UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE **0652/01**

Paper 1 Multiple Choice

May/June 2004

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 20.

This document consists of **18** printed pages and **2** blank pages.

1 Which diagram represents melting?

A

B

C

D

key

○ molecule

2 Four different liquids are mixed together to form a single liquid.

Which method could be used to separate the mixture back into the four liquids?

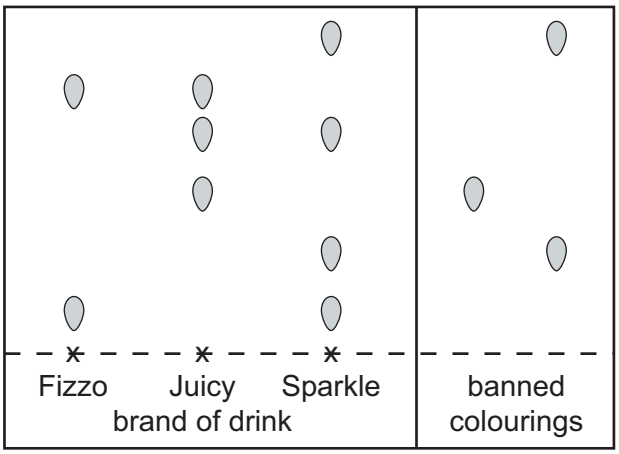
A catalysis

B distillation

C filtration

D fractional distillation

3 Chromatography is used to test three brands of drink for banned colourings.



Which of the drinks contain banned colourings?

A Fizzo only

B Fizzo and Juicy

C Juicy only

D Juicy and Sparkle

4 Which atom has two more electrons than an atom of a noble gas?

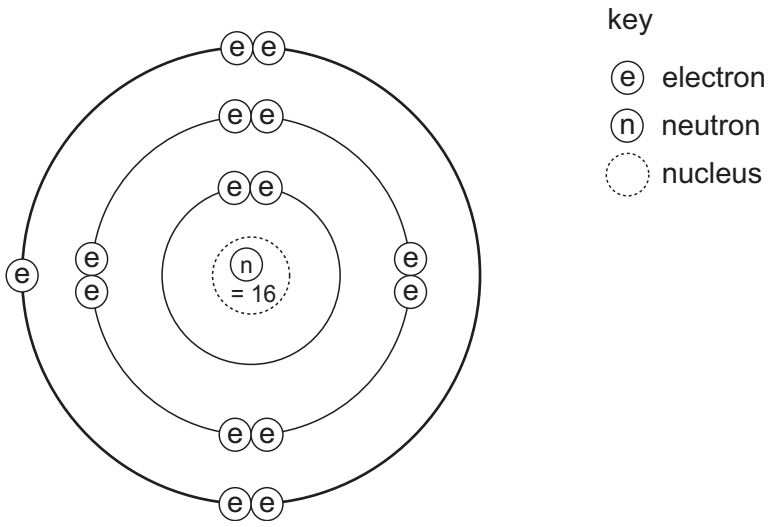
A aluminium

B bromine

C calcium

D rubidium

5 Which element has the atomic structure shown?

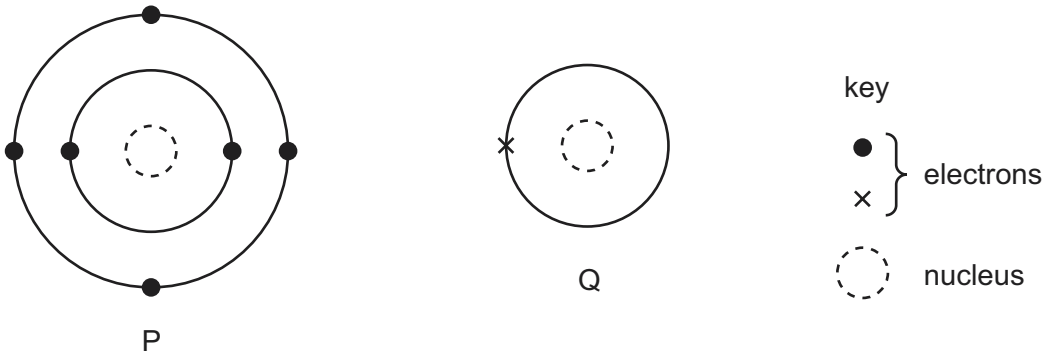


A A*l* **B** P **C** S **D** Si

6 Which ions are formed from the relevant atoms by gaining electrons?

	sodium ion	chloride ion
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

7 The electronic structures of atoms P and Q are shown.



P and Q combine to form a covalent molecule.

