UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

COMBINED SCIENCE **5129/22**

Paper 2 **October/November 2011**

2 hours 15 minutes

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.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
A copy of the Periodic Table is printed on page 20.

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.

For Examiner's Use

This document consists of **19** printed pages and **1** blank page.

1 Study the following reaction scheme.

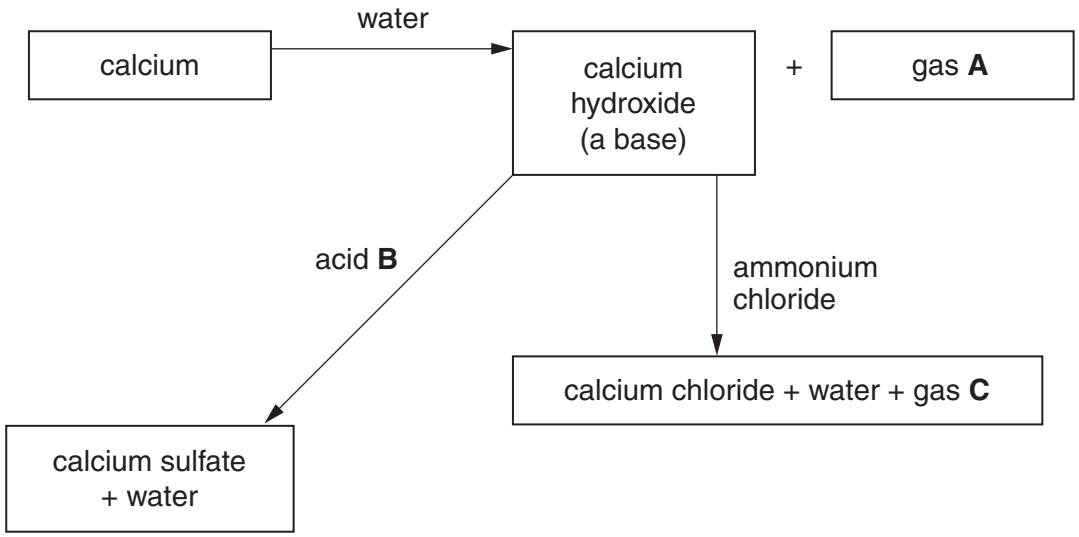

Fig. 1.1

(a) Identify **A**, **B** and **C**.

gas **A** .....

acid **B** .....

gas **C** ..... [3]

(b) Calcium hydroxide solution is sometimes called limewater.

State the gas for which limewater is the test. What would be the result of the test?

gas .....

result .....

[2]

2 Changes in the volume of a person's lungs are measured over a period of two minutes.

For Examiner's Use

The results are shown in Fig. 2.1.

