

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**  **key**  
○ molecule

**B** 

**C** 

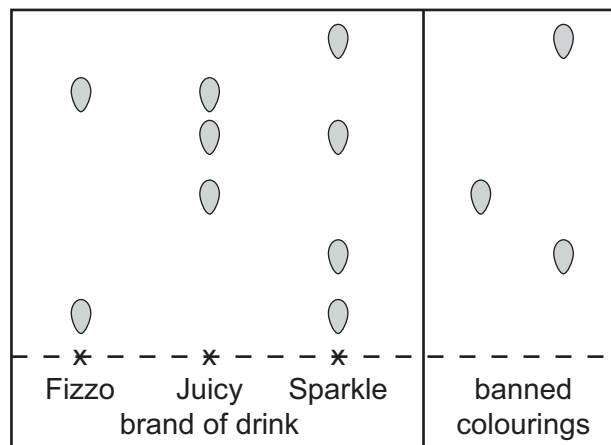
**D** 

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.



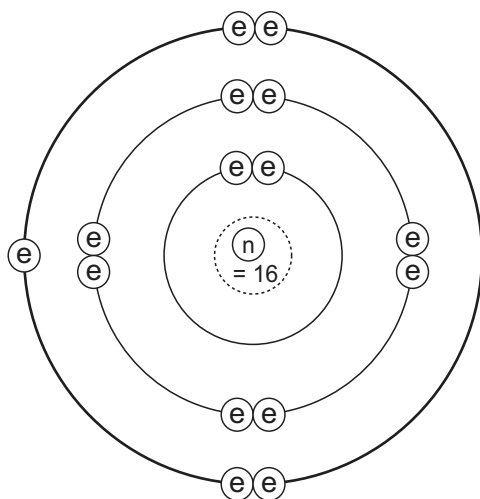
Which of the drinks contain banned colourings?

- 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?



key

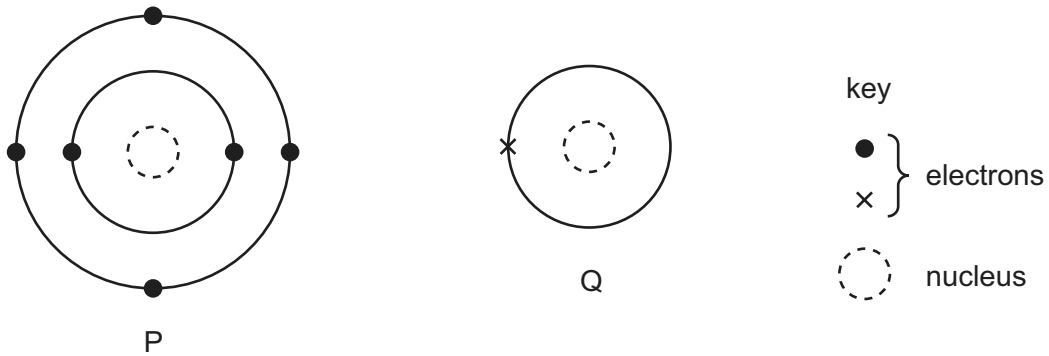
- (e) electron
- (n) neutron
- nucleus

- A Al
- B P
- C S
- D Si

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

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

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<sub>4</sub>                      **C** PQ<sub>8</sub>                      **D** P<sub>4</sub>Q

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

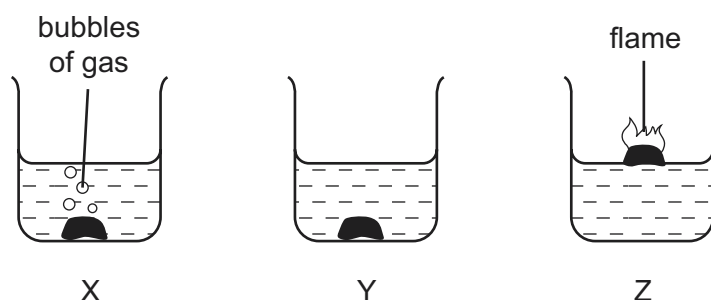
12 A few crystals of ammonium chloride are placed in a test-tube and then 5 cm<sup>3</sup> of aqueous solution **S** are added. The mixture is heated.

