



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.

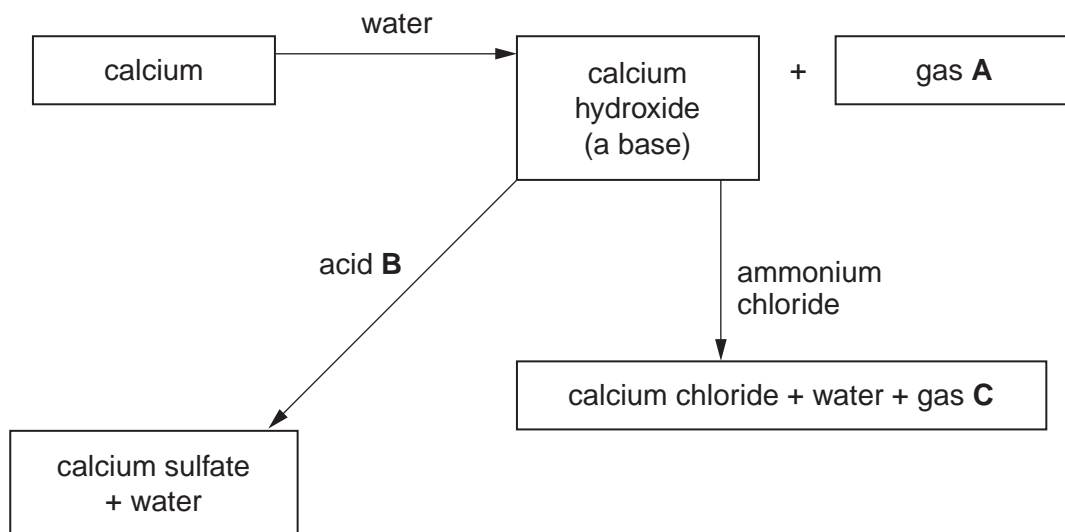


Fig. 1.1

(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

The results are shown in Fig. 2.1.

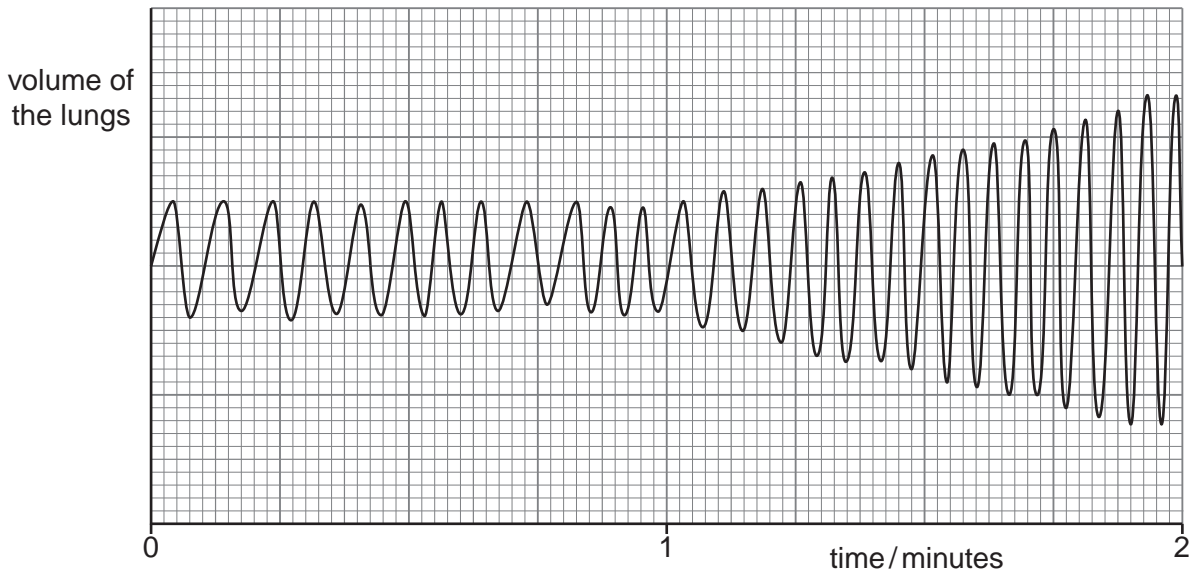


Fig. 2.1

(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.

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.