What is the formula of the molecule?

A PQ **B** PQ_4 **C** PQ_8 **D** P_4Q

8 How is the following reaction written as a balanced symbol equation?

carbon + carbon dioxide → carbon monoxide

A $C + CO_2 \rightarrow 2CO$

B $C + CO_2 \rightarrow C_2O_2$

C $2C + CO_2 \rightarrow 2CO$

D $2C + CO \rightarrow 2CO_2$

9 Which fuel burns **without** forming carbon dioxide?

A coal

B hydrogen

C methane

D petrol

10 The equation shows what happens when a neutron collides with a nucleus of uranium–235.

neutron + uranium–235 ⟶ krypton + barium + three neutrons

What else is released during this stage?

A energy

B hydrogen

C oxygen

D protons

11 Tests are carried out on a solution containing both copper(II) sulphate and sodium chloride.

test	reagent	result
1	aqueous ammonia	white precipitate
2	aqueous barium chloride	blue precipitate
3	aqueous silver nitrate	white precipitate
4	aqueous sodium hydroxide	blue precipitate

In which tests are the results correct?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

12 A few crystals of ammonium chloride are placed in a test-tube and then 5 cm^3 of aqueous solution **S** are added. The mixture is heated.

Ammonia gas is given off.

What could be dissolved in water to make **S**?

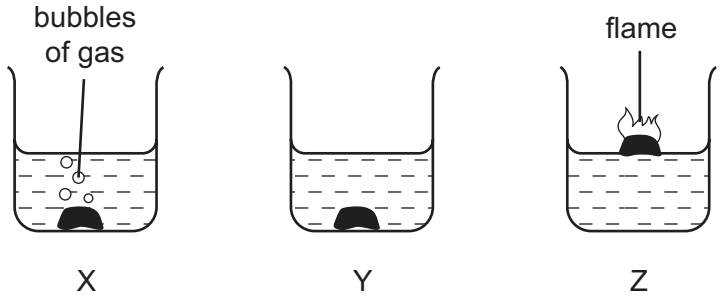
A ammonium sulphate

B copper(II) hydroxide

C potassium hydroxide

D sodium nitrate

13 The diagrams show what happens when three different metals are added to water.



What are the metals?

	X	Y	Z
A	calcium	copper	potassium
B	copper	calcium	potassium
C	potassium	calcium	copper
D	potassium	copper	calcium

14 Some of the general physical properties of metals are shown.

1	Metals are good conductors of electricity.
2	Metals are hard solids.
3	Metals have high densities.
4	Metals have high melting points.

How many of these properties does sodium have?

A 1 only

B 1 and 2 only

C 1, 2 and 3 only

D 1, 2, 3 and 4

15 Which of the metals aluminium, copper and gold occur 'native'?

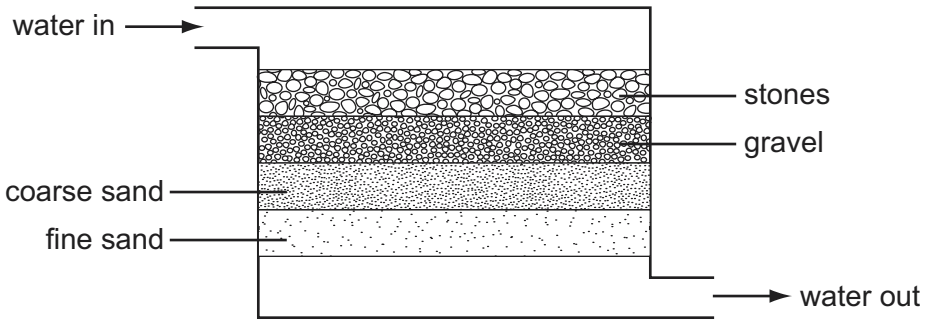
A aluminium and copper

B aluminium and gold

C aluminium, copper and gold

D copper and gold

16 The diagram shows one of the stages in the purification of water.



Which process is being used?

