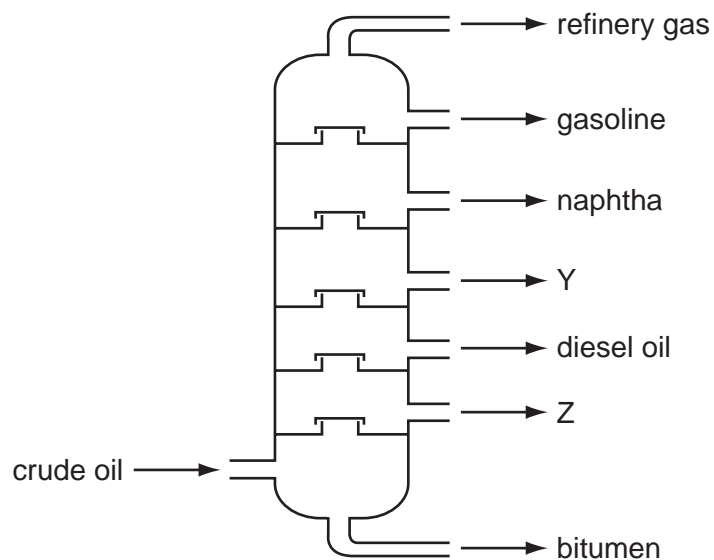
16 The diagram shows the structure of a molecule.



What is the name of this compound?

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

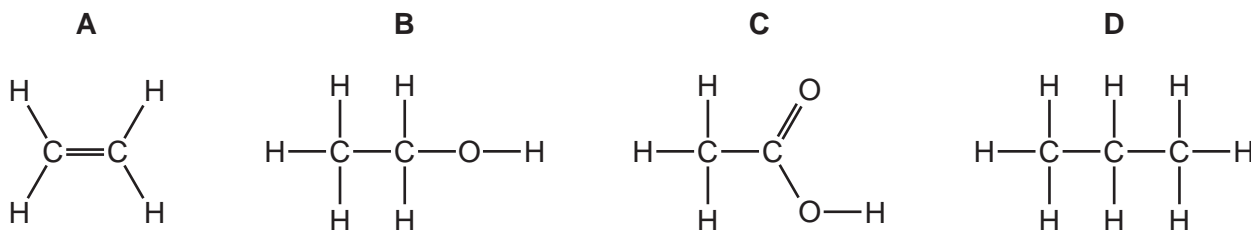
17 The diagram shows the fractional distillation of petroleum.



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?

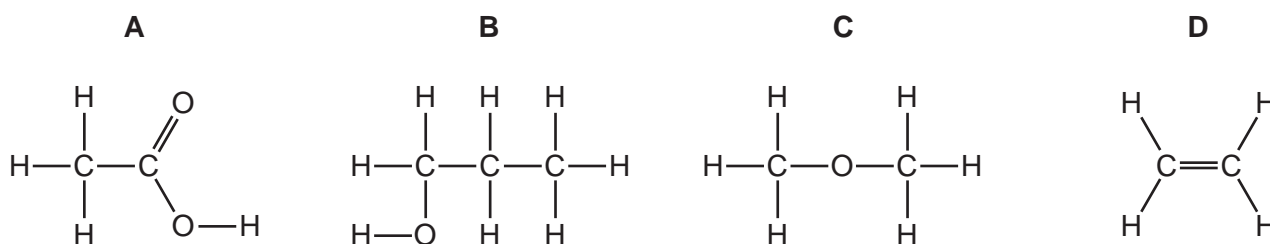


19 A hydrocarbon X burns but does **not** catalytically react with steam.

Which description of X is correct?

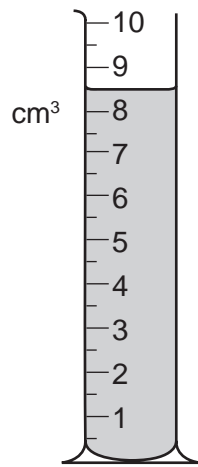
	name	number of single bonds in molecule	number of double bonds in molecule
A	ethane	6	1
B	ethane	7	0
C	ethene	6	1
D	ethene	7	0