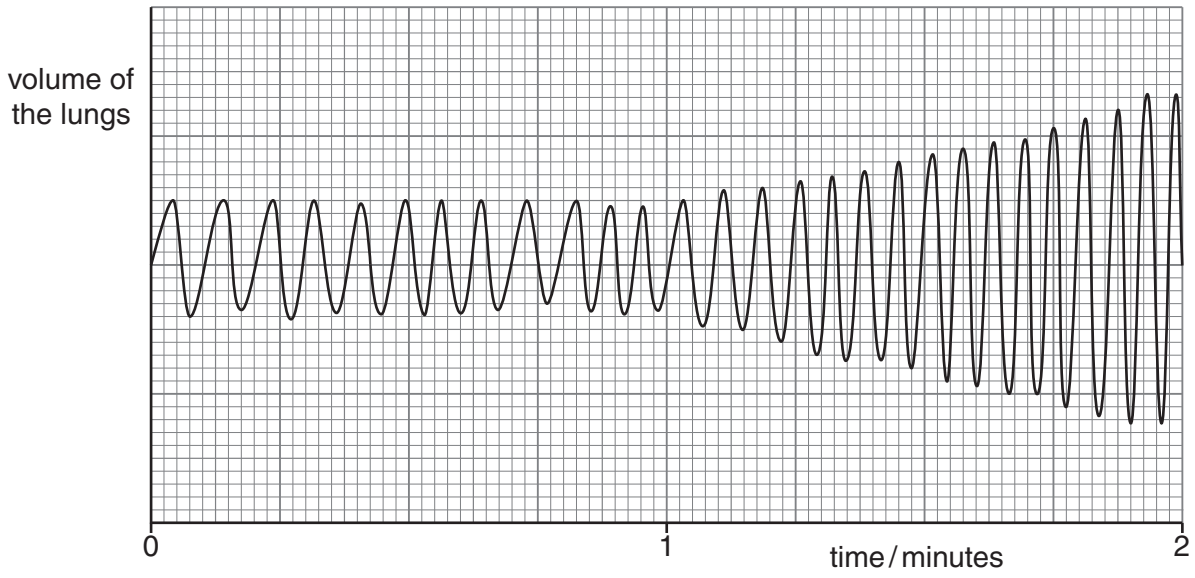

Fig. 2.1

(a) What is the breathing rate of this person during the first minute?

rate = ... breaths per minute [1]

(b) **(i)** Describe **two** ways in which the person's breathing changes during the second minute.

1. .....

2. .....

[2]

(ii) Suggest what caused these changes.

.....

.....

.....[1]

3 A metre rule is pivoted at its centre of gravity.

For Examiner's Use

A weight of 8.0 N is suspended from the rule at a distance of 0.20 m from the pivot, as shown in Fig. 3.1. The metre rule is held horizontally by means of a stretched spring that is 0.40 m from the pivot.

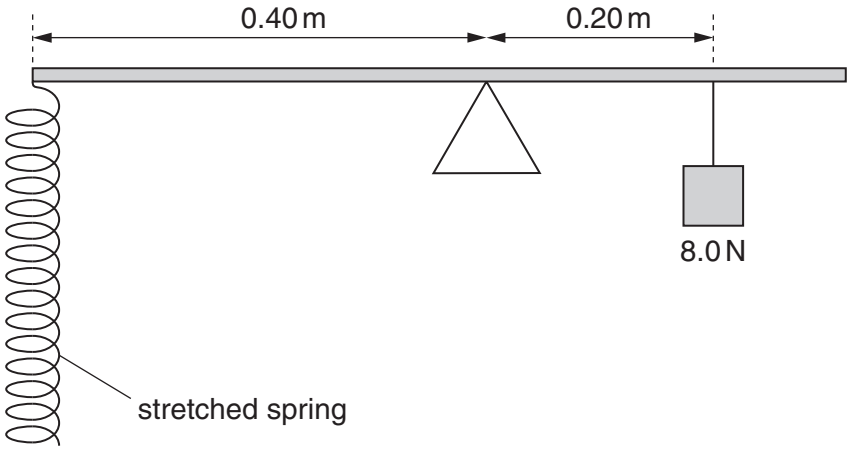

Fig. 3.1

(a) State the principle of moments.

.....

.....[2]

(b) Calculate

(i) the moment of the 8.0 N weight about the pivot,

moment = ... unit ..... [3]

(ii) the force exerted on the metre rule by the spring.

force = ... N [1]

(c) The spring has an unstretched length of 10.0 cm. When a force of 2.0 N is used to stretch the spring, its length becomes 11.5 cm.

Calculate the force needed to give the spring a length of 13.0 cm.

For Examiner's Use

force = ... N [2]

4 Microwaves, radio-waves and visible light are components of the electromagnetic spectrum.

(a) Name **two** other components of the electromagnetic spectrum.

..... and ..... [2]

(b) Radio-waves travel at a speed of 3.0×10^8 m/s in a vacuum.
A radio-wave has a wavelength of 1.5×10^3 m in a vacuum.

Calculate the frequency of this radio-wave.

frequency = ... unit ..... [3]

[Turn over

For Examiner's Use

5 Nitrogen is a gas that is the main constituent of air.

(a) State the approximate percentage of nitrogen in air. .....[1]

(b) Oxides of nitrogen are produced when a fuel is burned in a car engine.

State one adverse effect on the environment of oxides of nitrogen.

.....[1]

(c) Nitrogen reacts with lithium to produce lithium nitride.

Balance the equation for this reaction.

..... Li + N_2 ⟶ ..... Li_3N [1]

(d) Lithium nitride is an ionic substance made up of lithium ions, Li^+, and nitride ions.

(i) State the formula of a nitride ion. .....[1]

(ii) Suggest **two** properties of lithium nitride.

1. .....

2. .....

[2]

6 Fig. 6.1 shows the alimentary canal and associated structures in a rabbit. The arrangement is similar to the human alimentary canal.

