Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE **0653/02**

Paper 2

May/June 2003

1 hour

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
A copy of the Periodic Table is printed on page 16.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use	
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This document consists of **16** printed pages.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate
[Turn over

1 Fig. 1.1 shows a fruit containing seeds.

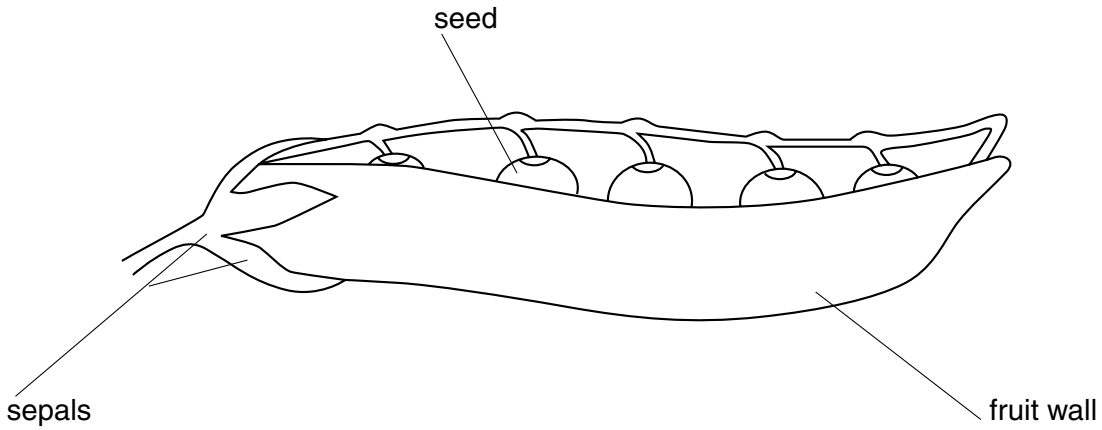

Fig. 1.1

(a) Name the part of the flower from which each of the following parts developed.

the whole fruit .....

the seeds inside the fruit ..... [2]

(b) A student investigated the conditions needed for the germination of these seeds.

He set up the apparatus shown in Fig. 1.2.

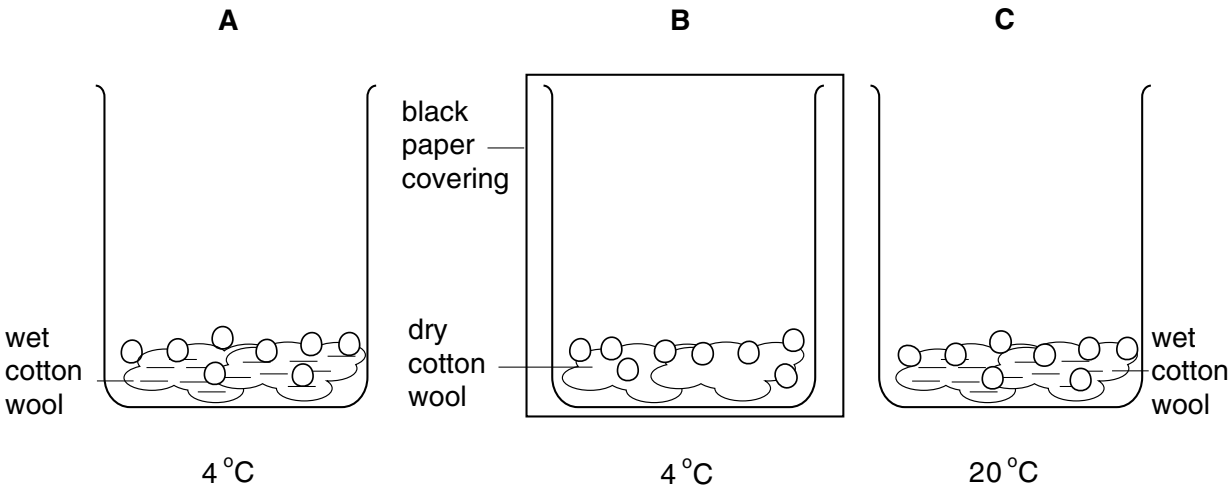

Fig. 1.2

The student found that the seeds in beakers **A** and **B** did not germinate. The seeds in beaker **C** did germinate.

