UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE **0652/01**

Paper 1 Multiple Choice

October/November 2006

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.

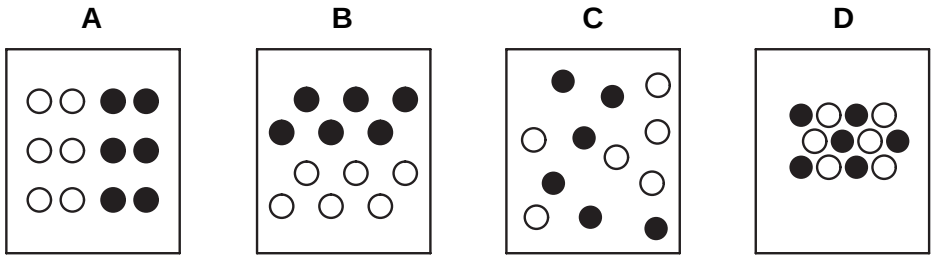
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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.

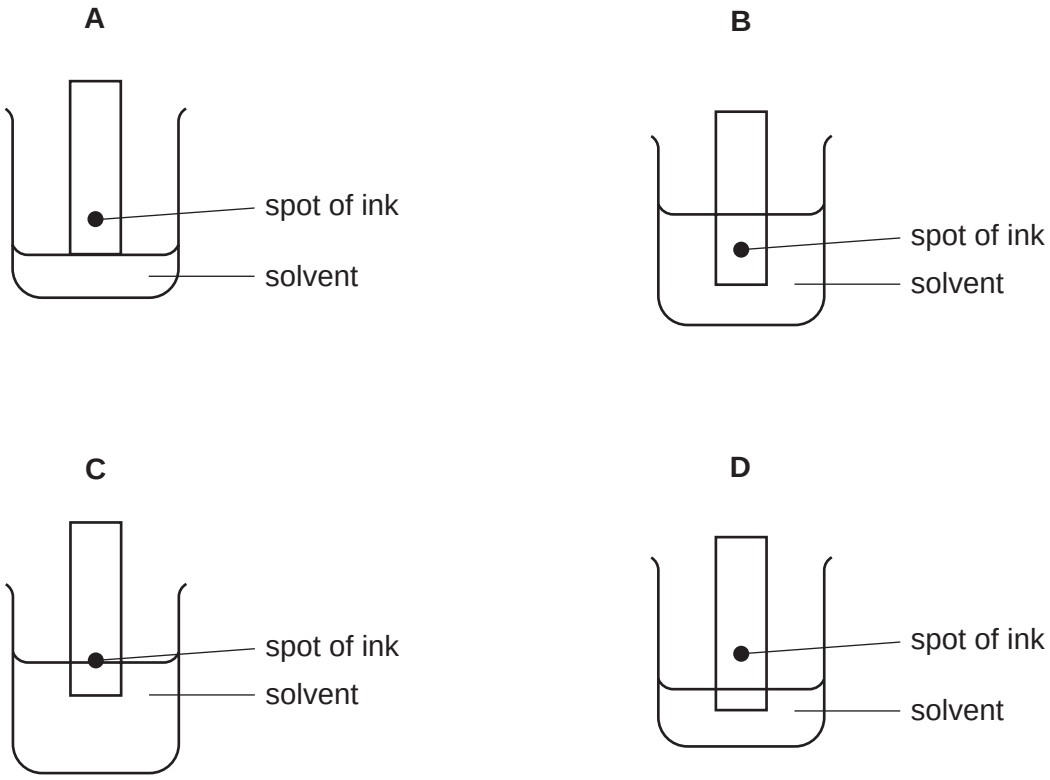
This document consists of **17** printed pages and **3** blank pages.

1 Which diagram shows how the particles in a mixture of two gases are arranged?



2 An ink can be separated by chromatography.

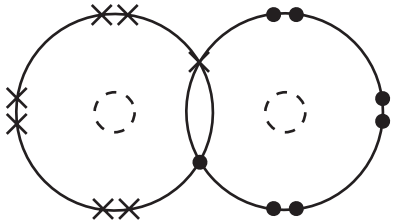
Which diagram shows the correct way to set up the apparatus?



3 What can be deduced from the number of protons and number of neutrons in an atom?

	group number	nucleon number
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

4 The dot-and-cross diagram shows the **outer** shell electrons in a molecule with a single covalent bond.



key

● electron

X electron

nucleus

What could this molecule be?