20 Which molecular structure shows an alcohol?

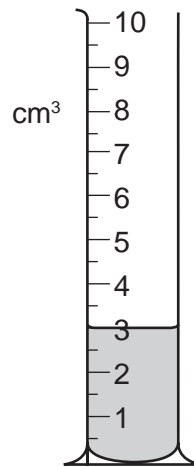


21 Some water is poured from a measuring cylinder.

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



before pouring

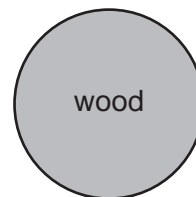
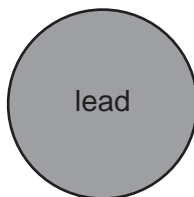
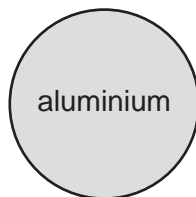


after pouring

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

- A** 3.0 cm^3 **B** 5.5 cm^3 **C** 6.5 cm^3 **D** 8.5 cm^3

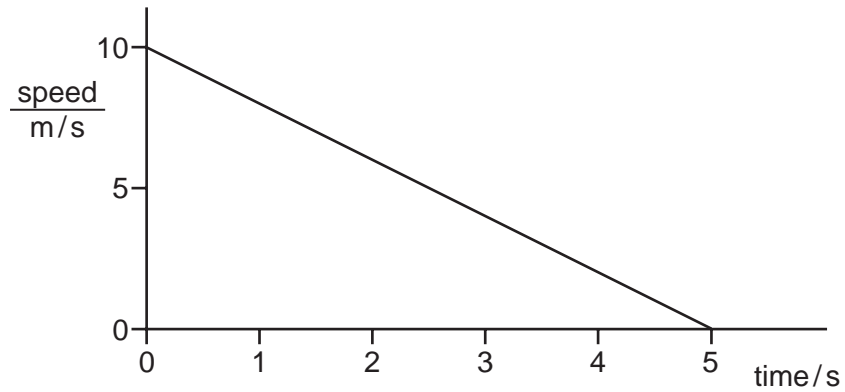
22 Three balls made of different materials are dropped from a bench.



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.



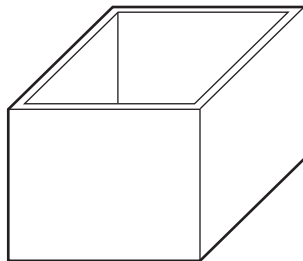
How far did the car travel in five seconds?

- A** 5 m **B** 10 m **C** 25 m **D** 50 m

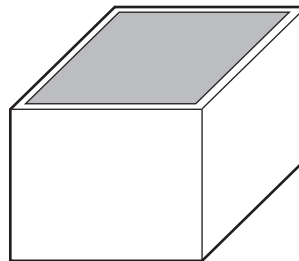
24 What is the unit of weight?

- 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 .

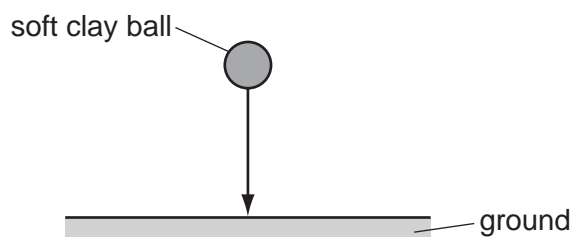
What is the volume of the liquid in the box?

- 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?

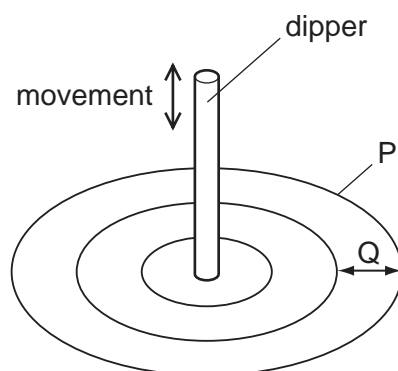
	temperature of a solid as it melts	temperature of a liquid as it boils
A	increases	increases
B	no change	increases
C	increases	no change
D	no change	no change

- 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.



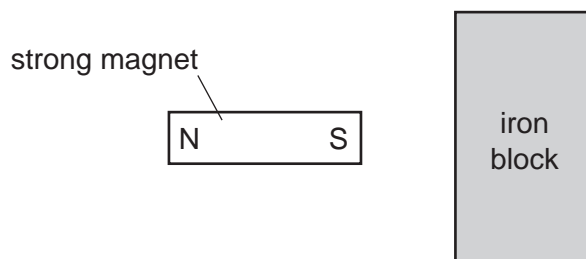
What does the line P represent and what is the distance Q called?