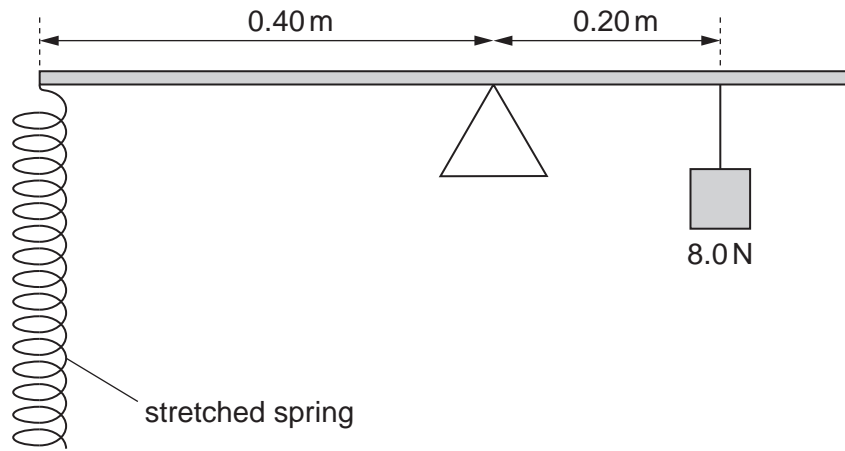


Fig. 3.1

(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.

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]

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

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

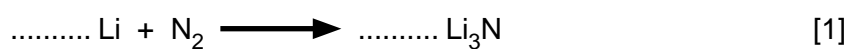
(b) Oxides of nitrogen are produced when a fuel is burned in a car engine.

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.



(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.

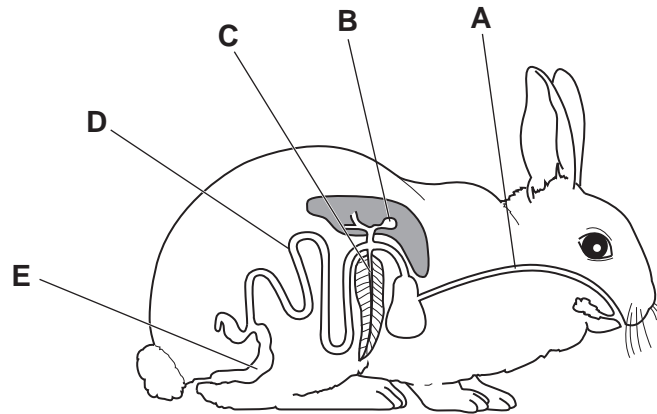


Fig. 6.1

- (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]

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.

(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.

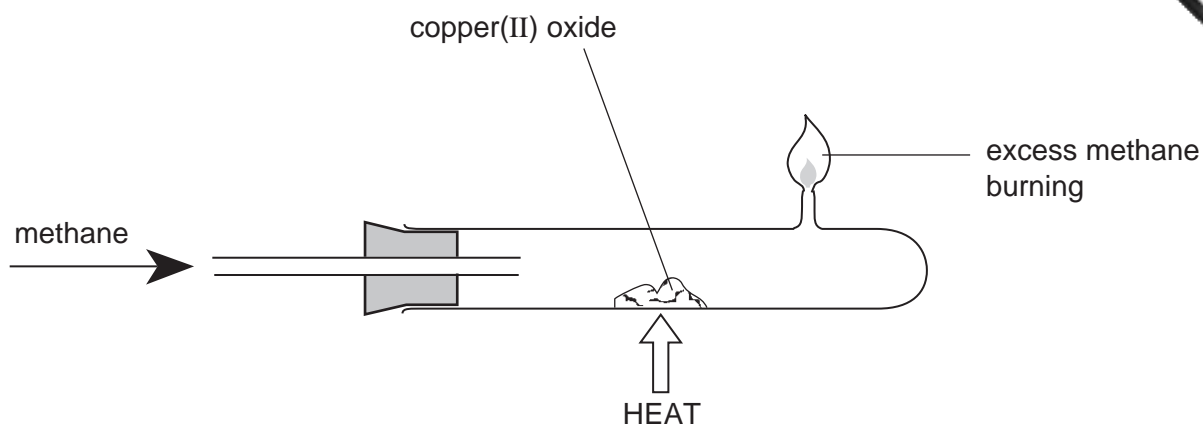


Fig. 8.1

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

.....
 [1]

- (b) The equation for the reaction is



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]

- 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.

