UNIVERSITY OF CAMBRIDGE INTERNATIONAL EX
International General Certificate of Secondary Educati

PHYSICAL SCIENCE

Paper 1 Multiple Choice

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

0544569426

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 students are asked to explain why gases diffuse more readil

Three of their suggestions are:

1 gas molecules are further apart;

2 gas molecules move more rapidly;

3 liquid molecules vibrate around fixed positions.

Which suggestions are correct?

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

2 Which substance in the table has ionic bonding?

	boiling point / °C	electrical conductivity		
		solid	molten	aqueous solution
A	–80	poor	poor	quite good
B	–26	poor	poor	poor
C	1206	poor	good	good
D	4875	good	good	insoluble

3 Element Y is in the second Period of the Periodic Table.

An atom of element Z has six more protons than an atom of element Y.

Which statement **must** be correct?

A Elements Y and Z are in the same Period.

B Elements Y and Z have the same number of electrons in the first shell.

C Element Z has six more electrons in its outer shell than element Y.

D The nucleon number of element Z is six more than that of element Y.

4 Some reactions of sulfuric acid are shown.

$H_2SO_4 + 2KHCO_3 \rightarrow K_2SO_4 + 2H_2O + 2C$

$H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$

$H_2SO_4 + MgCO_3 \rightarrow MgSO_4 + H_2O + CO$

$H_2SO_4 + MgO \rightarrow MgSO_4 + H_2O$

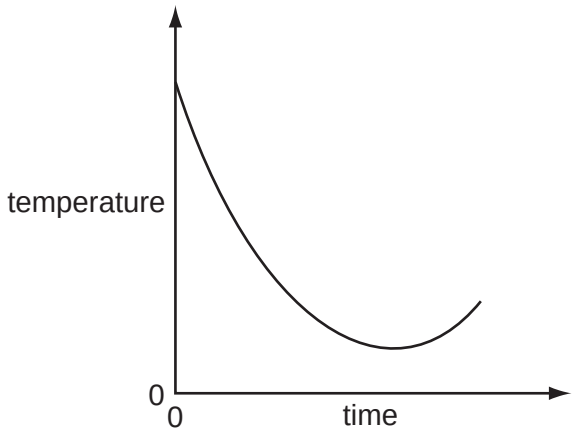
Which compound gives the greatest mass of water when 10 g sulfuric acid?

[M_r : MgO, 40; $MgCO_3$, 84; KOH, 56; $KHCO_3$, 100]

A $KHCO_3$ **B** KOH **C** $MgCO_3$ **D** MgO

5 The temperature of two solutions is measured before, during and after they react with each other.

The graph shows the results.



Which terms must apply to this reaction?

	endothermic	neutralisation
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

6 The diagram shows a cup of tea with a spoon in it.

What will **not** make the sugar in the tea dissolve more quickly?

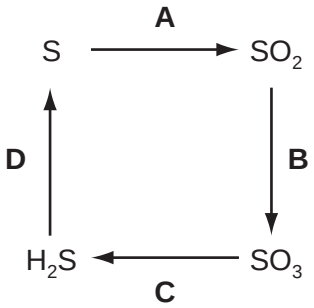
A adding more sugar

B stirring the tea

C using hotter water

D using more water

7 Which change shows a reduction?



8 A colourless solution of solid X has lost its label. Possible identities of X are shown.

1 sodium carbonate

2 sodium hydroxide

3 sodium chloride

The solution reacts with an acid, forming a salt and water only.

What could X be?

A 1 only **B** 1 or 2 only **C** 1, 2 or 3 **D** 2 only

9 Aqueous sodium hydroxide and aqueous ammonia each give a w
aqueous zinc sulfate.

What happens when an excess of each of these reagents is added

	excess NaOH(aq)	excess NH_3(aq)
A	precipitate dissolves	precipitate dissolves
B	precipitate dissolves	precipitate does not dissol
C	precipitate does not dissolve	precipitate dissolves
D	precipitate does not dissolve	precipitate does not dissolve

10 Which oxide is basic?

A CO_2 **B** H_2O **C** MgO **D** NO_2

11 Elements X and Y each have a proton number greater than 10 but less than 19.

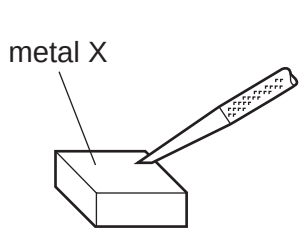
The proton number of Y is 6 greater than that of X.