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?

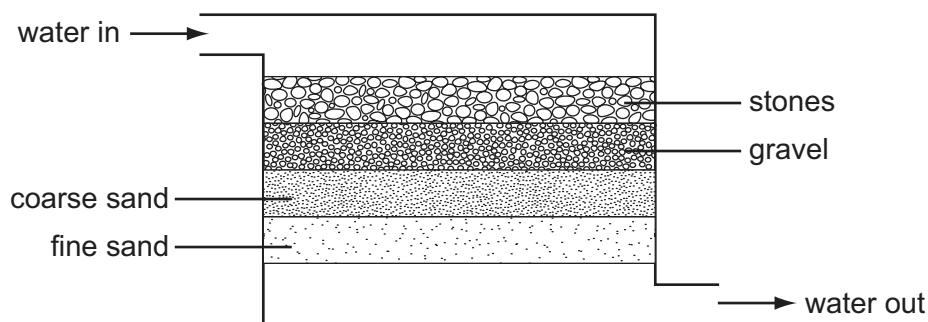
	X	Y	Z
<b>A</b>	calcium	copper	potassium
<b>B</b>	copper	calcium	potassium
<b>C</b>	potassium	calcium	copper
<b>D</b>	potassium	copper	calcium

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?

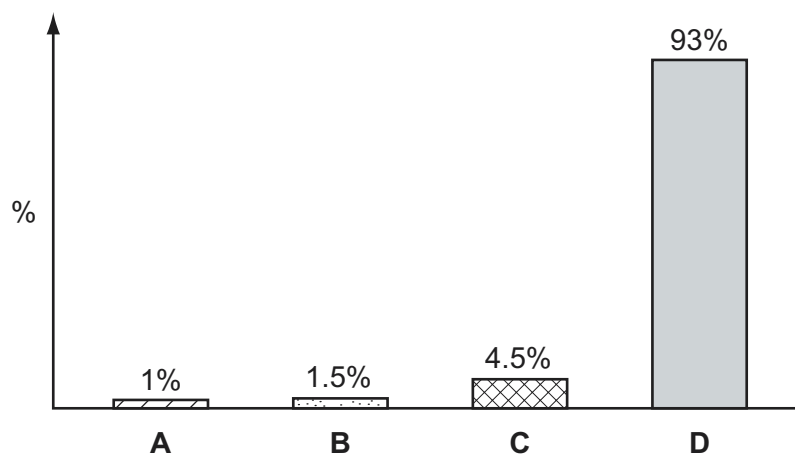
- A chlorination
- B distillation
- C filtration
- D neutralisation

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

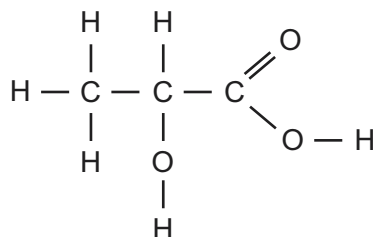
	hydrocarbon	colour change of bromine
<b>A</b>	alkane	brown to colourless
<b>B</b>	alkane	colourless to brown
<b>C</b>	alkene	brown to colourless
<b>D</b>	alkene	colourless to brown

- 18 The bar chart represents the composition of natural gas.

Which bar represents methane?



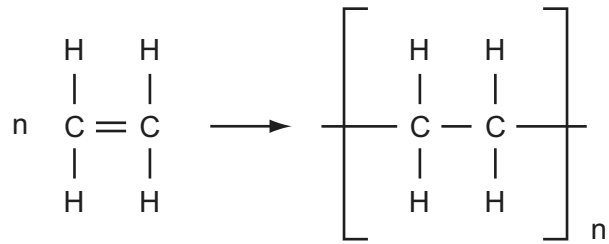
- 19 The molecule shown is found in tired muscles.