A chlorination

B distillation

C filtration

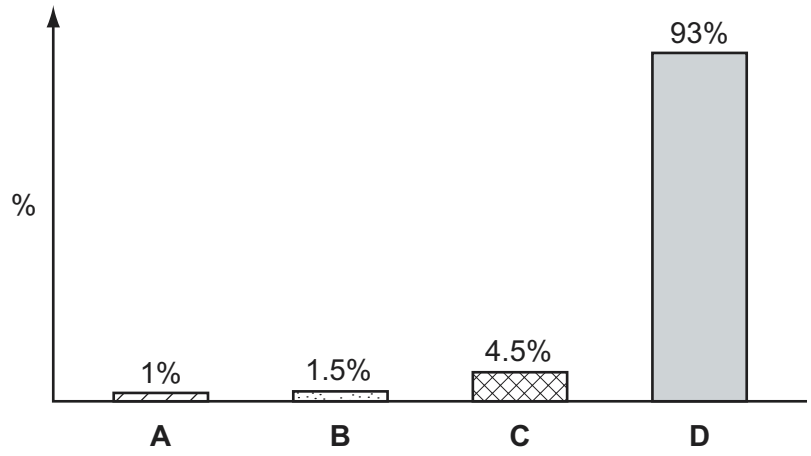
D neutralisation

17 Which type of hydrocarbon reacts rapidly with bromine and what is the colour change of the bromine?

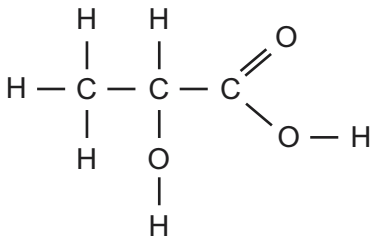
	hydrocarbon	colour change of bromine
A	alkane	brown to colourless
B	alkane	colourless to brown
C	alkene	brown to colourless
D	alkene	colourless to brown

18 The bar chart represents the composition of natural gas.

Which bar represents methane?



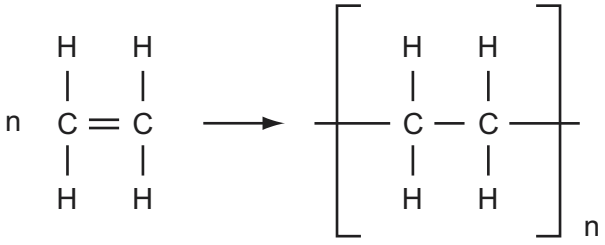
19 The molecule shown is found in tired muscles.



To which homologous series does this compound belong?

	acids	alcohols
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

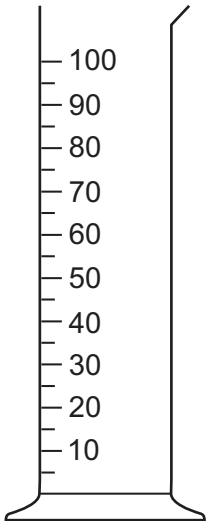
20 The diagram shows the structure of a monomer and of the polymer made from it.