He concluded that the seeds needed water, a warm temperature and light in order to germinate.

(i) Which **two** of these conclusions **cannot** be made from the results of this investigation?

..... [1]

(ii) Explain your answer.

.....

.....

..... [2]

(c) Seeds, such as beans, are a good source of carbohydrate and protein in the human diet.

(i) Describe how you would test a bean seed to see if it contained starch.

..... [1]

(ii) State what you would see if the result of the test was positive.

..... [1]

[Turn over

2 Hydrocarbons are important compounds found in crude oil (petroleum).

(a) Write the names and chemical symbols of the two elements which are combined in hydrocarbon molecules.

1. name ..... symbol .....

2. name ..... symbol ..... [2]

(b) Propane is a gaseous hydrocarbon fuel.

Fig. 2.1 shows apparatus used to investigate the products of complete combustion of propane.

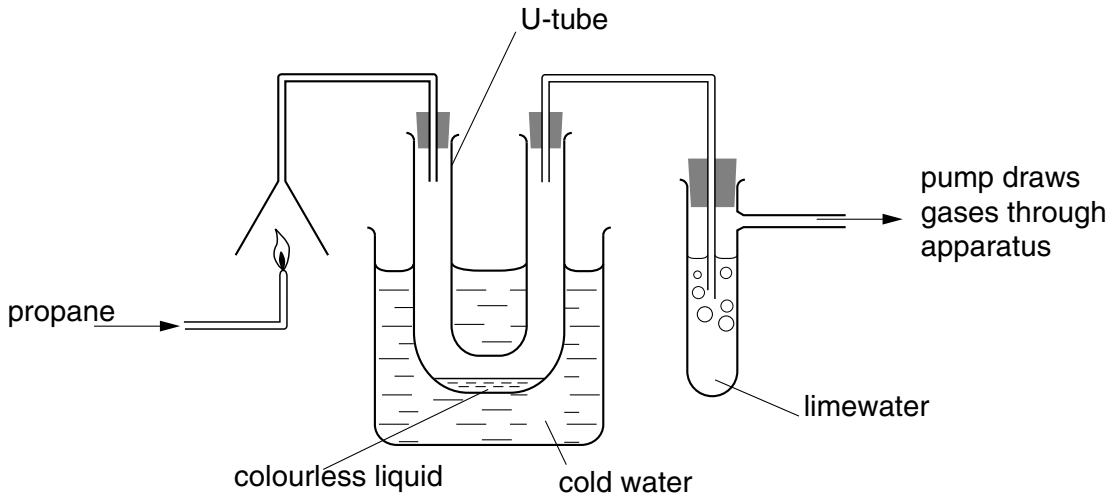

Fig. 2.1

(i) Name the colourless liquid which condenses in the U-tube.

..... [1]

(ii) Predict and explain what is observed in the tube containing limewater.

.....

.....

..... [2]

3 This question is about these types of radiation:

alpha radiation

beta radiation

gamma radiation

infra-red radiation

ultra-violet radiation

Which of these types of radiation

(a) is a stream of electrons?

..... [1]

(b) can penetrate a thick sheet of lead?

..... [1]

(c) causes the most ionisation?

..... [1]

(d) are forms of electromagnetic radiation?

..... [2]

[Turn over

4 All living things have certain characteristics. These include sensitivity and movement.

(a) List **four** other characteristics of living things.

.....

.....

.....

..... [2]

(b) In humans, sensitivity and movement are coordinated by the nervous system.

Name the two structures which form the **central** nervous system.

..... and ..... [1]

(c) Alcohol affects the nervous system.

A car was travelling at 12 metres per second along a city street. The driver had not drunk any alcohol. A child ran out in front of the car. The driver saw the child, and reacted by pressing his foot onto the brake. Fig. 4.1 shows the motion of the car during these events.