To which homologous series does this compound belong?

	acids	alcohols
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

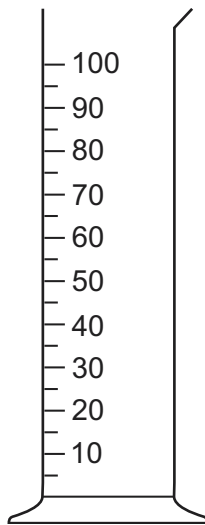
20 The diagram shows the structure of a monomer and of the polymer made from it.



What are the monomer and polymer?

	monomer	polymer
<b>A</b>	ethane	poly(ethane)
<b>B</b>	ethane	poly(ethene)
<b>C</b>	ethene	poly(ethane)
<b>D</b>	ethene	poly(ethene)

21 The diagram shows a measuring cylinder.

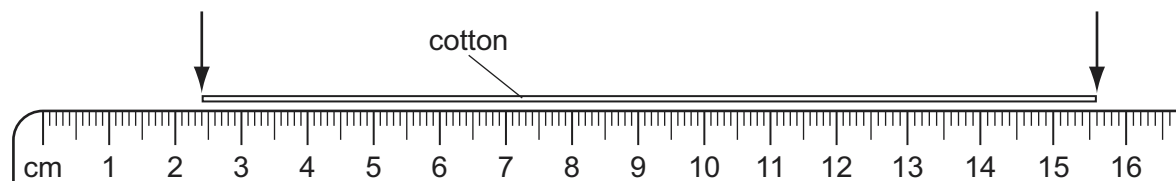


Which unit would be most suitable for its scale?

- A**  $\text{mm}^2$       **B**  $\text{mm}^3$       **C**  $\text{cm}^2$       **D**  $\text{cm}^3$



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

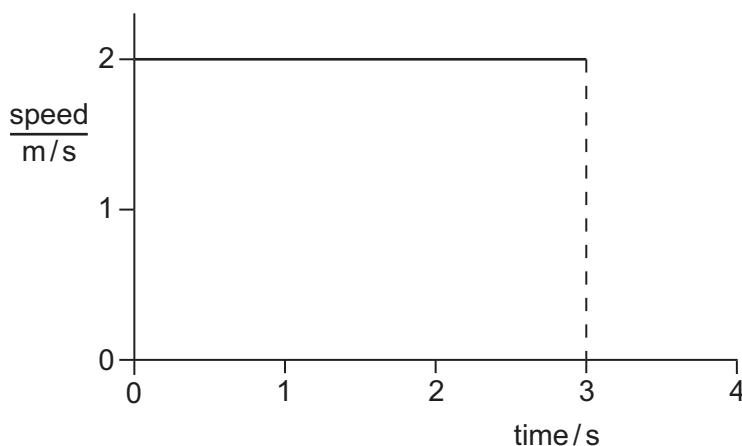


When the length of cotton is wound closely around a pen, it goes round six times.



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.



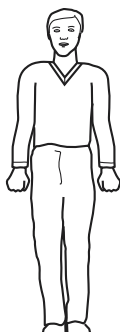
Which object is the lightest?

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

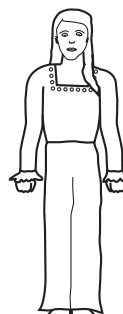
26 Which of the following is a unit of density?

- A**  $\text{cm}^3/\text{g}$   
**B**  $\text{g}/\text{cm}^2$   
**C**  $\text{g}/\text{cm}^3$   
**D**  $\text{kg}/\text{m}^2$

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



boy weighs 600 N



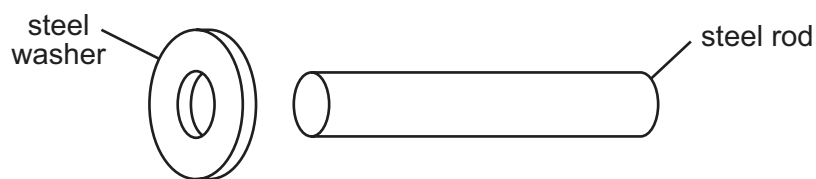
girl weighs 500 N

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.