What are the monomer and polymer?

	monomer	polymer
A	ethane	poly(ethane)
B	ethane	poly(ethene)
C	ethene	poly(ethane)
D	ethene	poly(ethene)

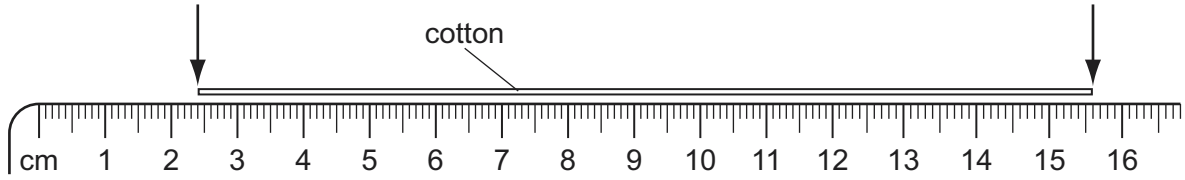
21 The diagram shows a measuring cylinder.



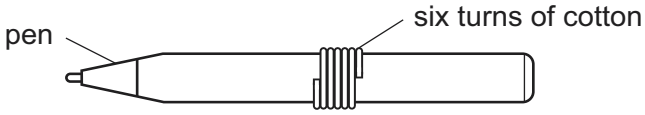
Which unit would be most suitable for its scale?

A mm^2 **B** mm^3 **C** cm^2 **D** cm^3

22 A piece of cotton is measured between two points on a ruler.



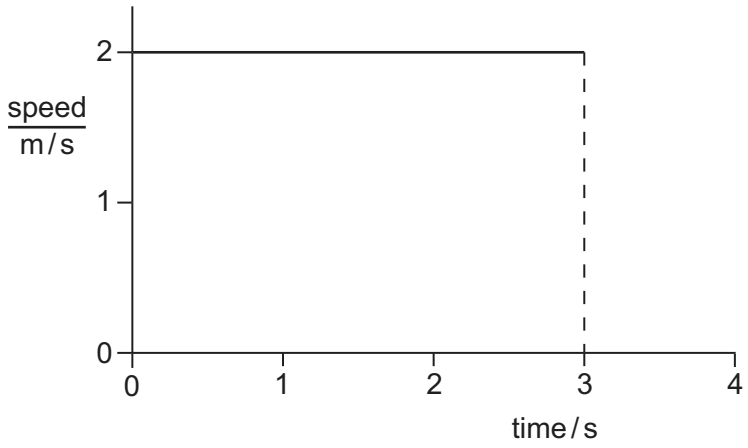
When the length of cotton is wound closely around a pen, it goes round six times.



What is the distance once round the pen?

A 2.2 cm **B** 2.6 cm **C** 13.2 cm **D** 15.6 cm

23 The diagram shows the speed-time graph for an object moving at constant speed.



What is the distance travelled by the object in the first 3 s?

A 1.5 m **B** 2.0 m **C** 3.0 m **D** 6.0 m

24 Which statement about the mass of a falling object is correct?

A It decreases as the object falls.

B It is equal to the weight of the object.

C It is measured in newtons.

D It stays the same as the object falls.

25 The weights of four objects, 1 to 4, are compared using a balance.

Which object is the lightest?

A object 1 **B** object 2 **C** object 3 **D** object 4

26 Which of the following is a unit of density?

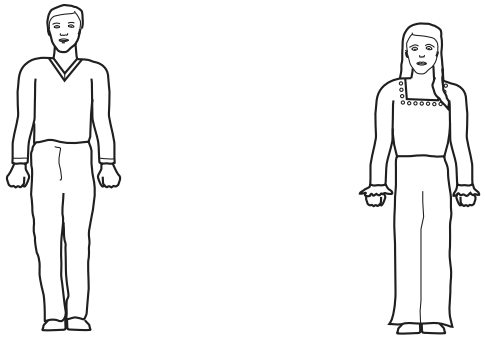
A cm^3 / g

B g / cm^2

C g / cm^3

D kg / m^2

27 A boy and a girl run up a hill in the same time.



boy weighs 600 N girl weighs 500 N

The boy weighs more than the girl.

Which statement is true about the power produced?

