

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.

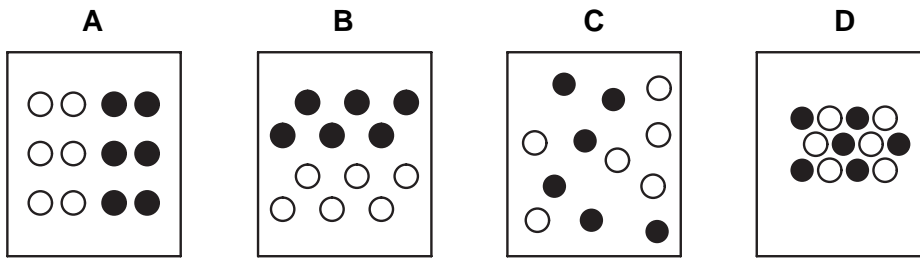
Read the instructions on the Answer Sheet very carefully.

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.

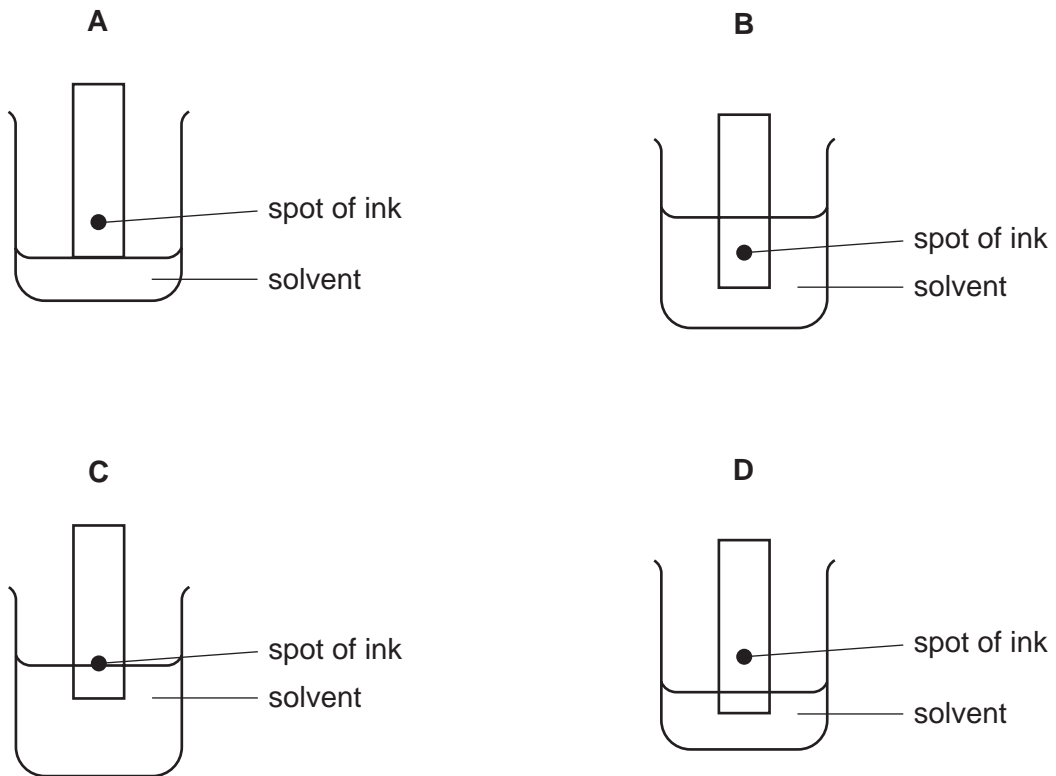


1 Which diagram shows how the particles in a mixture of two gases are arranged?



2 An ink can be separated by chromatography.

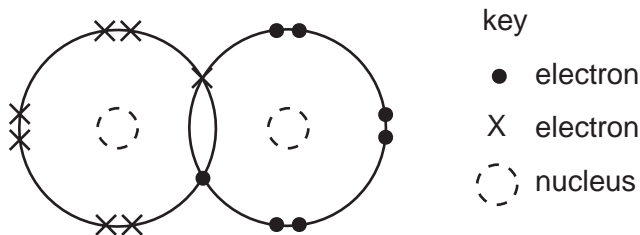
Which diagram shows the correct way to set up the apparatus?