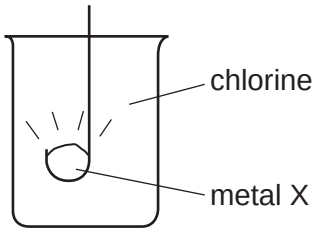
Which statements about elements X and Y **must** be correct?

	X is the more metallic	Y is diatomic	X and Y react together
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

12 Metal X

can easily be cut, reacts with chlorine,





Which metal could X be?

A copper

B iron

C magnesium

D potassium

13 Which properties of helium explain its use in filling balloons?

	low density	its unreactivity
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

14 Which substance is a malleable element that conducts electricity?

A aluminium

B bromine

C steel

D sulfur

15 A new container is being developed to carry food and water on long walks. It needs to be light and corrosion resistant.

Which metal would be the **most** suitable?

A aluminium

B iron

C mild steel

D stainless steel

16 Which statement is **not** correct?

A Carbon monoxide is formed by the incomplete combustion of c

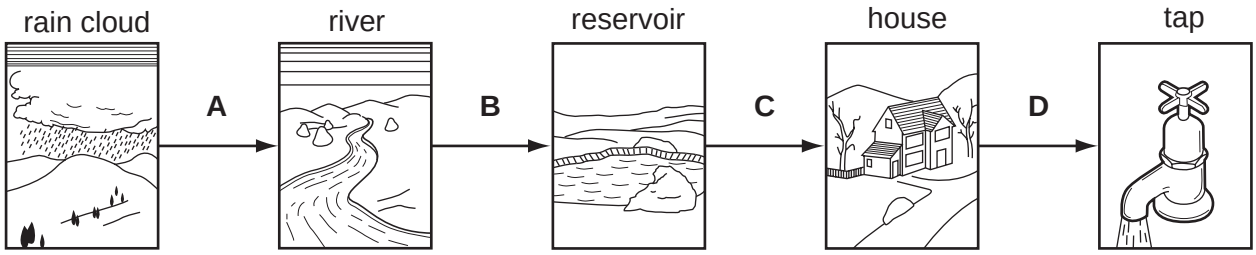
B Car exhaust fumes can contain oxides of nitrogen.

C Clean air contains approximately 79 % oxygen and 20 % nitrog

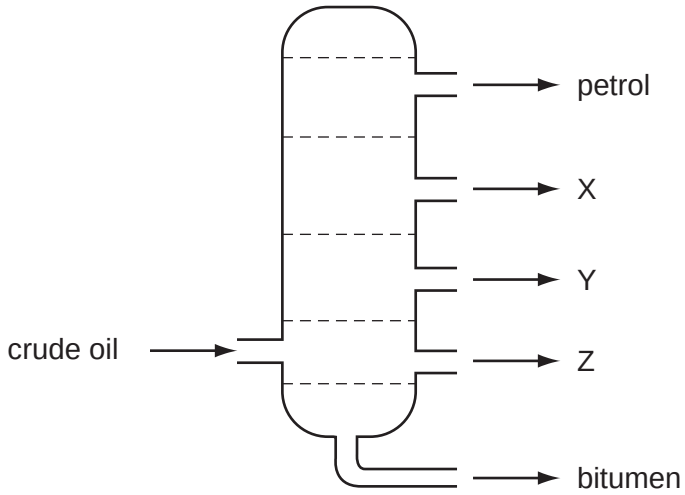
D Sulfur dioxide is a common air pollutant.

17 Chlorine is added to water to make it safe to drink.

At which stage is chlorine added to the water?



18 The diagram shows the separation of crude oil into fractions.



What could X, Y and Z represent?

	X	Y	Z
A	diesel	lubricating oil	paraffin
B	lubricating oil	diesel	paraffin
C	paraffin	lubricating oil	diesel
D	paraffin	diesel	lubricating oil

19 A homologous series is defined as a group of compounds which ha

A chain length.

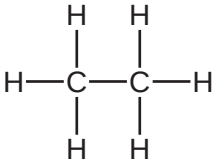
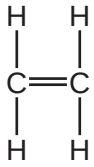
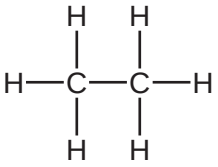
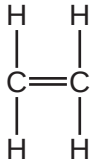
B elements in them.

C functional group.