For Examiner's Use

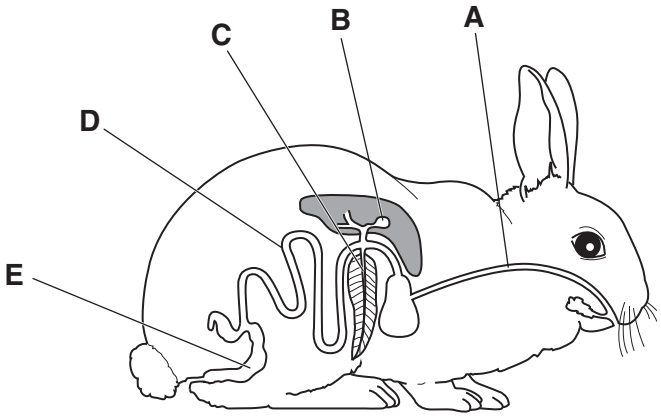

Fig. 6.1

(a) Name the structures **A** to **E**.

A .....

B .....

C .....

D .....

E .....[5]

(b) State where the following processes occur in the alimentary canal.

(i) ingestion .....[1]

(ii) egestion .....[1]

(iii) absorption of the soluble products of digestion

.....[1]

(c) Name a gland in the alimentary canal where amylase is secreted.

.....[1]

[Turn over

7 A pupil lifts a book from the floor on to a table through a vertical distance of 1.2 m.

The book weighs 5.0 N.

For Examiner's Use

(a) Calculate the useful work done by the pupil in lifting the book.

work done = ... J [2]

(b) It takes the pupil 0.50 s to lift the book.

Calculate the useful power developed by the pupil in lifting the book.

power = ... W [2]

(c) Lifting the same book through the same distance on the Moon would require the pupil to do less work than on the Earth.

Suggest why the work done would be less.

.....

.....[1]

8 Fig. 8.1 shows the reduction of copper(II) oxide by methane.

For Examiner's Use

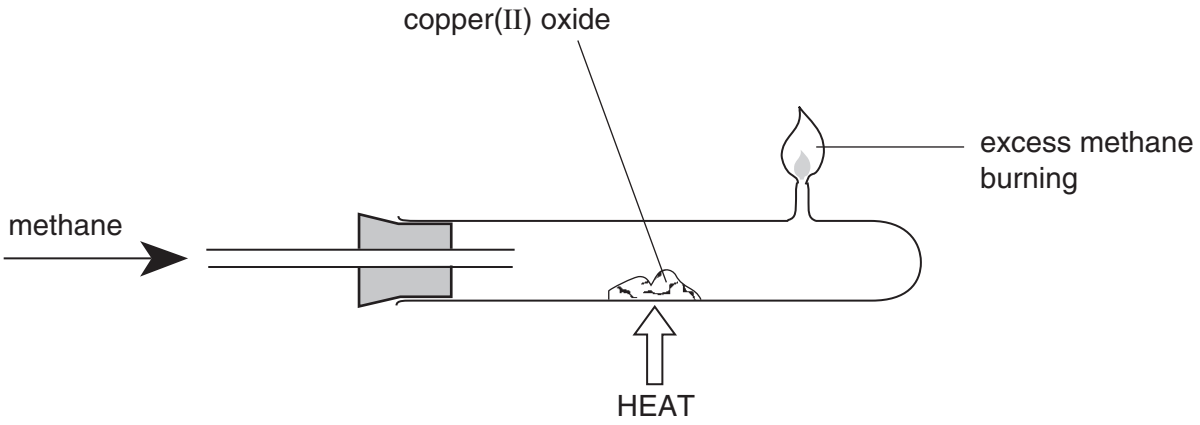

Fig. 8.1

(a) Explain the meaning of the word *reduction*.

.....

.....[1]

(b) The equation for the reaction is

$$4CuO + CH_4 \longrightarrow 4Cu + 2H_2O + CO_2$$

The relative molecular mass of copper(II) oxide is 80.
[A_r: C, 12; O, 16; H, 1]

Complete the following sentences.

320 g of copper(II) oxide produces ..... g of water and ..... g of carbon dioxide.

80 g of copper(II) oxide produces ..... g of carbon dioxide.

4 g of copper(II) oxide produces ..... g of carbon dioxide. [4]

(c) Oxides are either acidic, amphoteric or basic.