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

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

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



What could this molecule be?

	H ₂	Cl ₂	HCl
A	✓	✓	✓
B	✓	x	x
C	x	✓	x
D	x	x	✓

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

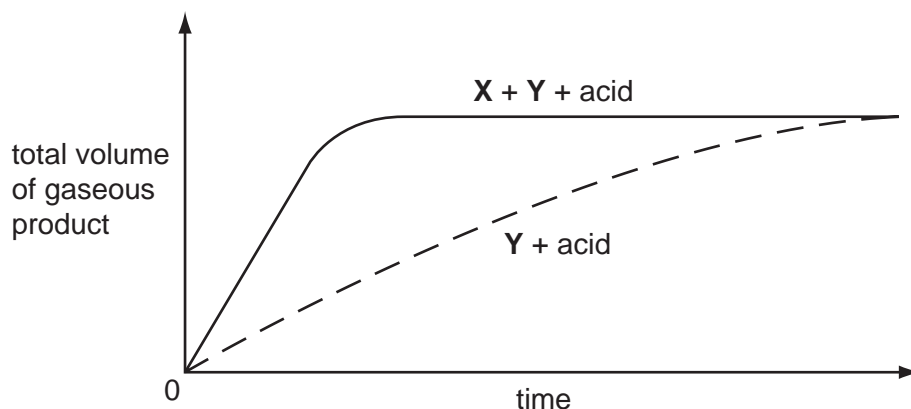
	copper(II) oxide	sulphur hexafluoride
A	CuO	SF ₆
B	CuO	S ₆ F
C	Cu ₂ O	SF ₆
D	Cu ₂ O	S ₆ F

- 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.

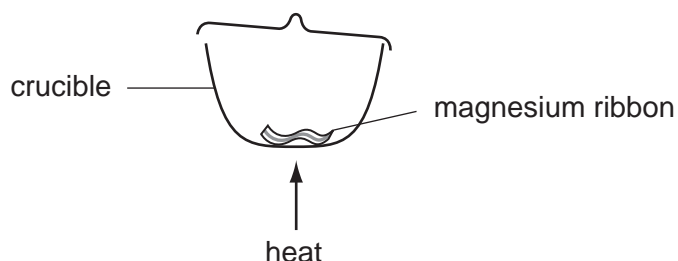
- 7 Substance **X** does not react with dilute acid but substance **Y** does, forming a gaseous product. The graph shows the results of experiments using **Y** and dilute acid alone and then with **X**.



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

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

- 8 The diagram shows an experiment.



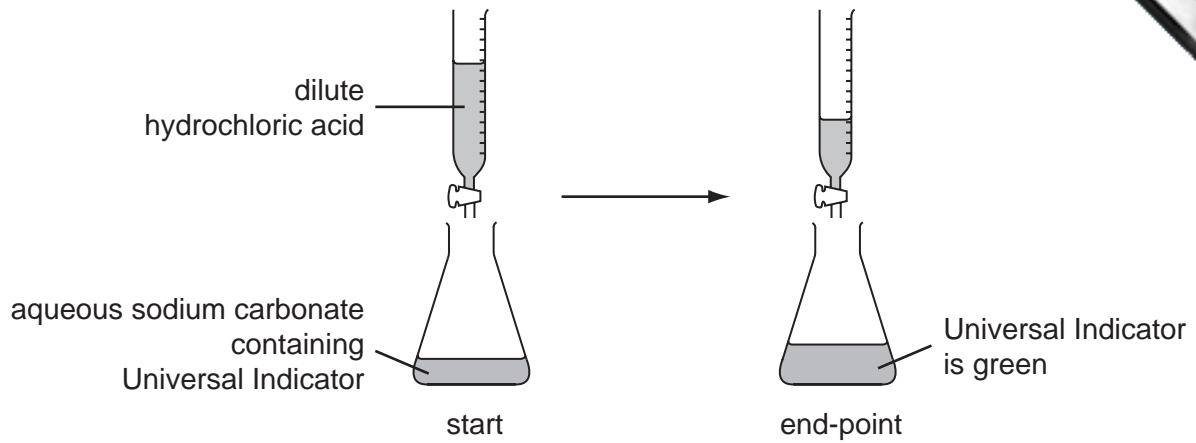
The crucible and contents are weighed before heating and then reweighed when cool.