	H_2	Cl_2	HCl
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✗
D	✗	✗	✓

5 What is the formula of copper(II) oxide and of sulphur hexafluoride?

	copper(II) oxide	sulphur hexafluoride
A	CuO	SF_6
B	CuO	S_6F
C	Cu_2O	SF_6
D	Cu_2O	S_6F

6 Some white anhydrous copper(II) sulphate powder is put into a beaker of water and stirred.

What shows that the process is exothermic?

A A blue solution forms.

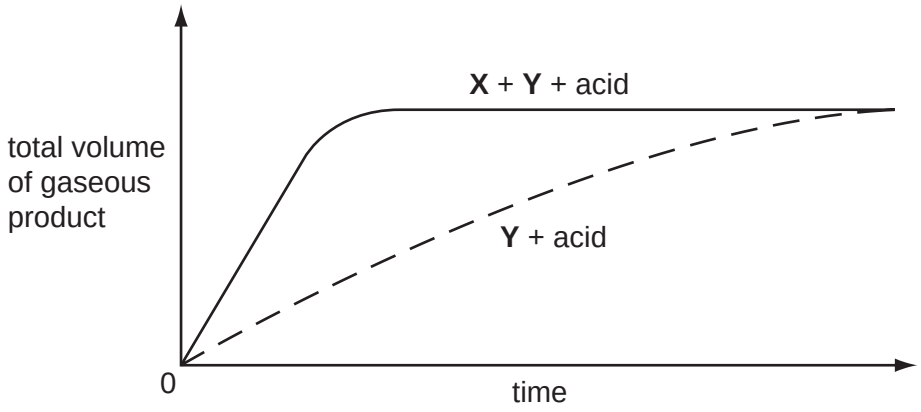
B A colourless solution forms.

C The beaker feels cooler to touch.

D The beaker feels warmer to touch.

7 Substance **X** does not react with dilute acid but substance **Y** does, forming a gaseous product.

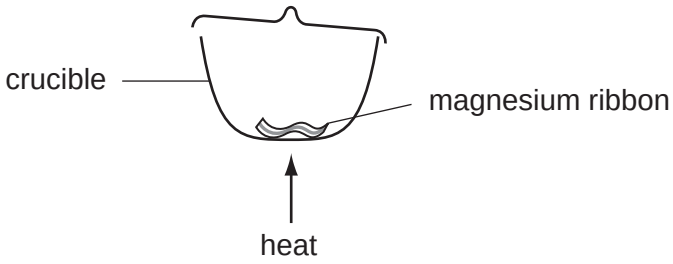
The graph shows the results of experiments using **Y** and dilute acid alone and then with **X** added.



What do these results show about **X**?

	X is a catalyst	**X** is quickly used up
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

8 The diagram shows an experiment.

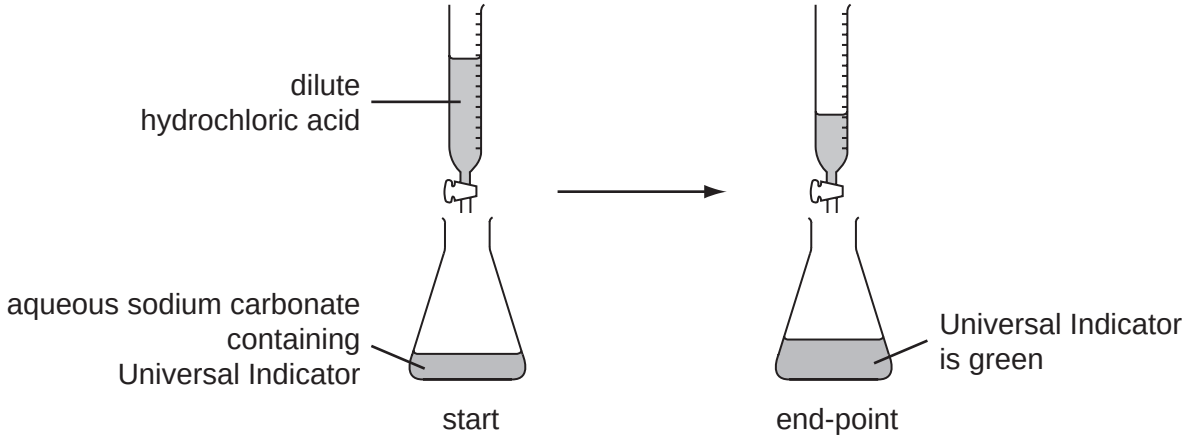


The crucible and contents are weighed before heating and then reweighed when cool.