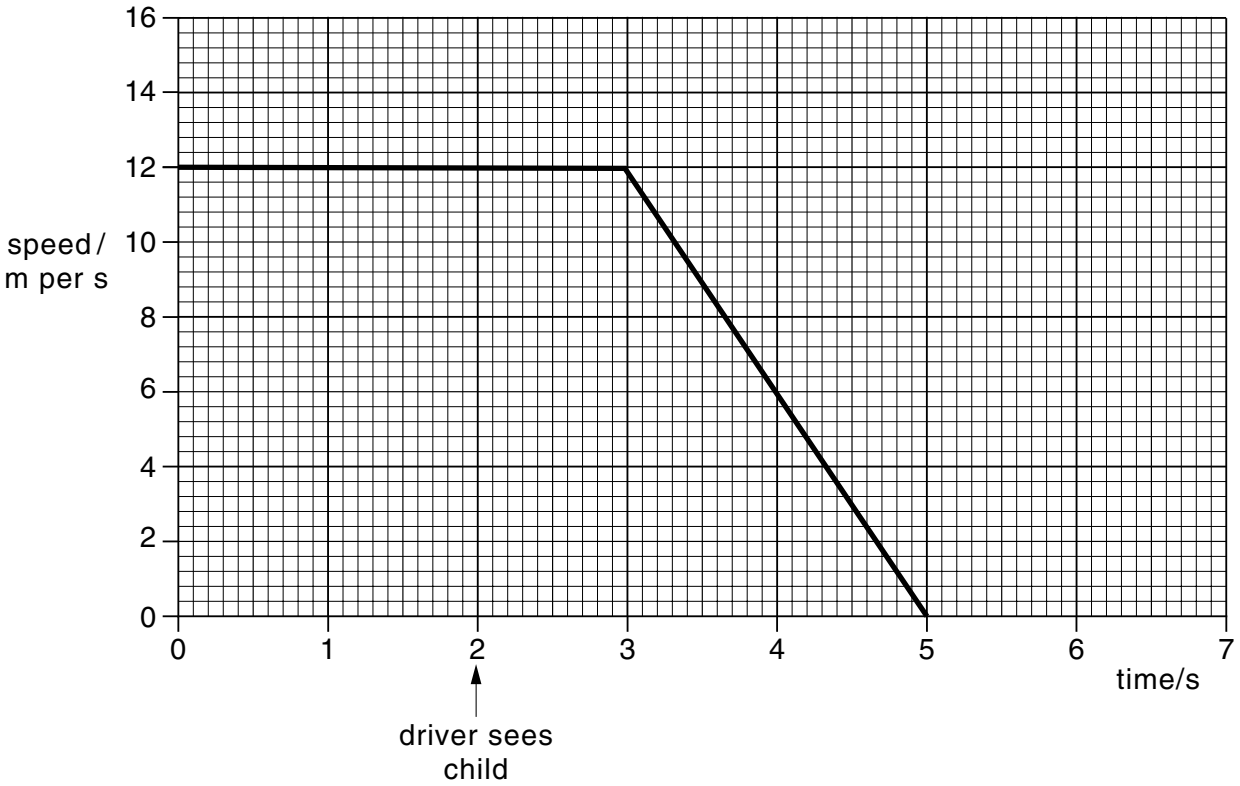

Fig. 4.1

(i) On Fig. 4.1, draw a curve to show the motion of the car if the driver had been drinking alcohol before driving the car. [2]

(ii) Using the information in Fig. 4.1, and your own knowledge about the effects of alcohol on the nervous system, explain why drivers should not drink alcohol.

.....

.....

..... [2]

5 Two reactions, **A** and **B**, involving metals and non-metals are carried out.

(a) Fig. 5.1 shows reaction **A**.