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

5

9 The diagram shows a titration experiment.



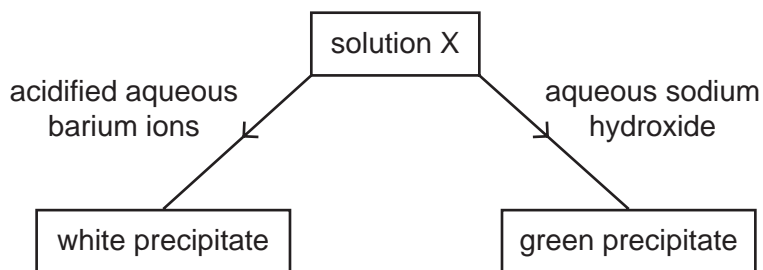
Which pH values in the table could be correct?

	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** $\text{NH}_3 + \text{HCl} \rightarrow \text{NH}_4\text{Cl}$
- B** $2\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$
- C** $2\text{NaBr} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{Br}_2$
- D** $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$

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 and argon.

They form ...1... bonds because all of their atoms have outer shells that2.....

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?

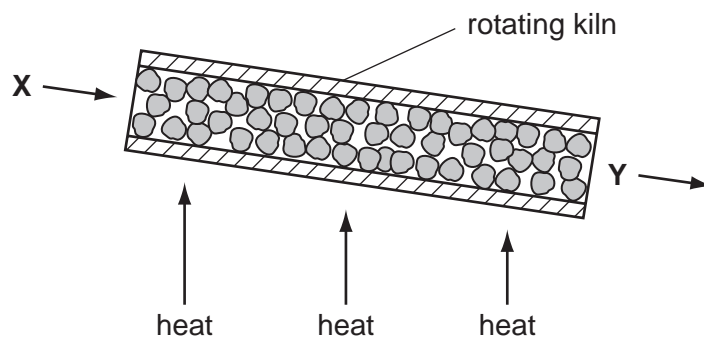
- A** glass and magnesium
- B** glass and poly(ethene)
- C** magnesium and poly(ethene)
- D** glass, magnesium and poly(ethene)

- 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

8

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

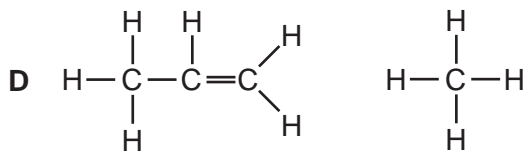
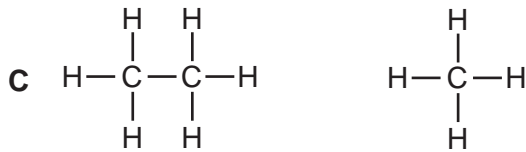
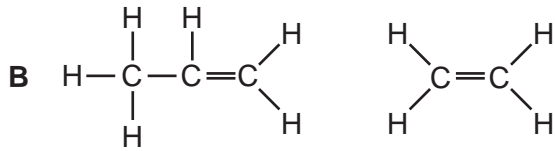
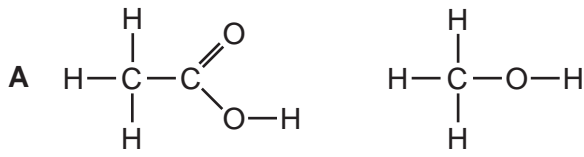
19 The molecular formulae for four hydrocarbons are shown.