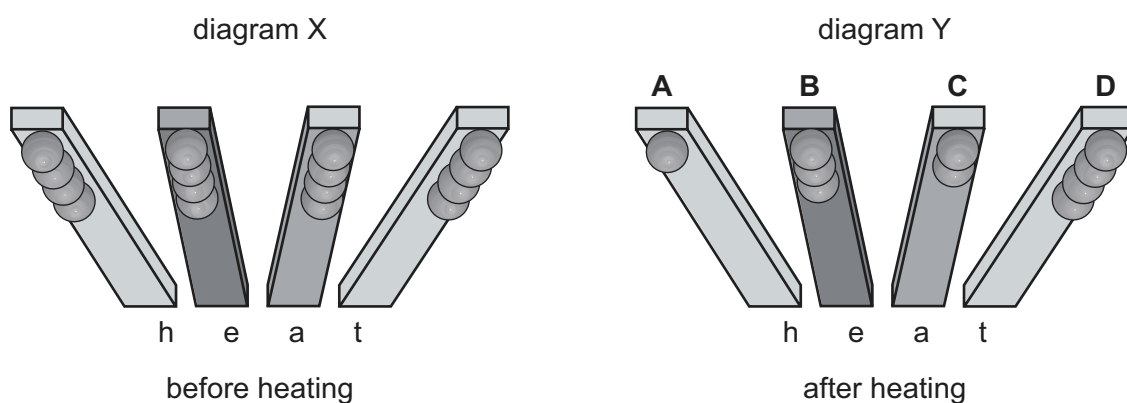


How can the engineer fit the washer onto the rod?

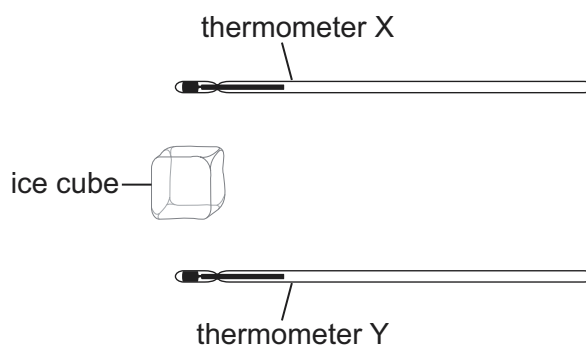
- A cool the washer and put it over the rod
  - B cool the washer and rod to the same temperature and push them together
  - C heat the rod and then place it in the hole
  - D heat the washer and place it over the rod
- 29 An experiment is set up to find out which metal is the best conductor of heat. 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?



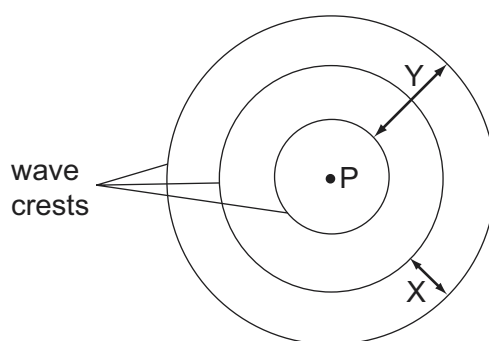
- 30 Thermometer X is held above an ice cube and thermometer Y is held the same distance below the ice cube. After several minutes, the reading on one thermometer changes. The ice cube does not melt.



Which thermometer reading changes and why?

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

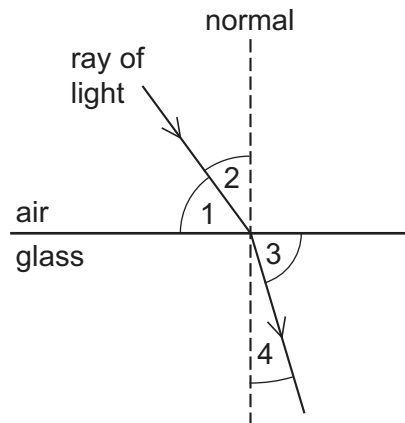
- 31 A vertical stick is dipped up and down in water at P. In two seconds, three wave crests are produced on the surface of the water.