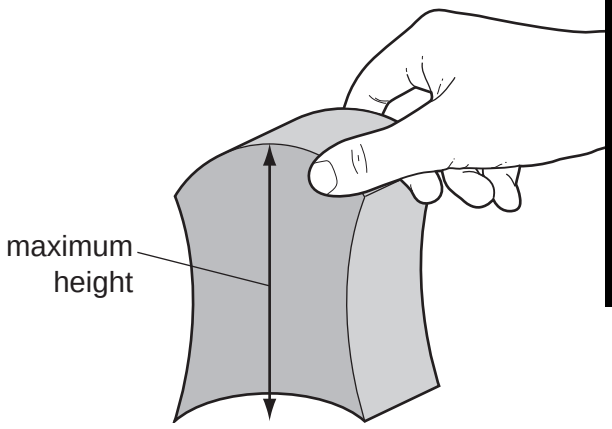
D number of carbon atoms.

20 A substance X decolourised aqueous bromine.

What is the name and structure of X?

	name	structure
A	ethane	
B	ethane	
C	ethene	
D	ethene	

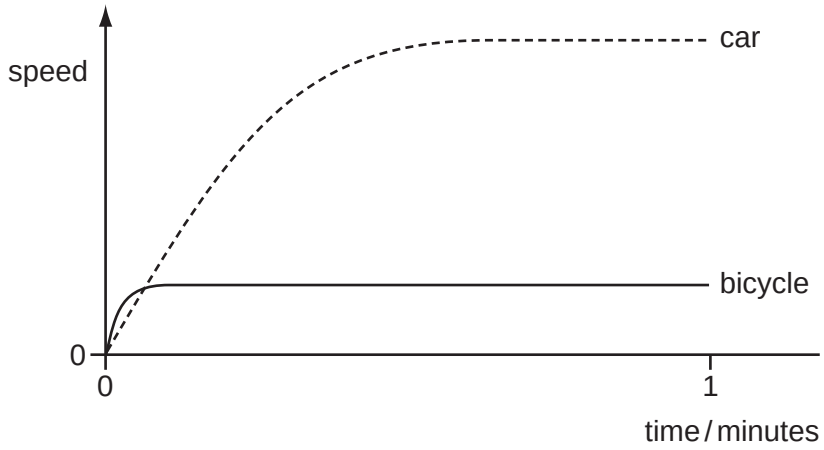
21 The diagram shows a child's building block. Its volume and maximu



Which instruments are used?

	to determine the volume	to measure the maximum height
A	balance	rule
B	measuring cylinder	rule
C	rule	balance
D	rule	measuring cylinder

22 The graph shows the speed of a bicycle and the speed of a car during the first minute after they start to move.



Compared with the car, the bicycle

A has a greater initial maximum acceleration.

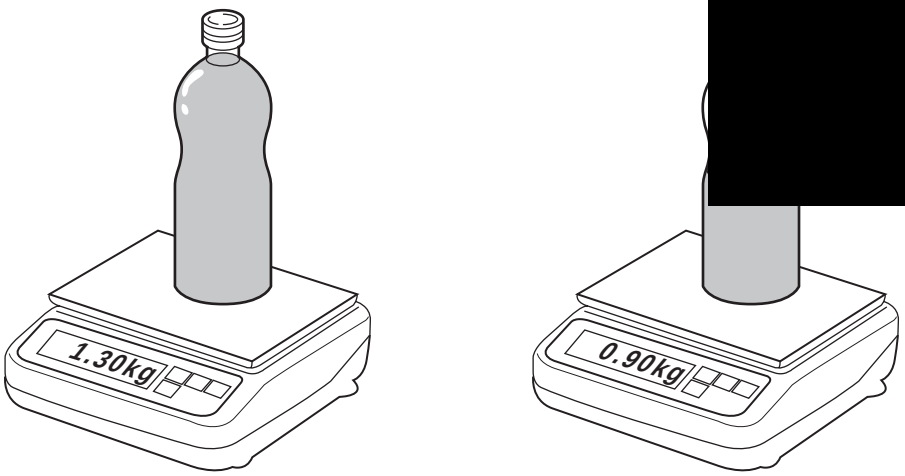
B has a greater steady speed.

C reaches its steady speed later than the car.

D travels further.

23 The mass of a full bottle of cooking oil is 1.30 kg.

When exactly half of the oil has been used, the mass of the b
0.90 kg.



What is the mass of the empty bottle?

A 0.40 kg **B** 0.50 kg **C** 0.65 kg **D** 0.80 kg

24 Ice has a density of 900 kg / m^3, and liquid water has a density of 1000 kg / m^3.

What happens to a block of ice as it melts?

A Its mass decreases.