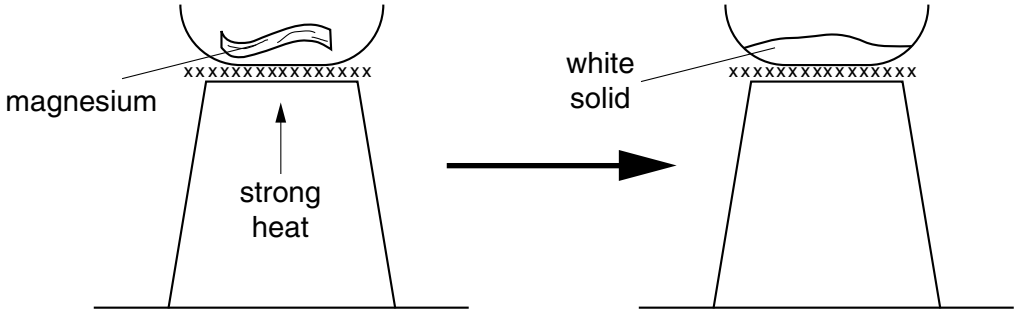

Fig. 5.1

(i) Reaction **A** is an example of oxidation.

Name the substance reacting with magnesium in reaction **A**.

..... [1]

(ii) Name the white solid produced in reaction **A**.

..... [1]

(b) Some of the white solid produced in reaction **A** was shaken with water.

State, with a reason, which of the following could be the pH of the mixture.

5 7 9

pH .....

reason .....

..... [3]

(c) Fig. 5.2 shows reaction **B**.

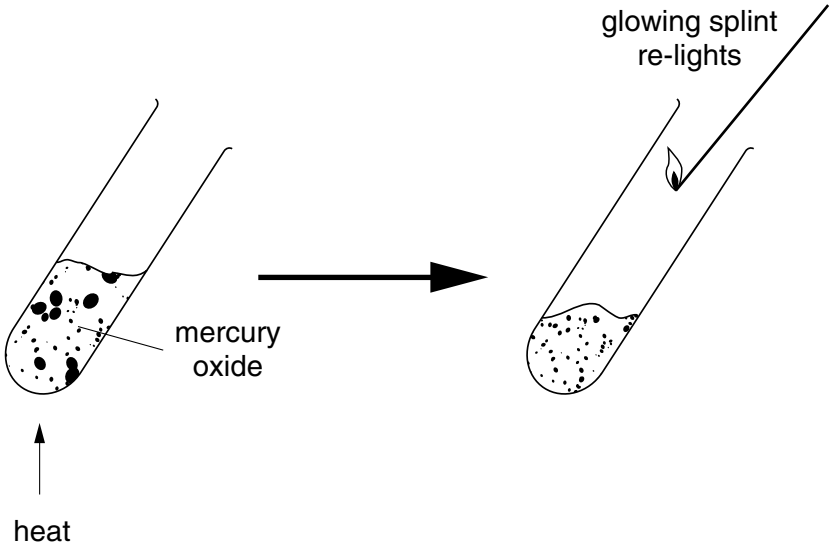

Fig. 5.2

(i) Name the gas produced during reaction **B**.

..... [1]

(ii) Suggest a word equation for reaction **B**.

..... [1]

(iii) Underline the type of chemical reaction which best describes reaction **B**.

combustion **decomposition** **neutralisation** [1]

[Turn over

6 Masses were hung on a spring. The length of the spring was measured and the extension was calculated.

Fig. 6.1 shows some of the results.

mass / g	length of spring / cm	extension of spring / cm
0	10.0	0
10	12.1	2.1
20	12.3	2.3
30	13.4	
40	14.4	4.4
50	15.6	5.6
60		6.7

Fig. 6.1

(a) Complete Fig. 6.1 by filling in the two missing values. [2]

(b) The graph in Fig. 6.2 has been plotted for some of the values.