	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)?

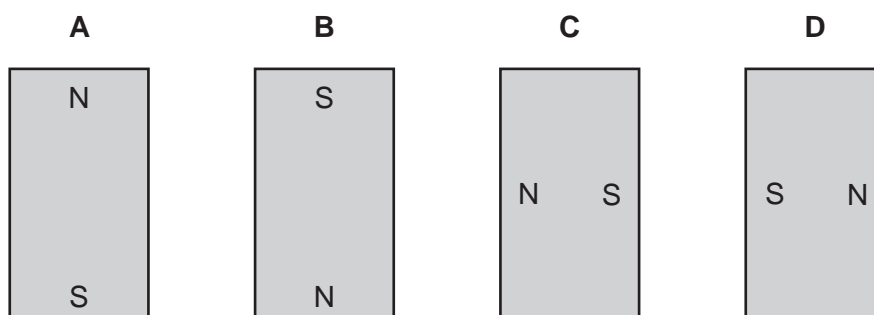
	speed of infra-red waves	speed of X-rays
A	greater than light	less than light
B	the same as light	greater than light
C	less than light	greater than light
D	the same as light	the same as light

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

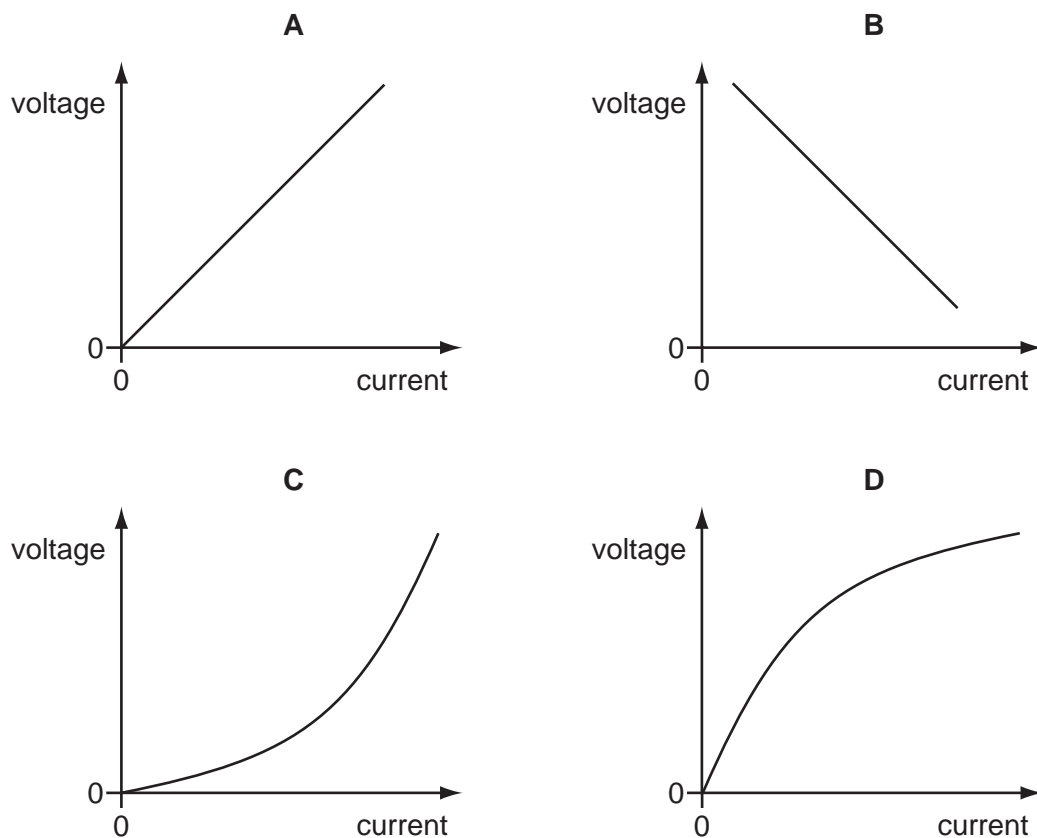


The iron block becomes an induced magnet.