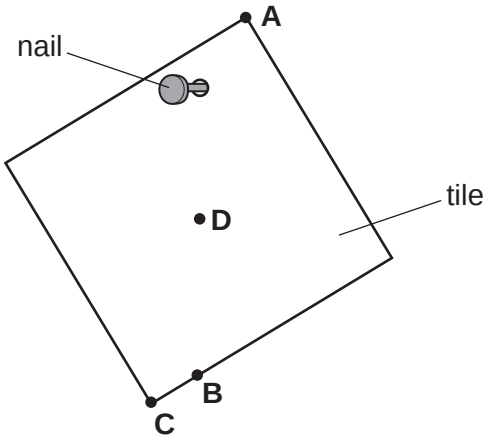
B Its mass increases.

C Its volume decreases.

D Its volume increases.

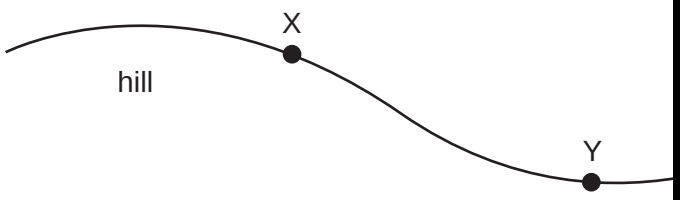
25 A hole is drilled in a square tile. The diagram shows the tile hanging freely on a nail.

Where is the centre of gravity of the tile?



26 A cyclist travels down a hill from rest at point X without pedalling.

The cyclist applies his brakes and the cycle stops at point Y.



Which energy changes have taken place between X and Y?

A gravitational potential → internal (heat) → kinetic

B gravitational potential → kinetic → internal (heat)

C kinetic → gravitational potential → internal (heat)

D kinetic → internal (heat) → gravitational potential

27 What would be suitable to use as a fixed point for a thermometer?

A a lit Bunsen burner

B a melting ice cube

C hot water in a bath

D refrigerated milk

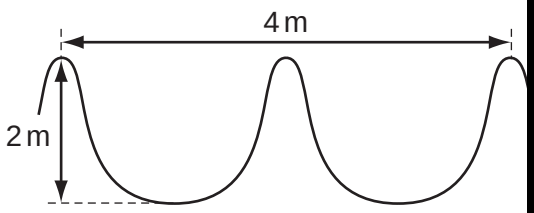
28 A fridge is fitted with a cooling unit and an oven is fitted with a heater.

The cooling unit can be fitted either at the top or at the bottom of the fridge, and the heater can be fitted either at the top or at the bottom of the oven.

Which row shows the best position to fit the cooling unit and the heater?

	cooling unit	heater
A	bottom	bottom
B	bottom	top
C	top	bottom
D	top	top

29 The diagram represents a water wave.



Which row shows the amplitude and the wavelength of the waves?

	amplitude / m	wavelength / m
A	1	2
B	1	4
C	2	2
D	2	4

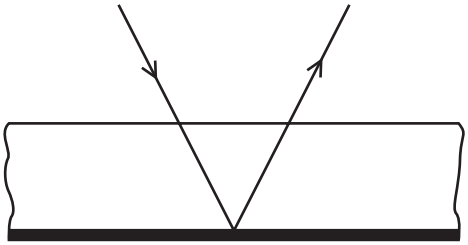
30 What is the correct order of waves in the electromagnetic spectrum?

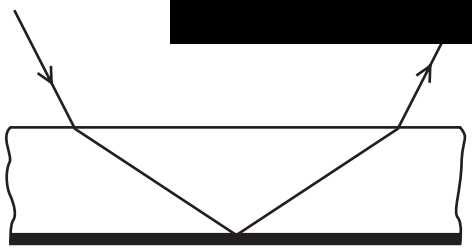
	shortest wavelength ⟶		longest wavelength
A	gamma-rays	radio waves	visible light
B	gamma-rays	visible light	radio waves
C	visible light	gamma-rays	radio waves
D	visible light	radio waves	gamma-rays

31 The diagram shows a section through a mirror made of thick glass

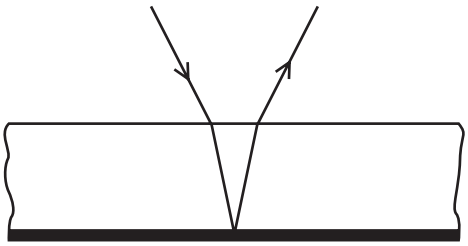
Which diagram shows the path of a ray of light reflected by the mir