What happens to the mass of the crucible and contents?

	the mass	because the magnesium is
A	decreases	oxidised
B	decreases	reduced
C	increases	oxidised
D	increases	reduced

9 The diagram shows a titration experiment.



Which pH values in the table could be correct?

	start		end-point
	dilute hydrochloric acid	aqueous sodium carbonate	solution in conical flask
A	2	7	5
B	2	9	7
C	12	7	9
D	12	9	7

10 Which equation shows a neutralisation reaction?

A $NH_3 + HCl \rightarrow NH_4Cl$

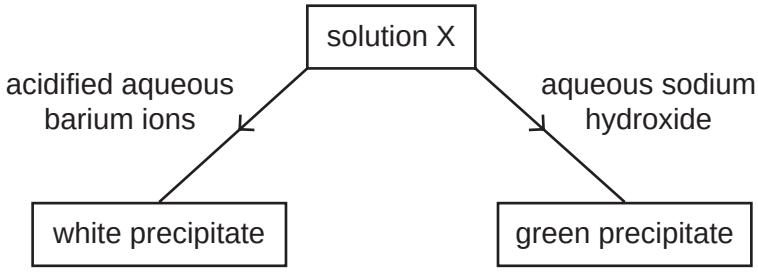
B $2N_2 + 3H_2 \rightarrow 2NH_3$

C $2NaBr + Cl_2 \rightarrow 2NaCl + Br_2$

D $S + O_2 \rightarrow SO_2$

[Turn over

11 Solution X is tested as shown.



Which ions are present in solution X?

	anion	cation
A	nitrate	copper(II)
B	nitrate	iron(II)
C	sulphate	copper(II)
D	sulphate	iron(II)

12 Which of the following reacts with aqueous sodium bromide?

A chloride ions

B chlorine

C iodide ions

D iodine

13 Which Group I metal and which Group VII non-metal react together most vigorously?

	Group I	Group VII
A	lithium	bromine
B	lithium	chlorine
C	potassium	bromine
D	potassium	chlorine

14 Students are asked to complete the following sentence about the elements helium, neon and argon.

They form …1… bonds because all of their atoms have outer shells that ……2…….

Which student is correct?

student	gap 1	gap 2
A	covalent	are full of electrons
B	covalent	have 8 electrons
C	no	are full of electrons
D	no	have 8 electrons

15 What is made from aluminium because of its low density?

A aircraft frames

B food cans

C pencil sharpeners

D window frames

16 A container is to be used to store either water or dilute sulphuric acid.

Which material can be used for making the container?

A glass and magnesium

B glass and poly(ethene)

C magnesium and poly(ethene)

D glass, magnesium and poly(ethene)

17 Which three elements should a balanced fertiliser contain?

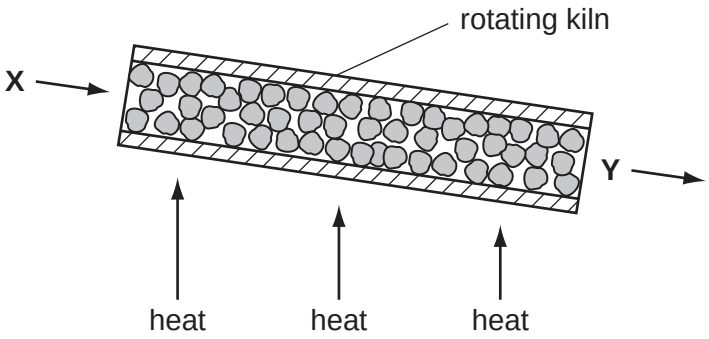
A Na, C, P

B Na, P, K

C K, C, N

D K, P, N

18 The diagram shows a lime kiln.



What are **X** and **Y**?

	X	Y
A	lime	limestone
B	lime	slaked lime
C	limestone	lime
D	slaked lime	lime

19 The molecular formulae for four hydrocarbons are shown.

CH_4	C_2H_4	C_3H_6	C_4H_{10}
1	2	3	4

Which of these hydrocarbons belong to the same homologous series?