CH_4	C_2H_4	C_3H_6	C_4H_{10}
1	2	3	4

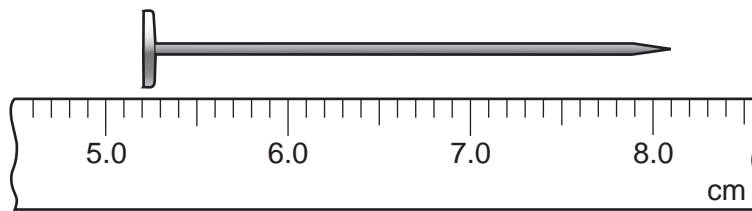
Which of these hydrocarbons belong to the same homologous series?

- 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?



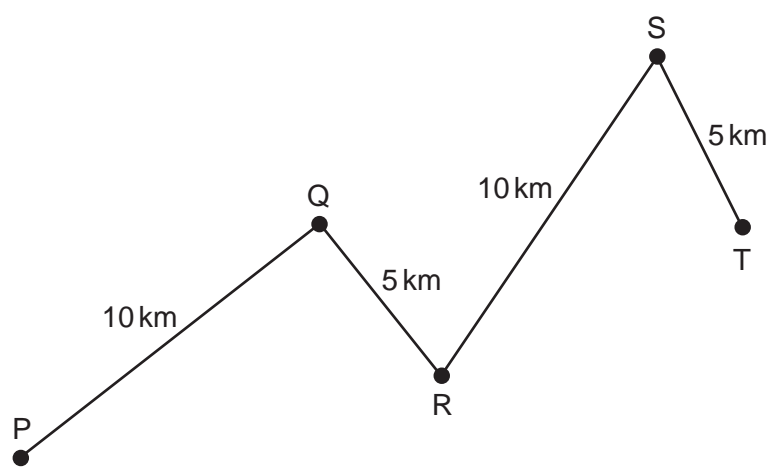
21 A ruler is used to measure the length of a nail.



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?

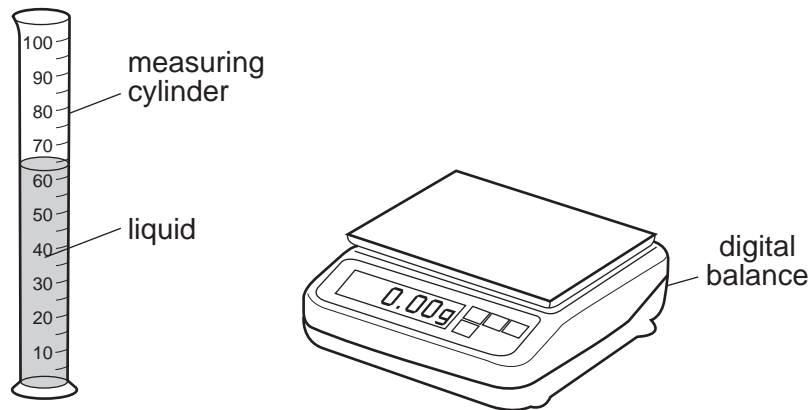
- A 10 km/hour
- B 20 km/hour
- C 30 km/hour
- D 60 km/hour

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?