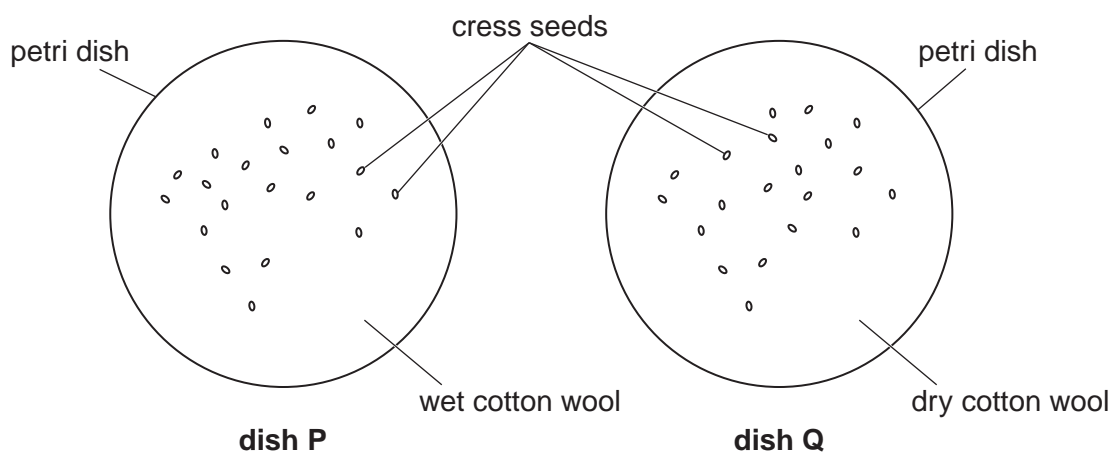


Fig. 9.1

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.

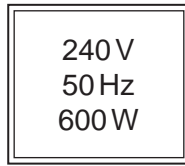


Fig. 10.1

- (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]

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

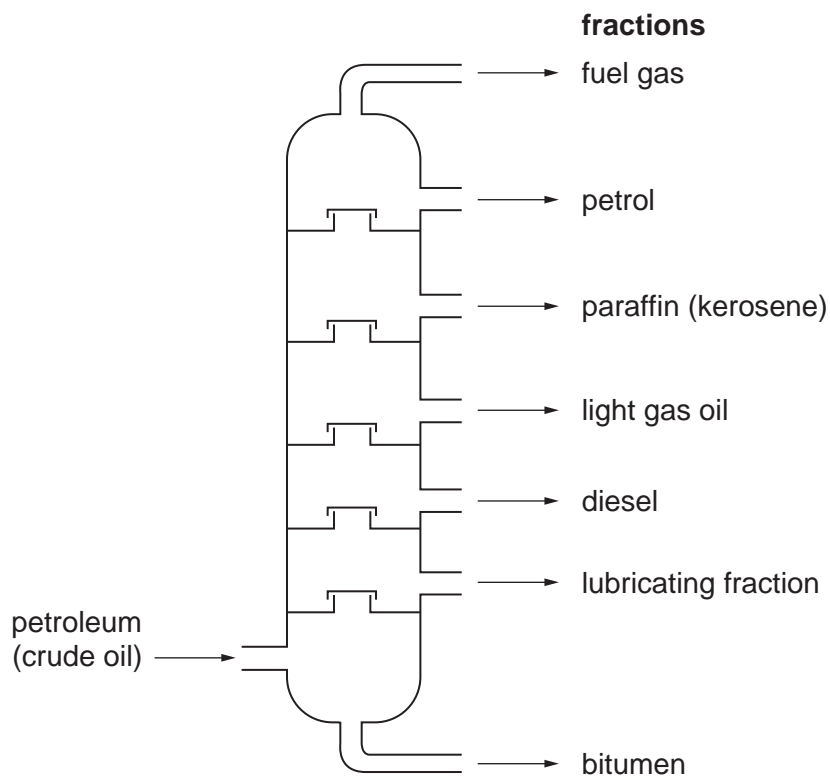
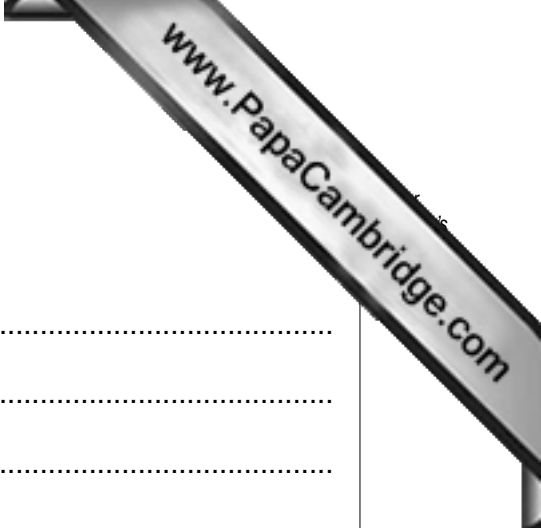