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.

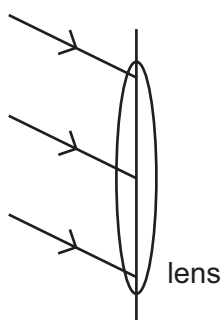
32 The diagram shows a ray of light entering a block of glass.



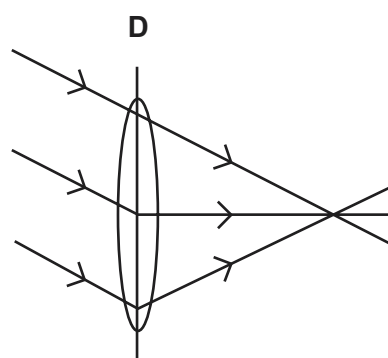
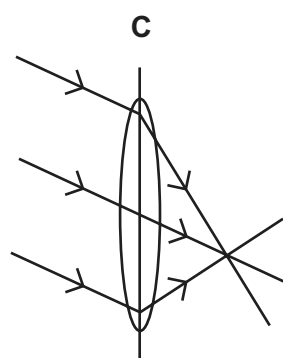
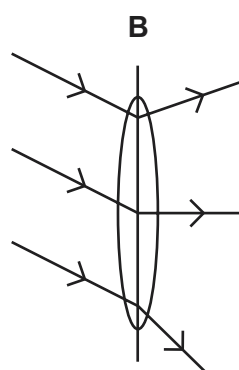
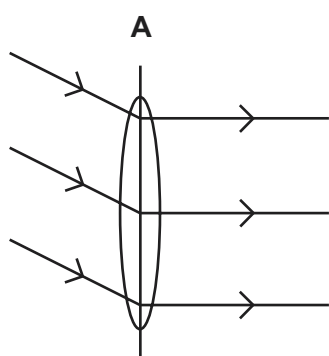
Which numbered angles are the angles of incidence and of refraction?

	angle of incidence	angle of refraction
<b>A</b>	1	3
<b>B</b>	1	4
<b>C</b>	2	3
<b>D</b>	2	4

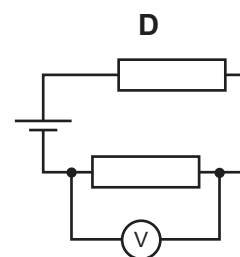
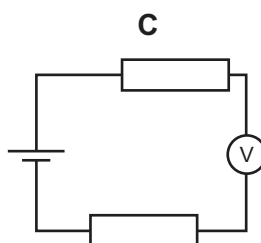
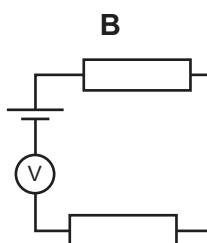
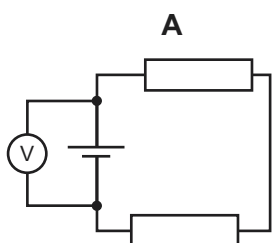
33 Three rays of light fall on a converging lens as shown.



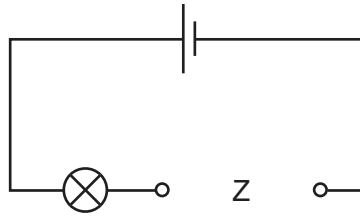
Which diagram shows the path of the rays after passing through the lens?



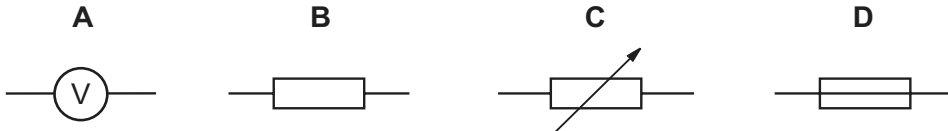
34 Which circuit shows how a voltmeter is connected to measure the potential difference across the cell?