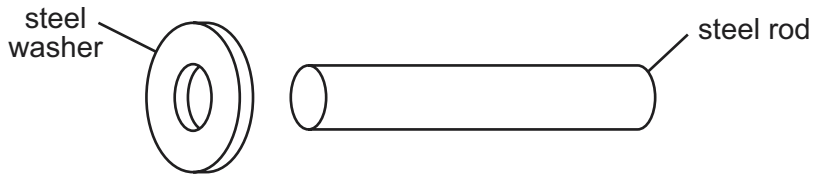
A The boy produces more power.

B The girl produces more power.

C They both produce the same power.

D It is impossible to tell who produces more power.

28 An engineer wants to fix a steel washer on to a steel rod. The rod is just too big to fit into the hole of the washer.



How can the engineer fit the washer onto the rod?

A cool the washer and put it over the rod

B cool the washer and rod to the same temperature and push them together

C heat the rod and then place it in the hole

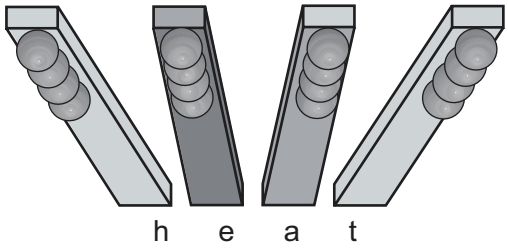
D heat the washer and place it over the rod

29 An experiment is set up to find out which metal is the best conductor of heat. Balls are stuck with wax to rods made from different metals, as shown in diagram X.

The rods are heated at one end. Some of the balls fall off, leaving some as shown in diagram Y.

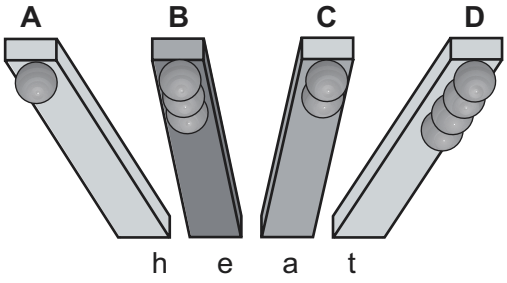
Which labelled metal is the best conductor of heat?

diagram X



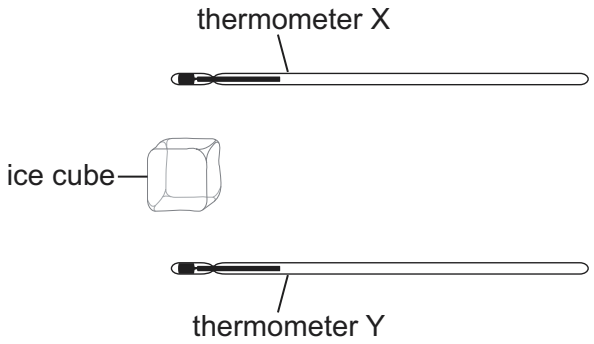
before heating

diagram Y



after heating

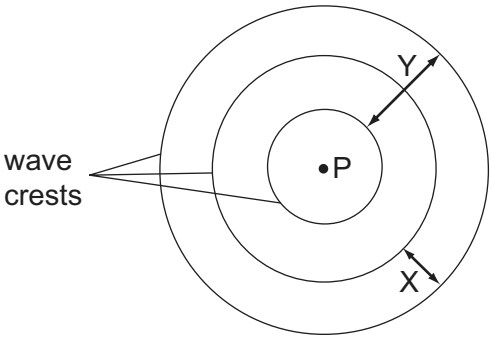
30 Thermometer X is held above an ice cube and thermometer Y is held the same distance below the ice cube. After several minutes, the reading on one thermometer changes. The ice cube does not melt.



Which thermometer reading changes and why?

	thermometer	reason
A	X	cool air rises from the ice cube
B	X	warm air rises from the ice cube
C	Y	cool air falls from the ice cube
D	Y	warm air falls from the ice cube

31 A vertical stick is dipped up and down in water at P. In two seconds, three wave crests are produced on the surface of the water.



Which statement is true?