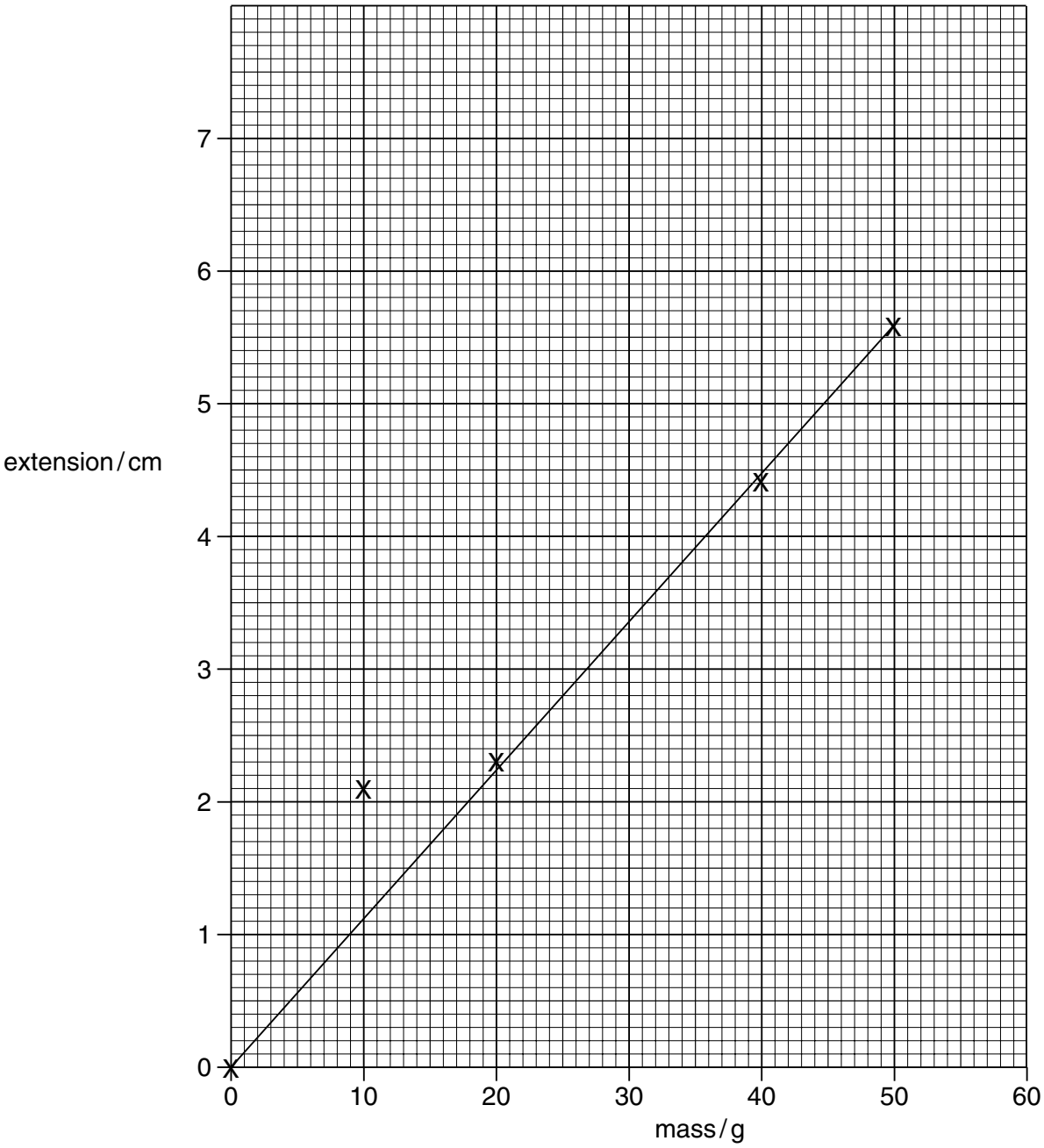

Fig. 6.2

(i) Suggest which result was probably measured inaccurately.

Explain your answer.

.....

..... [2]

(ii) Use the graph to find the value of the mass needed to produce an extension of 5.0 cm. Show your working on the graph.

..... [2]

(c) The masses are made of iron.

A 10 g mass has a volume of 1.25 cm^3.

Calculate the density of iron.

Show your working and state the formula that you use.

formula used .....

working

answer ..... g / cm^3 [3]

7 **(a)** Complete the sentences below, using some of the words from the list. You may use each word once, or not at all.

carbon dioxide	**conservation**	**deforestation**
global warming	**oxygen**	**photosynthesis**
soil erosion	**species diversity**	**temperature**

Many people are worried about the loss of tropical rain forests. It is important that rain forests should be conserved, because they have a very high …… . Also, when trees have been cut down, …… is more likely to occur when there is heavy rainfall.

If the trees are burnt, then …… is released into the atmosphere. An increase in the concentration of this gas in the atmosphere may lead to …… . [4]

(b) Decomposers play an important role in tropical rain forests.