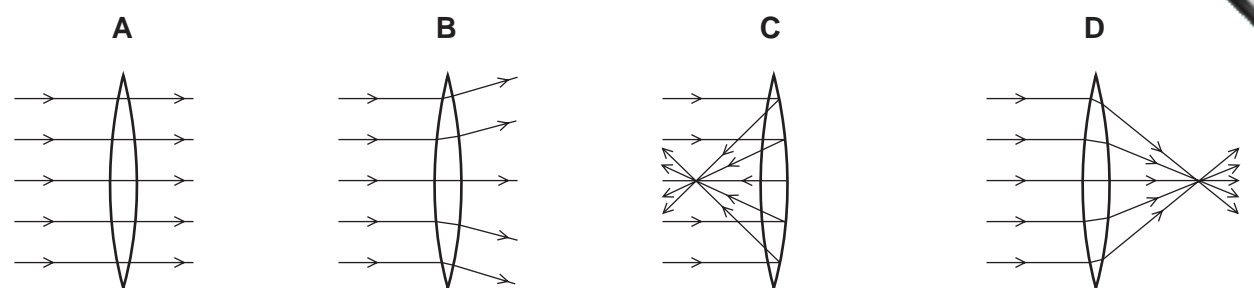
	temperature of ice while it is melting	temperature of water while it is boiling
A	increases	increases
B	increases	stays the same
C	stays the same	increases
D	stays the same	stays the same

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

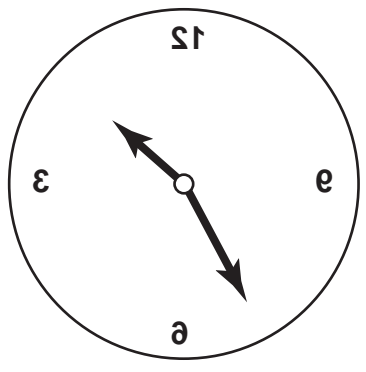
	conduction	convection
A	can happen in a solid	can happen in a solid
B	can happen in a solid	only happens in fluids
C	only happens in fluids	can happen in a solid
D	only happens in fluids	only happens in fluids

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

Which diagram shows what happens to the beam of light?



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

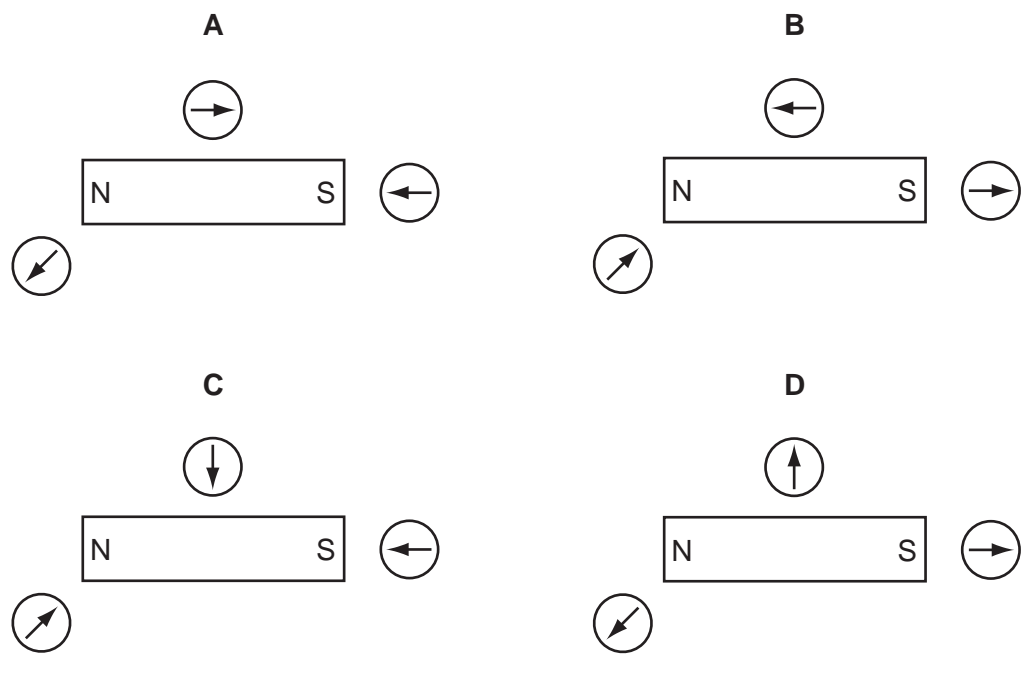


What is the time on the clock?