What type of oxide is copper(II) oxide? Give a reason for your choice.

type of oxide .....

reason .....
[2]

[Turn over

For Examiner's Use

9 An experiment is carried out to investigate conditions that affect the germination of cress seeds.

Two petri dishes are set up as shown in Fig. 9.1.

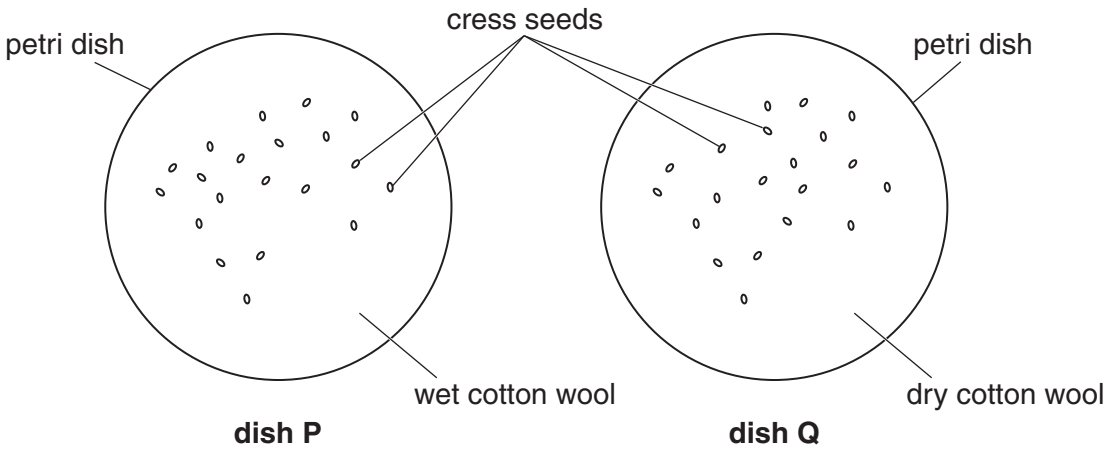

Fig. 9.1

The petri dishes are left for three days.

The number of seeds that have germinated in each of the two dishes is noted.

(a) State the results you would expect after three days. Explain why you would expect these results.

results .....

.....

.....

explanation .....

.....

.....
[3]

(b) Explain why 20 seeds were placed in each dish, rather than one seed.

.....

.....[1]

(c) State **two** environmental conditions that should be kept the same in the two dishes.

1. .....

2. .....
[2]

10 An electric heater has a label attached to it, as shown in Fig. 10.1.

For Examiner's Use

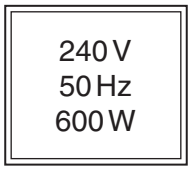

Fig. 10.1

(a) Use information from Fig. 10.1 to calculate the current in the electric heater when it is working normally.

current = ... unit ..... [3]

(b) Another electric heater has a metal case. It has been wired incorrectly because the live wire is touching the metal case.

The live wire is fitted with a fuse and the heater has an earth connection.

Explain how a person is protected from an electric shock when the heater is switched on.

.....

.....

.....[3]