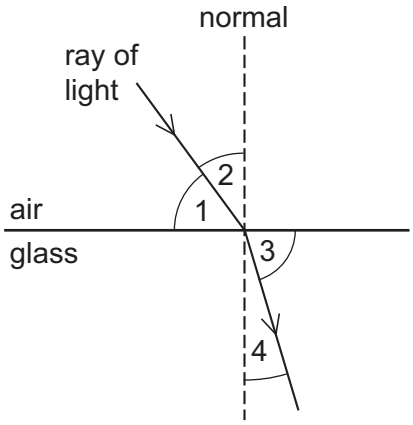
A Distance X is the amplitude of the waves.

B Distance Y is the wavelength of the waves.

C Each circle represents a wavefront.

D The frequency of the waves is 3 Hz.

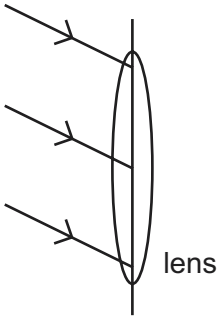
32 The diagram shows a ray of light entering a block of glass.



Which numbered angles are the angles of incidence and of refraction?

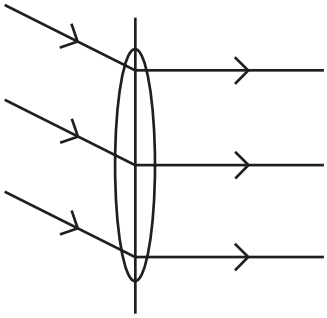
	angle of incidence	angle of refraction
A	1	3
B	1	4
C	2	3
D	2	4

33 Three rays of light fall on a converging lens as shown.

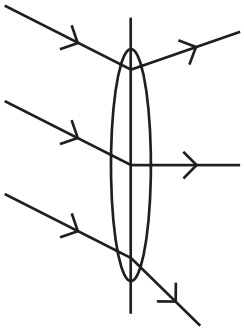


Which diagram shows the path of the rays after passing through the lens?

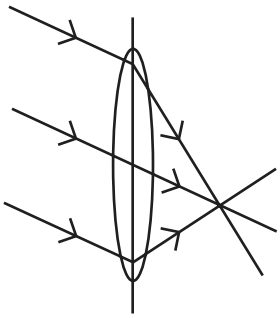
A



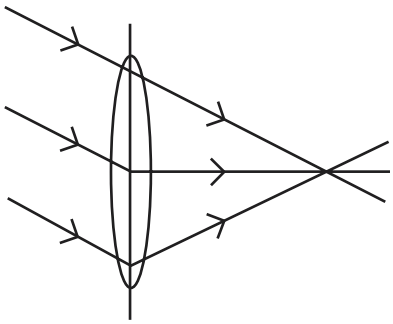
B



C

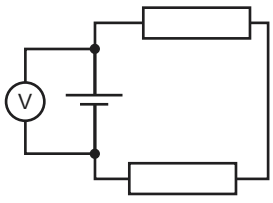


D

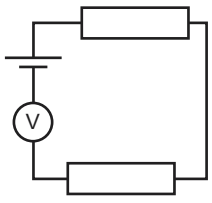


34 Which circuit shows how a voltmeter is connected to measure the potential difference across the cell?

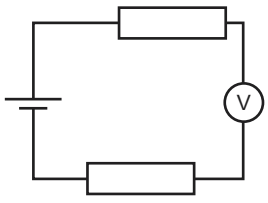
A



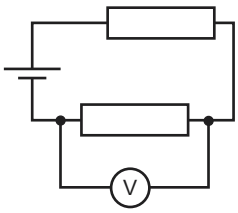
B



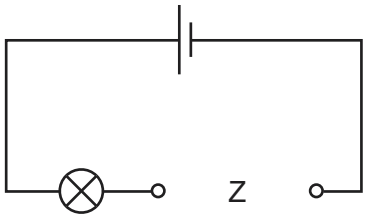
C



D



35 An electrical component is to be placed in the circuit at Z, to allow the brightness of the lamp to be varied from bright to dim.

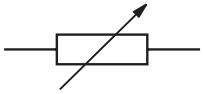


What should be connected at Z?