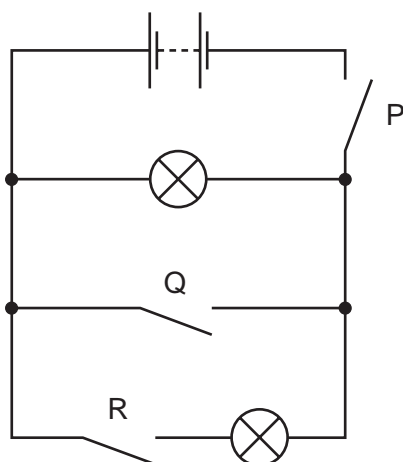
What is the arrangement of its poles?



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



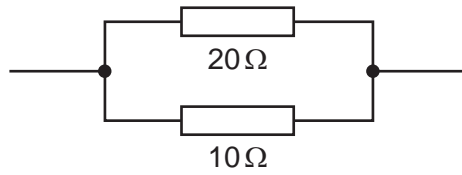
35 The diagram shows a circuit with three switches P, Q and R.



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

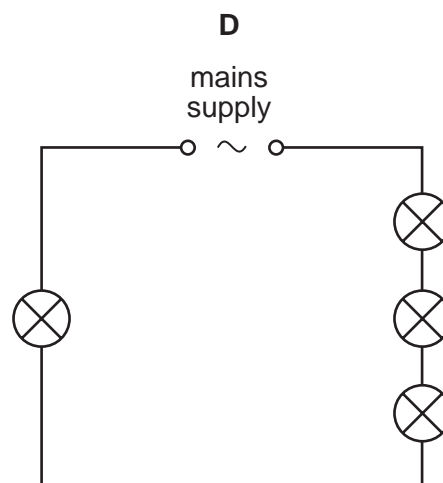
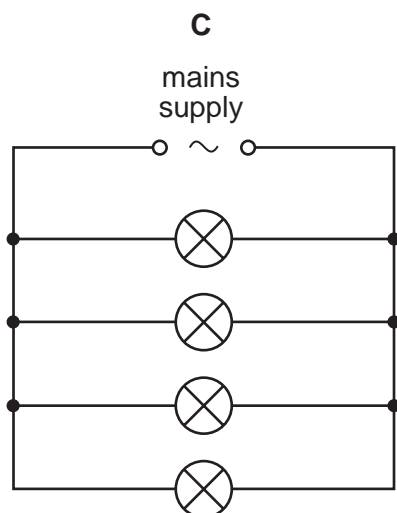
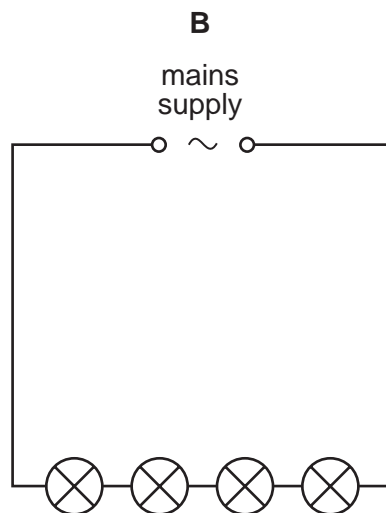
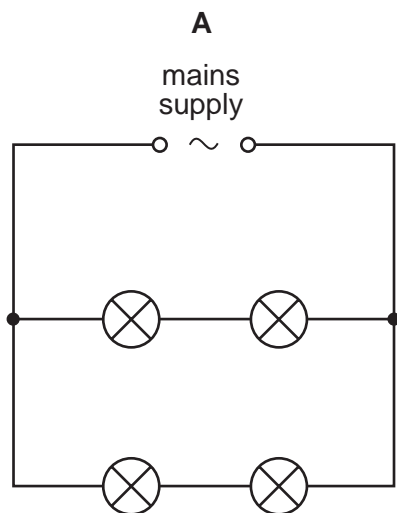
- 36 A 20Ω resistor and a 10Ω resistor are connected in parallel.



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?