[Turn over

11 Fig. 11.1 shows the apparatus used to separate petroleum (crude oil) into useful products.

For Examiner's Use

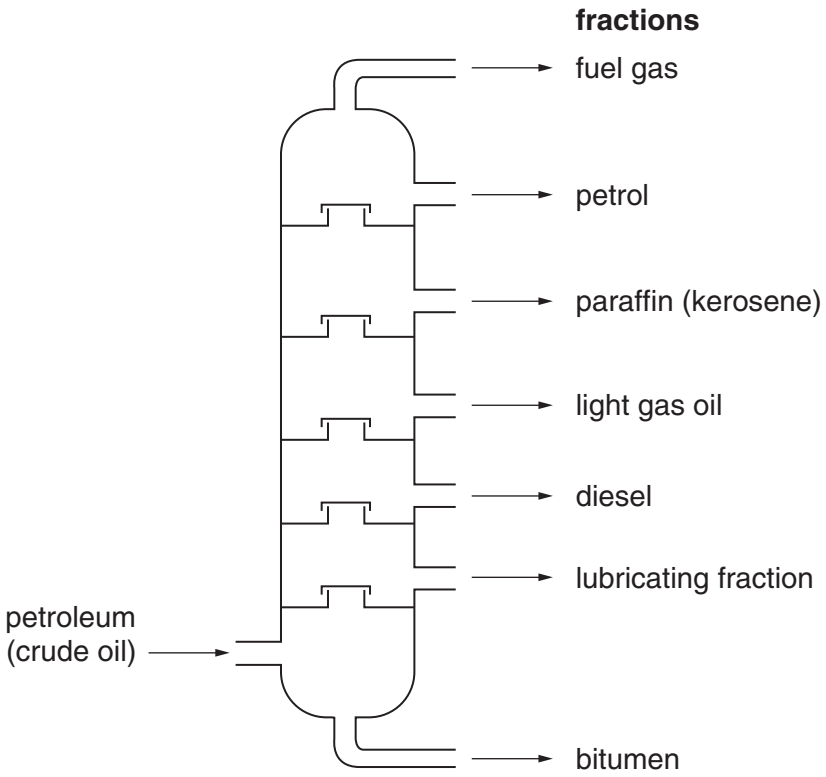

Fig. 11.1

(a) (i) Name the process used to separate petroleum (crude oil).

.....[1]

(ii) State **one** use of paraffin (kerosene) and **one** use of bitumen.

paraffin .....

bitumen ..... [2]

(b) Octane is a component of petrol. It belongs to a homologous series of hydrocarbons.

(i) Name the homologous series. .....[1]

(ii) Octane contains eight carbon atoms.

Complete the formula of octane. C_8H ..... [1]

(iii) What type of bonding is present in a molecule of octane?

.....[1]

For Examiner's Use

12 Gonorrhoea is a sexually transmitted bacterial disease.

(a) State **two** symptoms of gonorrhoea.

1. .....

.....

2. .....

.....

[2]

(b) Name one other bacterial disease that is usually sexually transmitted.

.....[1]

(c) How are these bacterial diseases usually treated?

.....

.....[1]

(d) Name a sexually transmitted disease that is caused by a virus.

.....[1]

13 **(a)** Name a piece of apparatus used to measure the volume of a liquid.

.....[1]

(b) A stone has an irregular shape.

Describe how the method of displacement may be used to find the volume of the stone.

.....

.....

.....[3]

[Turn over

14 **(a)** Copper is an element.

Sodium chloride is a compound.

Brass is an alloy.

Using these substances as examples, define the terms *element*, *compound* and *alloy*.

element .....

.....[1]

compound .....

.....[2]

alloy .....

.....[2]

(b) State **one** test to show that copper is a metal.

.....[1]