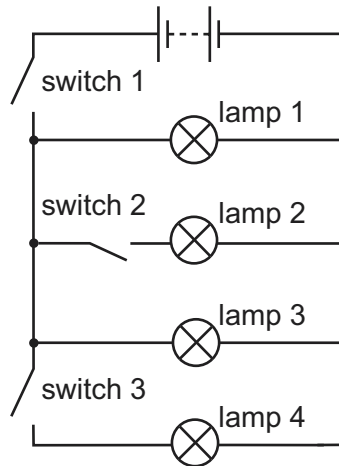
- 35 An electrical component is to be placed in the circuit at Z, to allow the brightness of the lamp to be varied from bright to dim.



What should be connected at Z?



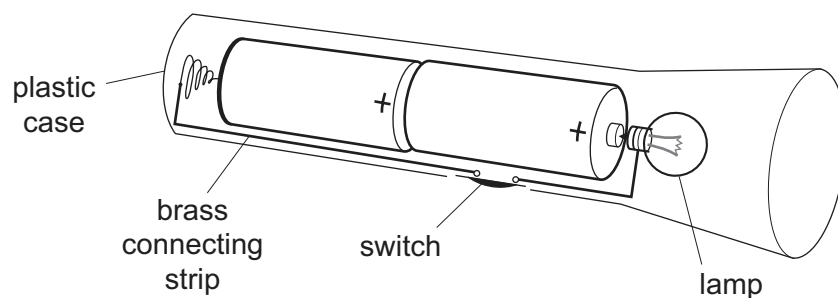
- 36 The circuit shown contains four lamps and three switches.



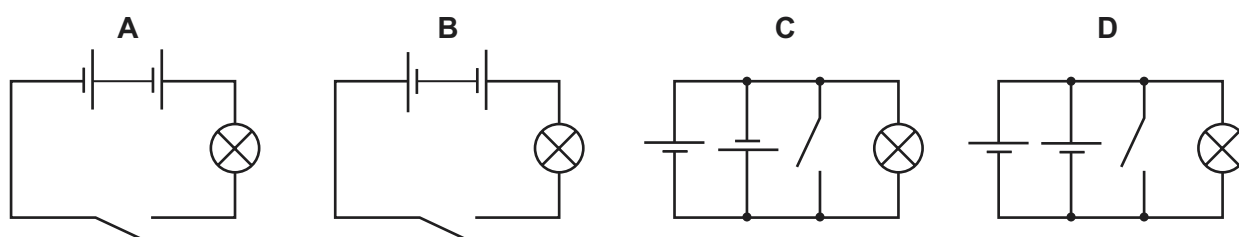
Which switches must be closed to light only lamps 1 and 3?

- 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

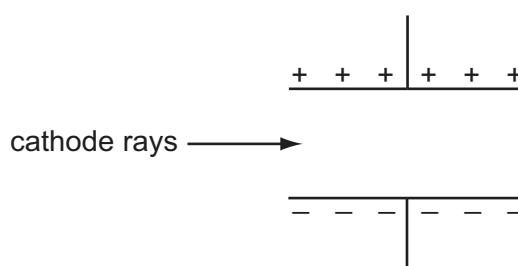
37 The diagram shows a torch containing two 2 V cells, a switch and a lamp.