A 1 and 2

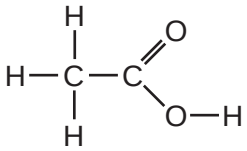
B 1, 2 and 4

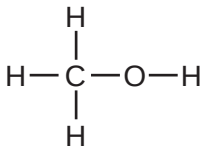
C 2 and 3

D 2, 3 and 4

20 In which pair are **both** molecules unsaturated?

A





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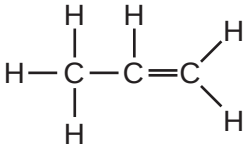

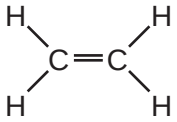

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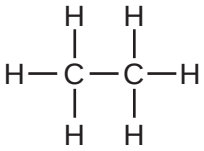

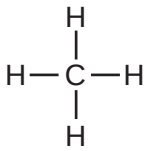

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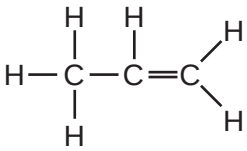
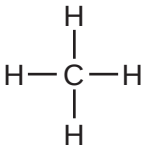
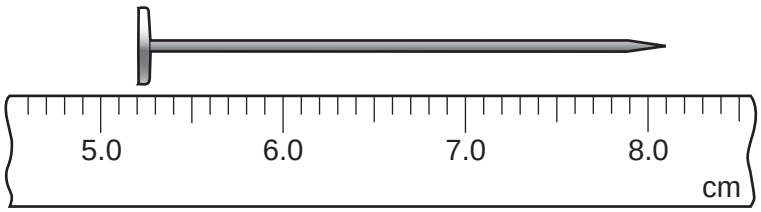




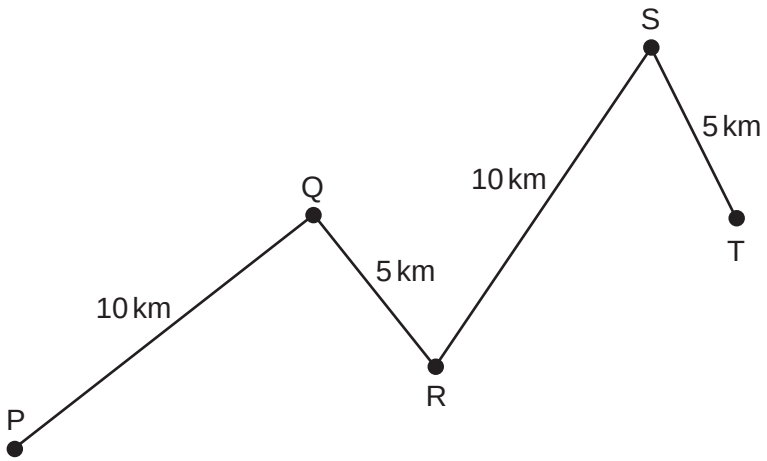
21 A ruler is used to measure the length of a nail.



What is the length of the nail?

A 1.3 cm **B** 2.9 cm **C** 5.2 cm **D** 8.1 cm

22 A car travels along the route PQRST in 30 minutes.



What is the average speed of the car?

A 10 km / hour

B 20 km / hour

C 30 km / hour

D 60 km / hour

23 A newton is a unit of force.

Which quantity is measured in newtons?

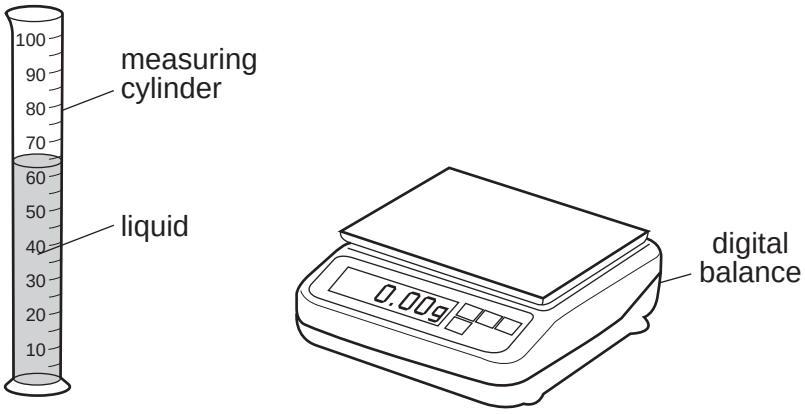
A acceleration

B density

C mass

D weight

24 A student pours liquid into a measuring cylinder.



The student records the volume of the liquid from the scale on the measuring cylinder. He then puts the measuring cylinder containing the liquid on a balance and records the mass.