For Examiner's Use

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TURN OVER FOR QUESTION 15

15 Fig. 15.1 is a map of an island where famines frequently occur.

For Examiner's Use

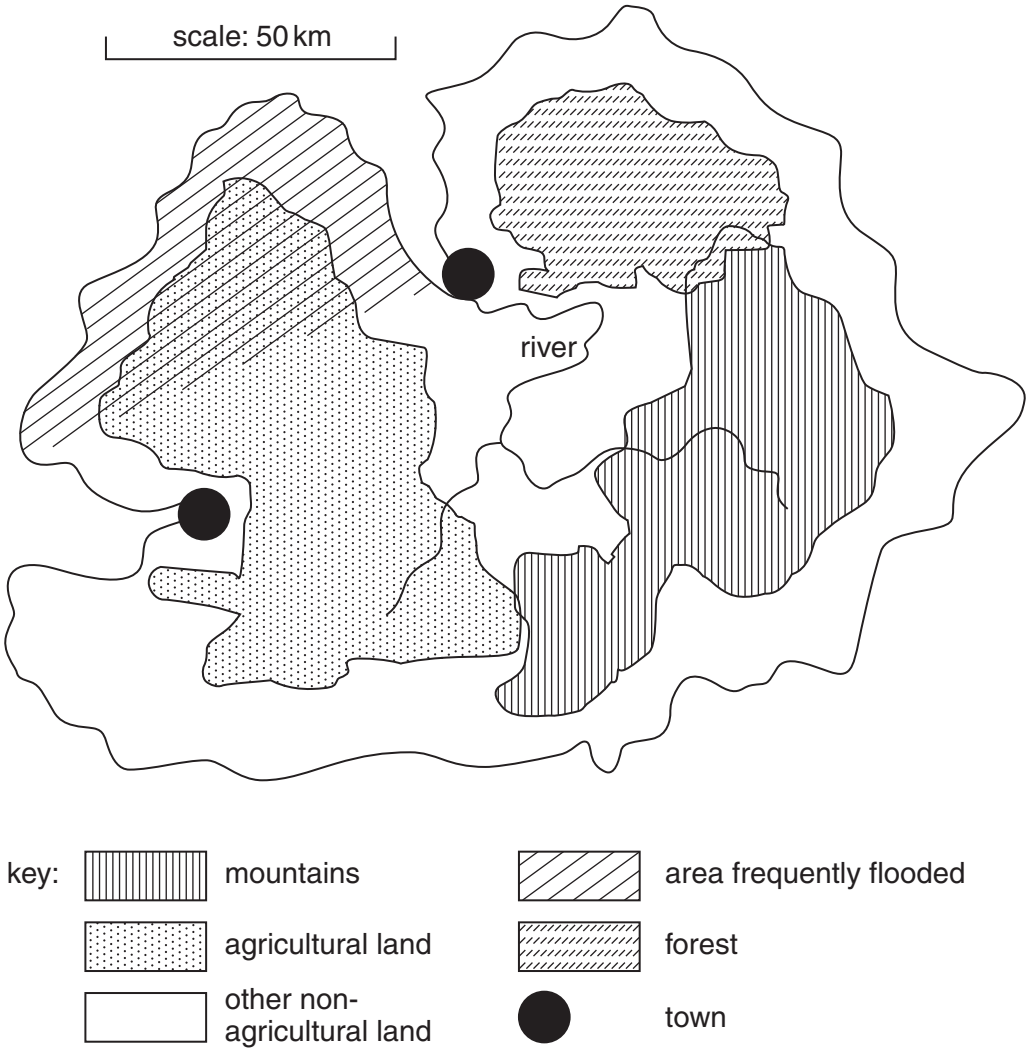

Fig. 15.1

(a) What is meant by *famine*?

.....[1]

(b) Use information from the map to suggest why famines often occur on this island.

.....

.....

.....[2]

(c) What effect would each of the following have on the probability of famine occurring on this island? In each case, explain your answer.

For Examiner's Use

(i) a rapid increase in population

.....

.....

.....[1]

(ii) a decrease in annual rainfall

.....

.....

.....[1]

16 Fig. 16.1 shows a bar magnet being pushed into a coil of wire.

For Examiner's Use

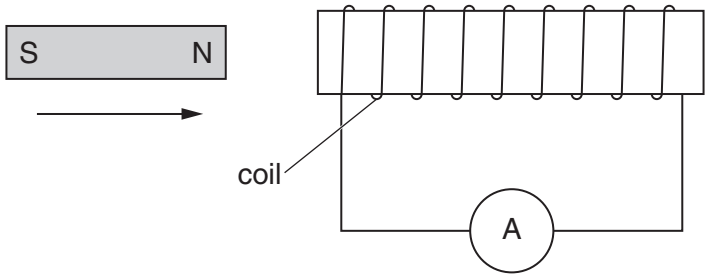

Fig. 16.1

The ammeter shows that there is a small current in the coil.

(a) Name this electrical effect.

..... [1]

(b) State **two** factors affecting the size of the current when a magnet is pushed into a coil.

1. .....

2. .....
[2]

(c) The current in the coil produces a magnetic field.

What effect does this magnetic field have on the bar magnet?

.....[1]

17 The following is a list of gases.

For Examiner's Use

ammonia	**carbon dioxide**	**ethane**	**ethene**
helium	**hydrogen**	**oxygen**	**sulphur dioxide**

Use the list to complete the following sentences.

Each gas from the list may be used once, more than once, or not at all.

(a) The gas that is used in the manufacture of steel is .....[1]

(b) The gas used for filling balloons is .....[1]

(c) The gas that undergoes polymerisation is .....[1]

(d) The gas that relights a glowing splint is .....[1]

18 Alcohol is a drug.

(a) Explain what is meant by the term *drug*.

.....

.....

.....[2]

(b) Describe **three** harmful physical effects on a person who drinks excessive amounts of alcohol.

1. .....

.....

2. .....

.....

3. .....

.....

[3]

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 Sulfur 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	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 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	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	244 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	247 Bk Berkelium 97	251 Cf Californium 98	252 Es Einsteinium 99	257 Fm Fermium 100	258 Md Mendelevium 101	259 No Nobelium 102	260 Lr Lawrencium 103

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

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

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