

Centre Number	Candidate Number	Name
---------------	------------------	------

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

COMBINED SCIENCE

5129/02

Paper 2

May/June 2004

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 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.
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 20.

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	
Total	

1 (a) Both animal and plant cells contain a nucleus.
State two other features found in

(i) animal cells,

1.

2.

(ii) plant cells.

1.

2.

[4]

(b) Fig. 1.1 shows a cell.

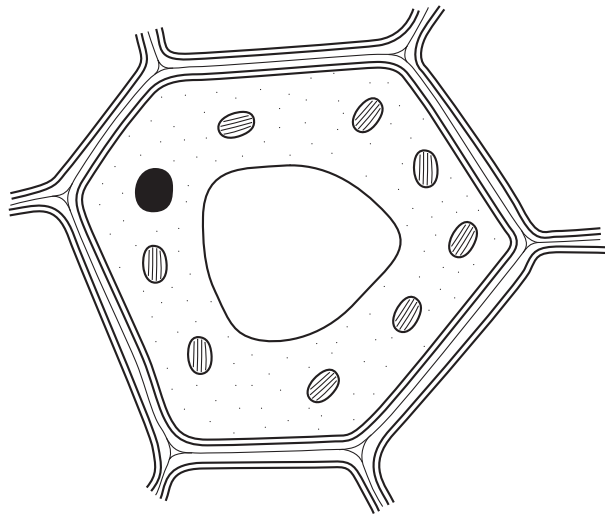


Fig. 1.1

State whether this is a plant cell or an animal cell.

.....[1]

- 2 Fig. 2.1 shows an extension – load graph for an elastic band.

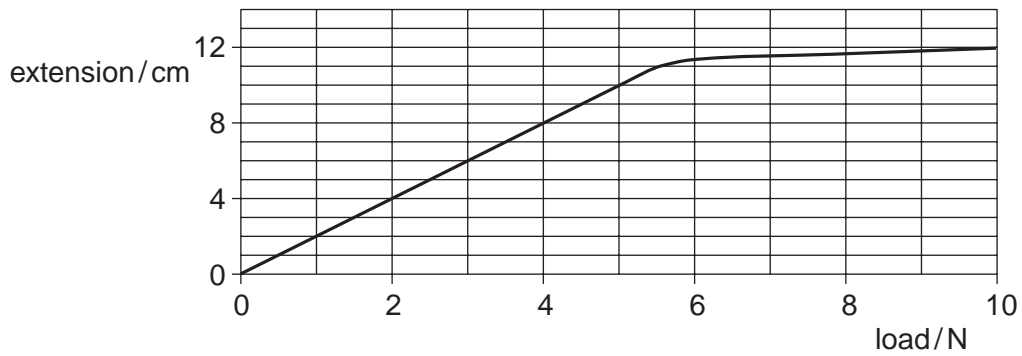


Fig. 2.1

(a) What load gives an extension of 5.0 cm?N [1]

(b) The length of the elastic band with no load is 8.0 cm.

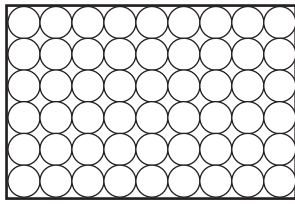
What load gives the elastic band a length of 14.0 cm?

.....N [2]

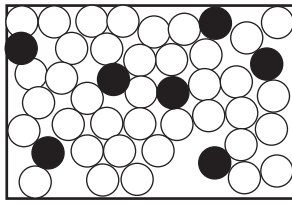
(c) Draw a labelled diagram of the apparatus that may be used to obtain an extension – load graph for an elastic band.

[2]

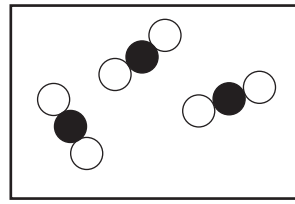
- 3 Fig. 3.1 represents the particles in different substances at room temperature.