What else needs to be measured before the density of the liquid can be calculated?

A the depth of the liquid in the measuring cylinder

B the mass of the empty measuring cylinder

C the temperature of the liquid in the measuring cylinder

D the volume of the empty measuring cylinder

25 Which source of energy uses the production of steam to generate electricity?

A hydroelectric

B nuclear

C tides

D waves

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 energy of motion → heat → gravitational

B energy of motion → gravitational → heat

C gravitational → heat → energy of motion

D gravitational → energy of motion → heat

27 A block of ice is heated until it has all melted. The water that is produced is then heated until it boils.

Which line in the table states what happens to the temperature of the ice while it is melting, and to the temperature of the water while it is boiling?

	temperature of ice while it is melting	temperature of water while it is boiling
A	increases	increases
B	increases	stays the same
C	stays the same	increases
D	stays the same	stays the same

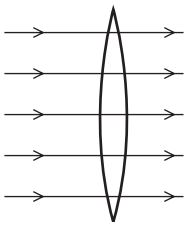
28 Which line in the table is correct about conduction and convection?

	conduction	convection
A	can happen in a solid	can happen in a solid
B	can happen in a solid	only happens in fluids
C	only happens in fluids	can happen in a solid
D	only happens in fluids	only happens in fluids

29 A parallel beam of light falls on a converging lens.

Which diagram shows what happens to the beam of light?

A



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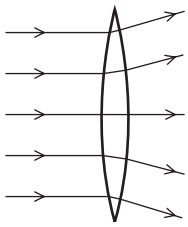

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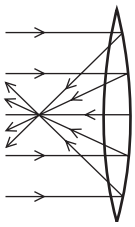
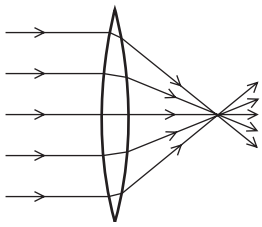
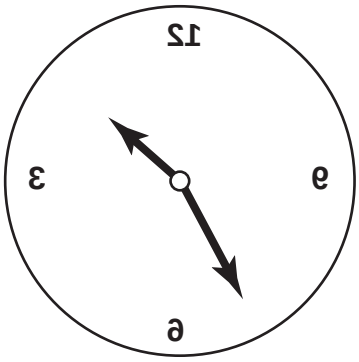


D



30 The image of a clock face as seen in a plane mirror is shown.



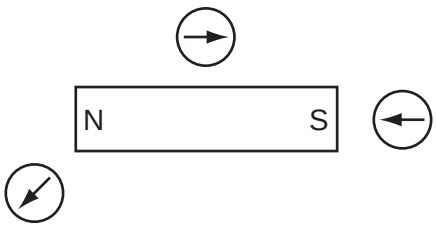
What is the time on the clock?

A 1.25 **B** 1.35 **C** 10.25 **D** 10.35

31 A student uses three small plotting compasses to investigate the magnetic field around a bar magnet.

Which diagram shows the directions in which the compass needles point?

A



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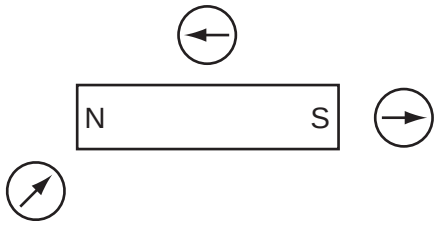

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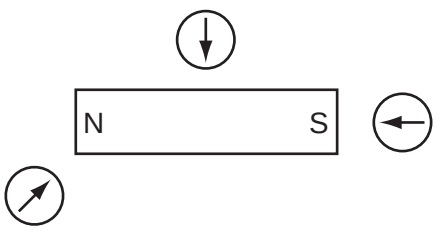

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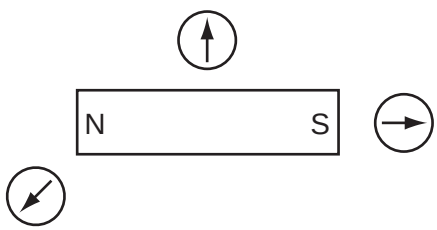
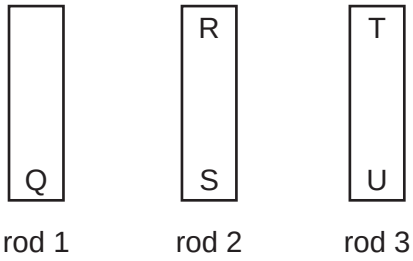


[Turn over

32 The ends of three metal rods are tested by holding end Q of rod 1 close to the others in turn.



The results are as follows.