A

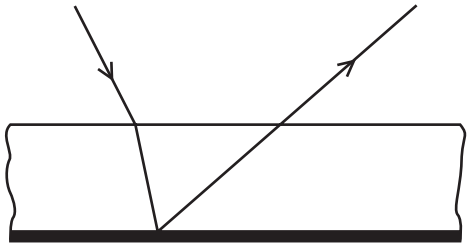




C



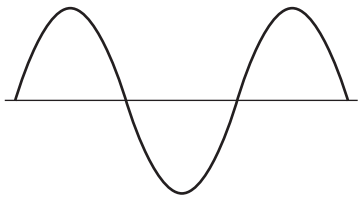
D



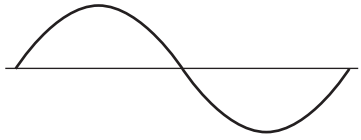
32 The diagrams represent four different sound waves shown on the screen of an oscilloscope. The controls of the oscilloscope are set the same in each case.

Which diagram represents the sound with the highest frequency?

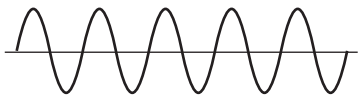
A



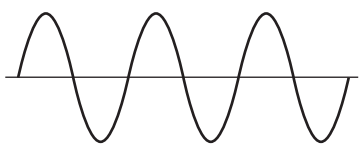
B



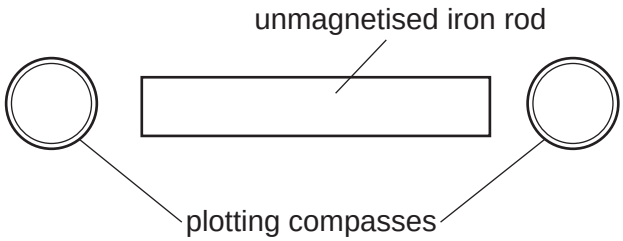
C



D

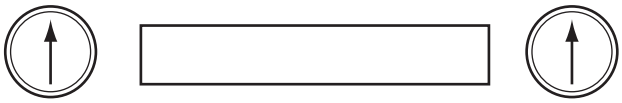


33 Two plotting compasses are positioned, one at each end of an u
positioned in an east-west direction.

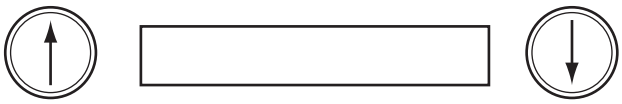


Which diagram shows the directions of the pointers of the plotting compasses?

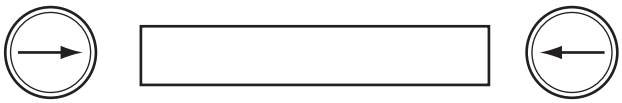
A



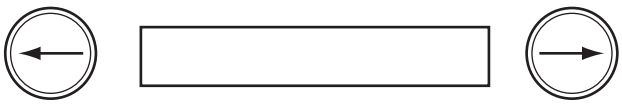
B



C



D



34 A car headlamp takes a current of 3.0 A when connected to a 12.0 V battery.

What is the resistance of the bulb when it is lit?

A 0.25 Ω **B** 4.0 Ω **C** 15 Ω **D** 36 Ω

35 When a plastic comb is placed next to a small piece of aluminium foil hanging from a nylon thread, the foil is repelled by the comb.

Why is this?

A The comb is charged and the foil is uncharged.

B The comb is uncharged and the foil is charged.

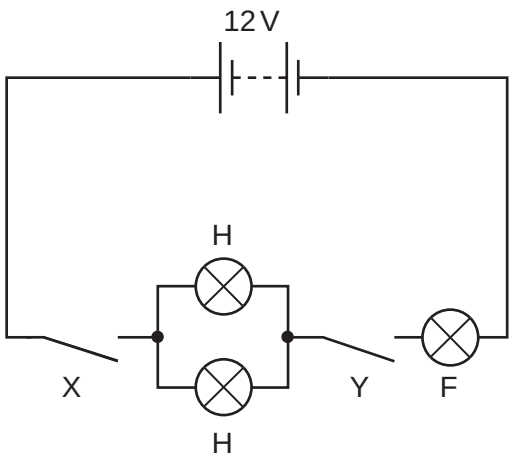
C The comb and the foil have charge of opposite signs.