Fig. 11.1

- (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]



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]

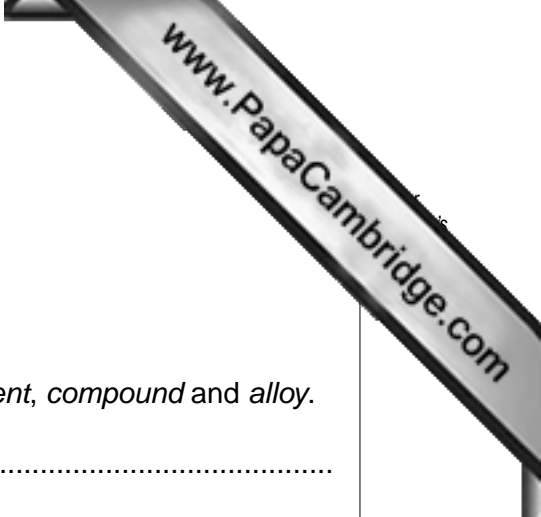
13 (a) Name a piece of apparatus used to measure the volume of a liquid.

..... [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]



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]

15

BLANK PAGE

www.PapaCambridge.com

TURN OVER FOR QUESTION 15

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

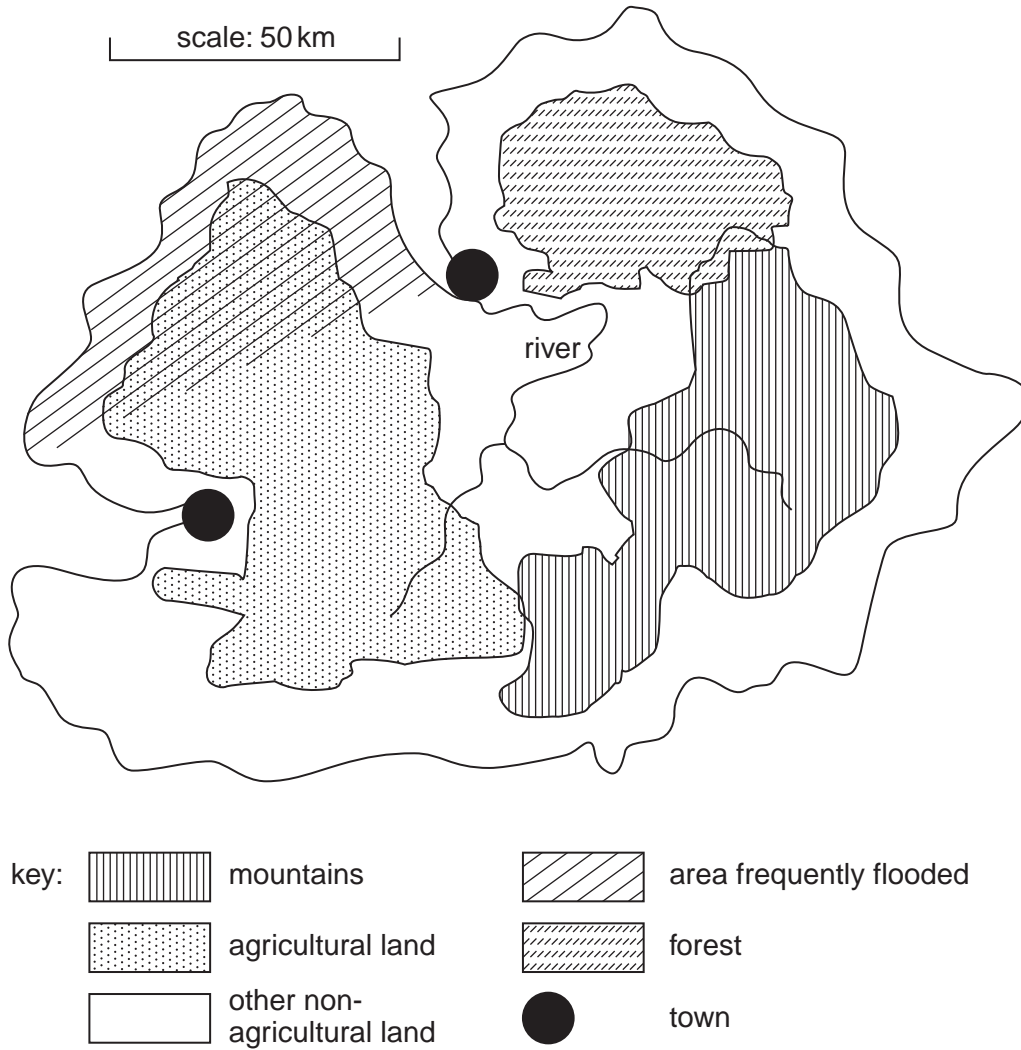


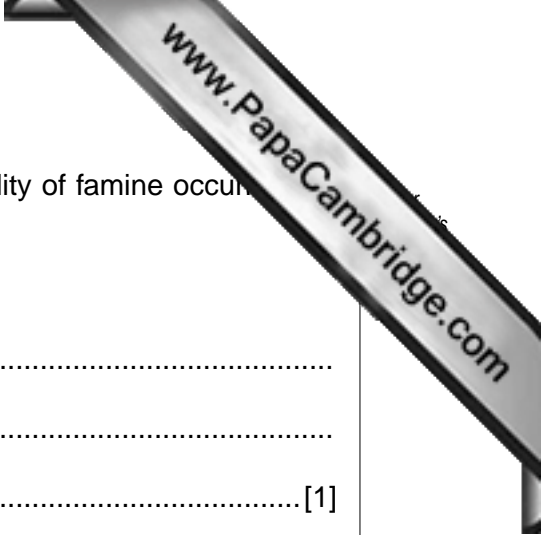
Fig. 15.1

(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.

(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.

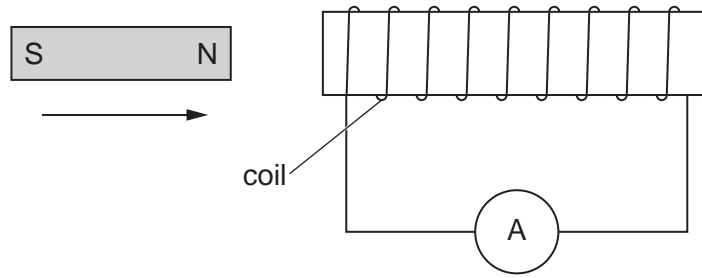


Fig. 16.1

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.

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					0					
1 H Hydrogen 1											2 He Helium 2						
3 Li Lithium 3	4 Be Beryllium 4	5 B Boron 5	6 C Carbon 6	7 N Nitrogen 7	8 O Oxygen 8	9 F Fluorine 9	10 Ne Neon 10	11 B Boron 11	12 C Carbon 12	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18		
19 K Potassium 19	20 Ca Calcium 20	21 Sc Scandium 21	22 Ti Titanium 22	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	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 Zr Zirconium 40	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 La Lanthanum 57	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 Hf Hafnium 72
87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	104 Rf Rutherfordium 104
105 Db Dubnium 105	106 Sg Seaborgium 106	107 Bh Bohrium 107	108 Hs Hassium 108	109 Mt Meitnerium 109	110 Ds Darmstadtium 110	111 Rg Roentgenium 111	112 Cn Copernicium 112	113 Nh Nihonium 113	114 Fl Flerovium 114	115 Mc Moscovium 115	116 Lv Livermorium 116	117 Ts Tennessine 117	118 Og Oganesson 118	119 Uu Ununennium 119	120 Ubn Unbinilium 120	121 Uub Unbibium 121	122 Ubu Unbibium 122

58–71 Lanthanoid series
90–103 Actinoid series

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).