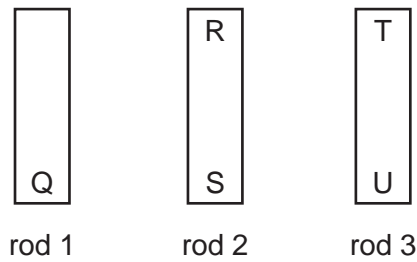
- A 1.25
- B 1.35
- C 10.25
- D 10.35

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?



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



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.

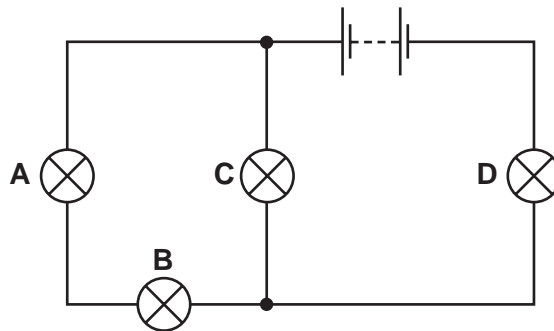
She has the resistor, the battery and some connecting wires.

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?

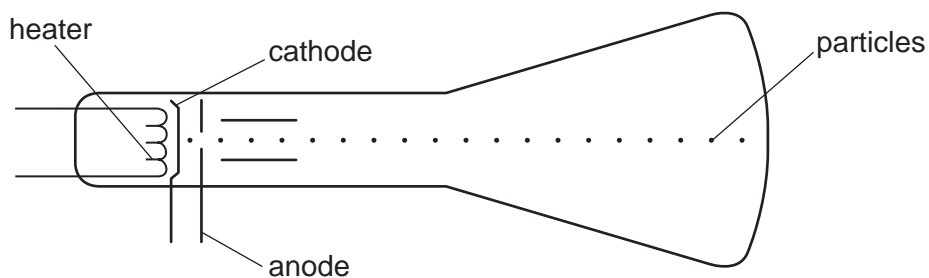


35 An electric heater is connected to the mains, using insulated copper wires. The wires become very warm.

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
${}^1_1\text{H}$	${}^2_1\text{H}$	${}^3_1\text{H}$

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

DATA SHEET
The Periodic Table of the Elements

		Group																												
I	II	III	IV	V	VI	VII	VIII					0																		
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	6 C Carbon 6	7 N Nitrogen 7	8 O Oxygen 8	9 F Fluorine 9	10 Ne Neon 10	11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18															
23 Na Sodium 11	24 Mg Magnesium 12	27 Fe Iron 26	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Ca Calcium 20	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	
55 Cs Caesium 55	56 Ba Barium 56	57 Fr Francium 87	58 Ce Cerium 58	59 Pr Praseodymium 59	60 Nd Neodymium 60	61 Pm Promethium 61	62 Sm Samarium 62	63 Eu Europium 63	64 Gd Gadolinium 64	65 Tb Terbium 65	66 Dy Dysprosium 66	67 Ho Holmium 67	68 Er Erbium 68	69 Tm Thulium 69	70 Yb Ytterbium 70	71 Lu Lutetium 71	72 Th Thorium 90	73 Pa Protactinium 91	74 U Uranium 92	75 Np Neptunium 93	76 Pu Plutonium 94	77 Am Americium 95	78 Cm Curium 96	79 Bk Berkelium 97	80 Cf Californium 98	81 Es Einsteinium 99	82 Fm Fermium 100	83 Md Mendelevium 101	84 No Nobelium 102	85 Lr Lawrencium 103
87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 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	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

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

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.).