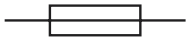
A

B

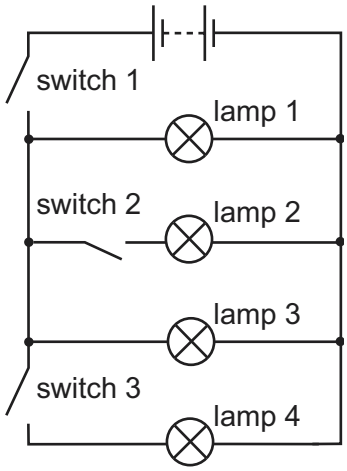
C



D



36 The circuit shown contains four lamps and three switches.



Which switches must be closed to light only lamps 1 and 3?

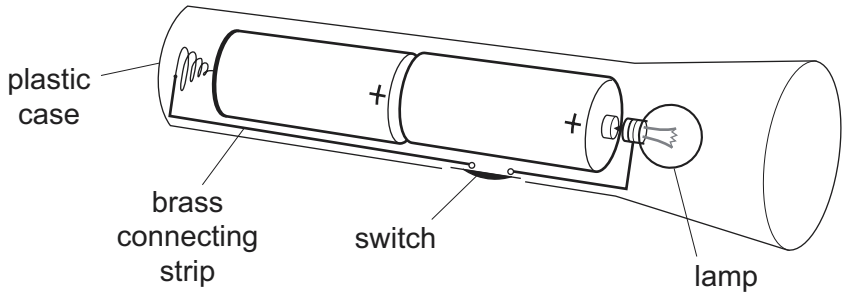
A switch 1 only

B switch 1 and switch 2 only

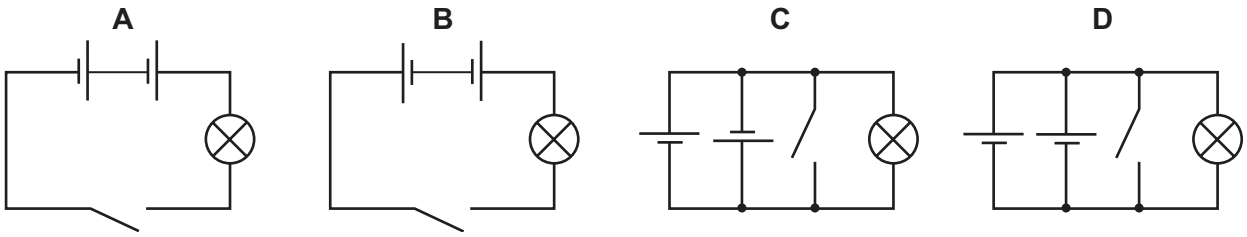
C switch 1 and switch 3 only

D switch 2 and switch 3 only

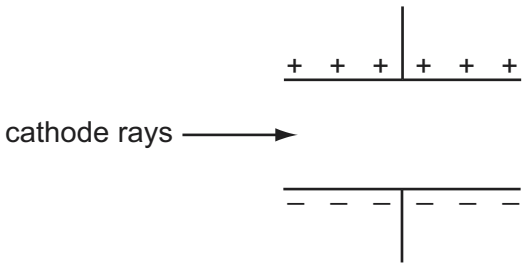
37 The diagram shows a torch containing two 2 V cells, a switch and a lamp.



What is the circuit diagram for the torch?



38 A beam of cathode rays passes through an electric field between two parallel plates.



In which direction is the beam deflected?

A into the page

B out of the page

C towards the bottom of the page

D towards the top of the page

39 Which line correctly describes α-particles?

	electric charge	penetrates 1 cm of aluminium?
A	negative	yes
B	negative	no
C	positive	yes
D	positive	no

40 A small amount of a radioactive isotope contains 72 billion unstable nuclei. The half-life of the isotope is 4 hours.

How many unstable nuclei would remain after 12 hours?

A 6 billion

B 9 billion

C 18 billion

D 24 billion

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 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 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	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 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	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	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
90-103 Actinoid series

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

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