Describe the role of decomposers in the carbon cycle.

.....

.....

..... [2]

8 **(a)** Bohrium is a recently discovered element. The chemical symbol for bohrium is

$$^{267}_{107}Bh$$

(i) State the number of protons and the number of neutrons in the nucleus of this atom.

number of protons .....

number of neutrons ..... [2]

(ii) A compound of bohrium contains one atom of bohrium, three atoms of oxygen and one atom of chlorine in its molecules.

Write the chemical formula of this compound.

..... [2]

(b) Fig. 8.1 shows part of the Periodic Table. Some elements are represented by letters. These letters are **not** the chemical symbols of the elements.

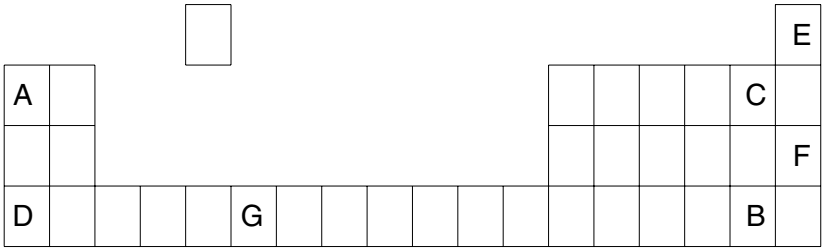

Fig. 8.1

Using only the letters shown in Fig. 8.1, choose the element that is described in each case below. Each letter may be used once or not at all.

a transition metal .....

an element in Group 7 and the Fourth Period .....

the more reactive element in Group I ..... [3]

[Turn over

9 Fig. 9.1 shows a simple electrical circuit.

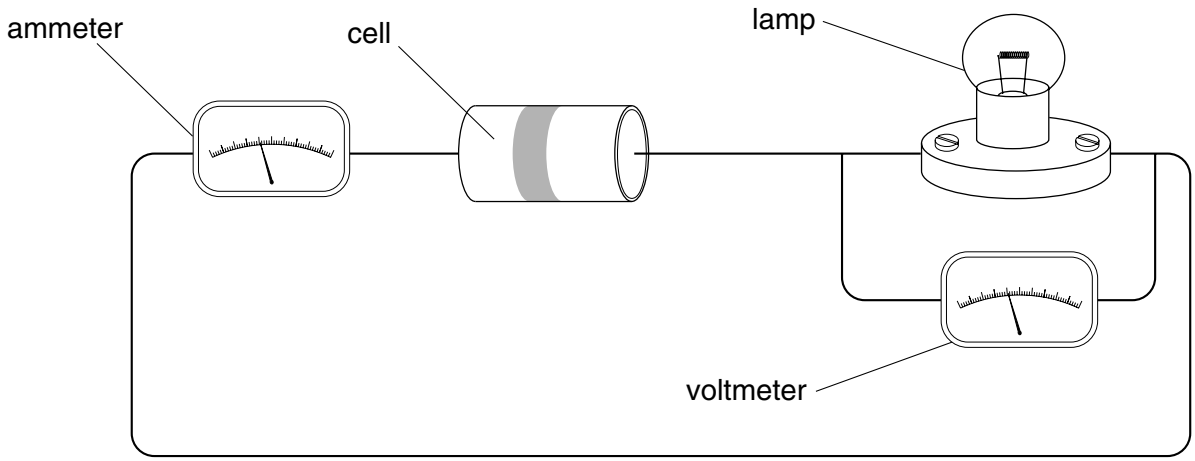

Fig. 9.1

(a) In the space below, draw the circuit diagram for the circuit in Fig. 9.1, using the correct symbols.

[3]

(b) The current flowing through the ammeter is 0.1 A and the potential difference measured by the voltmeter is 1.5 V.

Calculate the resistance of the lamp. Show your working and state the formula that you use.

..... ohms [2]

(c) Electrical devices such as an electric fire can be dangerous, especially when they are handled with wet hands.

Explain why you are quite likely to be electrocuted if you handle an electrical device with wet hands rather than dry hands.

.....

..... [1]

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
X
b

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.).