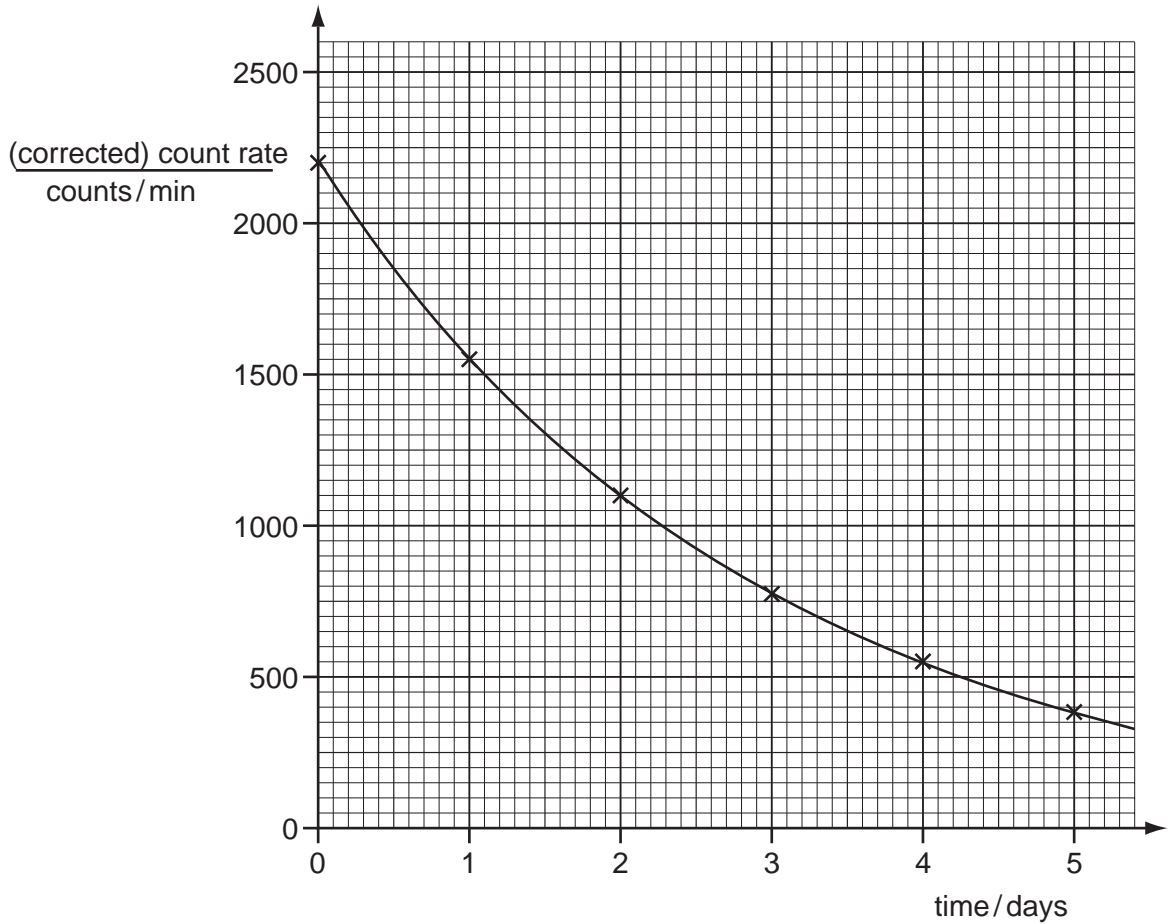


38 When a tungsten filament is heated in a vacuum, thermionic emission occurs.

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	VIII	IX	X	
		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	48	51	52	55	56	59	59	64	65	
		Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	
85	88	89	91	93	96	101	101	103	106	108	112	
Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48		
133	137	139	178	181	184	190	190	192	195	197	201	
Cs Caesium 55	Ba Barium 56	La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80		
226	227	227										
Fr Francium 87	Ra Radium 88	Ac Actinium 89										
*58-71 Lanthanoid series †90-103 Actinoid series												
		140	141	144	150	152	157	159	162	165	167	
		Ce Cerium 58	Pr Praseodymium 59	Nd Neodymium 60	Pm Promethium 61	Sm Samarium 62	Eu Europium 63	Gd Gadolinium 64	Dy Dysprosium 66	Ho Holmium 67	Er Erbium 68	
		232	238	238	238	238	238	238	238	238	238	
		Th Thorium 90	Pa Protactinium 91	U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	
		169	173	173	173	173	173	173	173	173	173	
		Tm Thulium 69	Yb Ytterbium 70	Lu Lutetium 71	No Nobelium 102	Md Mendelevium 101	Lr Lawrencium 103					

Key

a	X
b	

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

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

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