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  $\alpha$ -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	VIII	IX	X	XI	XII																																																																																																			
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	13 <b>Al</b> Aluminium 13	14 <b>N</b> Nitrogen 7	15 <b>O</b> Oxygen 8	16 <b>F</b> Fluorine 9	17 <b>Ne</b> Neon 10	18 <b>Ar</b> Argon 18	19 <b>K</b> Potassium 19	20 <b>Ca</b> Calcium 20	21 <b>Sc</b> Scandium 21	22 <b>Ti</b> Titanium 22	23 <b>V</b> Vanadium 23	24 <b>Cr</b> Chromium 24	25 <b>Mn</b> Manganese 25	26 <b>Fe</b> Iron 26	27 <b>Co</b> Cobalt 27	28 <b>Ni</b> Nickel 28	29 <b>Cu</b> Copper 29	30 <b>Zn</b> Zinc 30	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36	37 <b>Rb</b> Rubidium 37	38 <b>Sr</b> Strontium 38	39 <b>Y</b> Yttrium 39	40 <b>Zr</b> Zirconium 40	41 <b>Nb</b> Niobium 41	42 <b>Mo</b> Molybdenum 42	43 <b>Tc</b> Technetium 43	44 <b>Ru</b> Ruthenium 44	45 <b>Rh</b> Rhodium 45	46 <b>Pd</b> Palladium 46	47 <b>Ag</b> Silver 47	48 <b>Cd</b> Cadmium 48	49 <b>In</b> Indium 49	50 <b>Sn</b> Tin 50	51 <b>Sb</b> Antimony 51	52 <b>Te</b> Tellurium 52	53 <b>I</b> Iodine 53	54 <b>Xe</b> Xenon 54	55 <b>Cs</b> Caesium 55	56 <b>Ba</b> Barium 56	57 <b>La</b> Lanthanum 57	58 <b>Ce</b> Cerium 58	59 <b>Pr</b> Praseodymium 59	60 <b>Nd</b> Neodymium 60	61 <b>Pm</b> Promethium 61	62 <b>Sm</b> Samarium 62	63 <b>Eu</b> Europium 63	64 <b>Gd</b> Gadolinium 64	65 <b>Tb</b> Terbium 65	66 <b>Dy</b> Dysprosium 66	67 <b>Ho</b> Holmium 67	68 <b>Er</b> Erbium 68	69 <b>Tm</b> Thulium 69	70 <b>Yb</b> Ytterbium 70	71 <b>Lu</b> Lutetium 71	72 <b>Hf</b> Hafnium 72	73 <b>Ta</b> Tantalum 73	74 <b>W</b> Tungsten 74	75 <b>Re</b> Rhenium 75	76 <b>Os</b> Osmium 76	77 <b>Ir</b> Iridium 77	78 <b>Pt</b> Platinum 78	79 <b>Au</b> Gold 79	80 <b>Hg</b> Mercury 80	81 <b>Tl</b> Thallium 81	82 <b>Pb</b> Lead 82	83 <b>Bi</b> Bismuth 83	84 <b>Po</b> Polonium 84	85 <b>At</b> Astatine 85	86 <b>Rn</b> Radon 86	87 <b>Fr</b> Francium 87	88 <b>Ra</b> Radium 88	89 <b>Ac</b> Actinium 89	90 <b>Th</b> Thorium 90	91 <b>Pa</b> Protactinium 91	92 <b>U</b> Uranium 92	93 <b>Np</b> Neptunium 93	94 <b>Pu</b> Plutonium 94	95 <b>Am</b> Americium 95	96 <b>Cm</b> Curium 96	97 <b>Bk</b> Berkelium 97	98 <b>Cf</b> Californium 98	99 <b>Es</b> Einsteinium 99	100 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103	104 <b>Rf</b> Rutherfordium 104	105 <b>Db</b> Dubnium 105	106 <b>Sg</b> Seaborgium 106	107 <b>Bh</b> Bohrium 107	108 <b>Hs</b> Hassium 108	109 <b>Mt</b> Meitnerium 109	110 <b>Ds</b> Darmstadtium 110	111 <b>Rg</b> Roentgenium 111	112 <b>Cn</b> Copernicium 112	113 <b>Nh</b> Nihonium 113	114 <b>Fl</b> Flerovium 114	115 <b>Mc</b> Moscovium 115	116 <b>Lv</b> Livermorium 116	117 <b>Ts</b> Tennessine 117	118 <b>Og</b> Oganesson 118

**\*58-71 Lanthanoid series**

**90-103 Actinoid series**

**Key**

$a$	<b>X</b>	$b$
-----	----------	-----

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

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