End Q: attracts end R,
attracts end S,
attracts end T,
repels end U.

Which of the metal rods is a magnet?

A rod 1 only

B rod 1 and rod 2 only

C rod 1 and rod 3 only

D rod 3 only

33 A student wishes to measure the electromotive force (e.m.f.) of a battery and the potential difference (p.d.) across a resistor.

She has the resistor, the battery and some connecting wires.

What else does she need?

A a voltmeter only

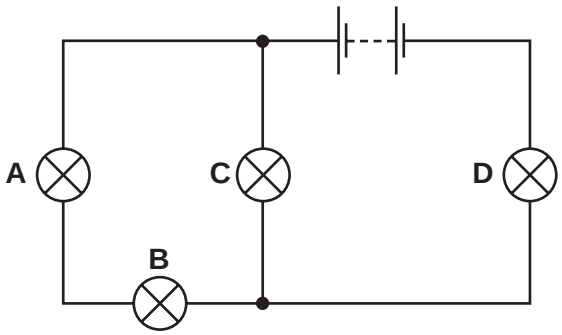
B an ammeter only

C an ammeter and a voltmeter

D a force meter (newton meter) and a voltmeter

34 In the circuit below, one of the lamps breaks, causing all the other lamps to go out.

Which lamp breaks?



35 An electric heater is connected to the mains, using insulated copper wires. The wires become very warm.

What can be done to prevent so much heat being produced in the connecting wires?

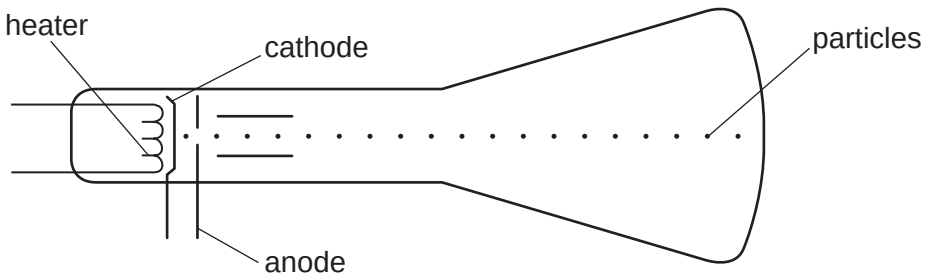
A Use thicker copper wires.

B Use thinner copper wires.

C Use thicker insulation.

D Use thinner insulation.

36 Particles are emitted by a heated cathode in a cathode-ray tube.



What are these particles?

A atoms

B electrons

C neutrons

D protons

37 Which line in the table describes the nature of an alpha-particle and of a gamma-ray?

	alpha-particle	gamma-ray
A	helium nucleus	electromagnetic radiation
B	helium nucleus	electron
C	proton	electromagnetic radiation
D	proton	electron

38 The count rates of four radioactive sources were measured at the same time on three consecutive days.

Which source has a half-life of two days?

	Monday	Tuesday	Wednesday
A	100	50	25
B	200	140	100
C	300	300	300
D	400	200	100

39 Which statement is true of all neutral atoms?

A The number of electrons equals the number of nucleons.

B The number of neutrons equals the number of protons.

C The number of nucleons equals the number of neutrons.

D The number of protons equals the number of electrons.

40 There are three nuclides of hydrogen.

nuclide 1	nuclide 2	nuclide 3
${}^{1}_{1}\mathrm{H}$	${}^{2}_{1}\mathrm{H}$	${}^{3}_{1}\mathrm{H}$

Which of these nuclides have the same number of protons in their nuclei?

A 1 and 2 only

B 2 and 3 only

C all of them

D none of them

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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 Sulphur 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	64 Cu Copper 29	65 Zn Zinc 30	115 In Indium 49	119 Sn Tin 50	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	112 Cd Cadmium 48	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
	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							
		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	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
†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	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

Key

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

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