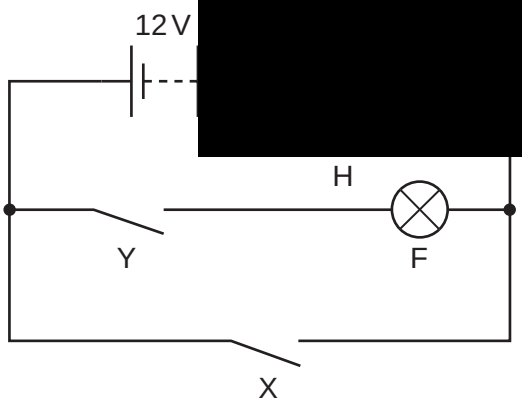
D The comb and the foil have charge of the same sign.

36 In a car, the headlamps H are controlled by switch X. The foglamp
only comes on if the headlamps are also switched on.

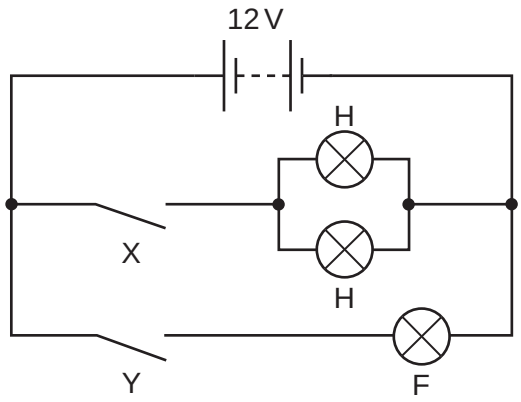
Which circuit would allow all the lamps to work as above and at full

A





C



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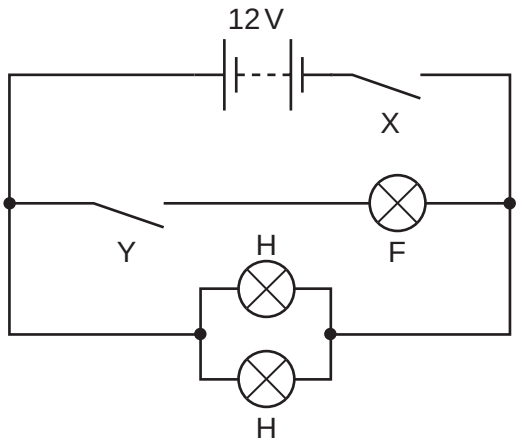


37 A mains electrical circuit uses insulated copper cable and the cable overheats.

To prevent the cable overheating, how should the cable be changed, and why?

A Use thicker copper cable which has less resistance.

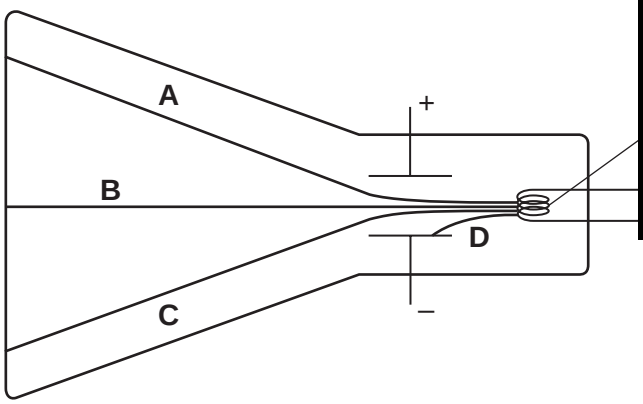
B Use thicker insulation which stops the heat escaping.

C Use thinner copper cable which has more resistance.

D Use thinner insulation which allows less heat to escape.

38 In a cathode ray tube, cathode rays are emitted by a filament.

Which line could show the path the rays take, with the connections



39 The half-life of the radioactive isotope caesium $^{137}_{55}Cs$ is 30 years.

Starting with 30 grams of the isotope, what mass of the isotope remains after 90 years?

A 10.0 grams

B 7.50 grams

C 3.75 grams

D 1.25 grams

40 What is the number of protons in an atom of $^{222}_{86}Rn$?

A 86 **B** 136 **C** 222 **D** 308

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DATA SHEET
The Periodic Table of the Elements

	Group																	
	I	II									III	IV	V	VI	VII	0
																4 He Helium 2
							1 H Hydrogen 1				11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
	7 Li Lithium 3	9 Be Beryllium 4									27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
	23 Na Sodium 11	24 Mg Magnesium 12									70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
	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	65 Zn Zinc 30	112 Cd Cadmium 48	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
	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	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	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
	223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

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

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.).