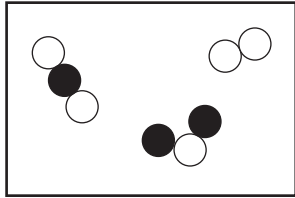
A



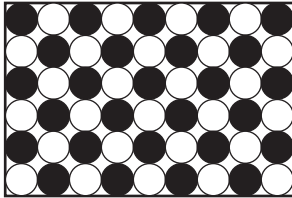
B



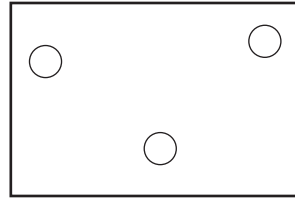
C



D



E



F

Fig. 3.1

Which diagram could represent

- (a) a gaseous element,
- (b) an alloy,
- (c) a gaseous mixture,
- (d) sodium chloride,
- (e) air?

[5]

4 Fig. 4.1 shows a ray of light from a pin. The light is incident on a plane mirror.

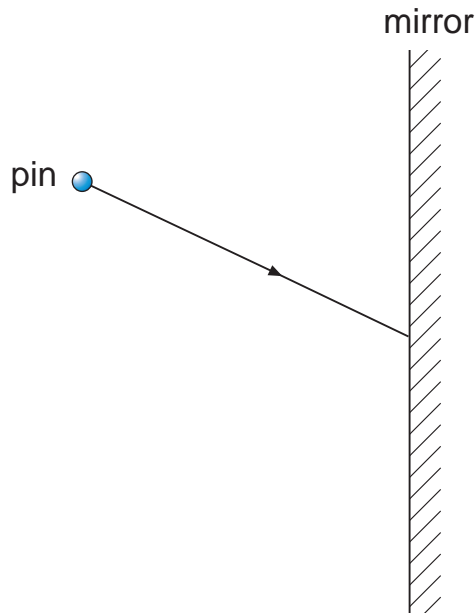


Fig. 4.1

(a) On Fig. 4.1,

- (i) draw the reflected ray,
- (ii) mark with an X the position of the image of the pin.

[3]

(b) Fig. 4.2 shows a ray of light passing from air into a glass block. The normal to the surface of the glass is shown.

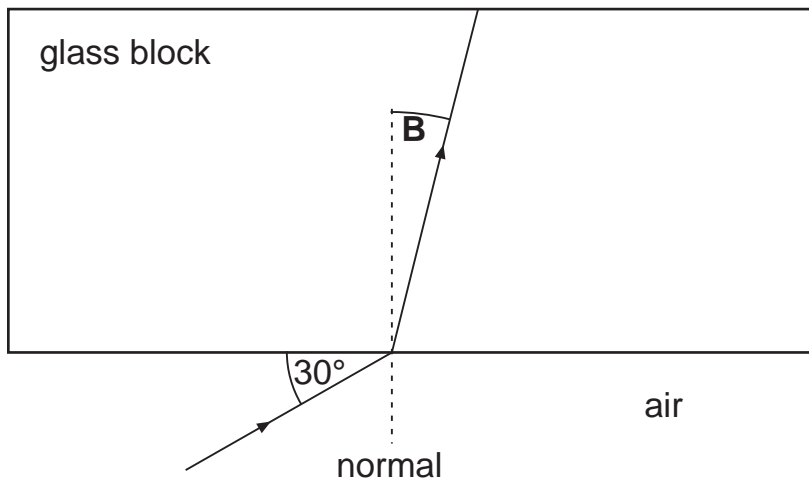


Fig. 4.2

- (i) Calculate the angle of incidence.
- (ii) Name angle B.

[2]

- 5 Fig. 5.1 shows a seedling with its roots in a coloured dye solution. The dye travels slowly up the stem to the leaves.

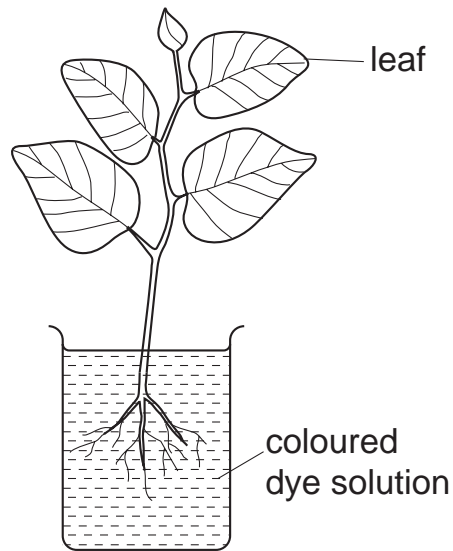


Fig. 5.1

- (a) After four hours, a section of one of the leaves is examined under a microscope.

Fig. 5.2 shows the section as seen under the microscope.

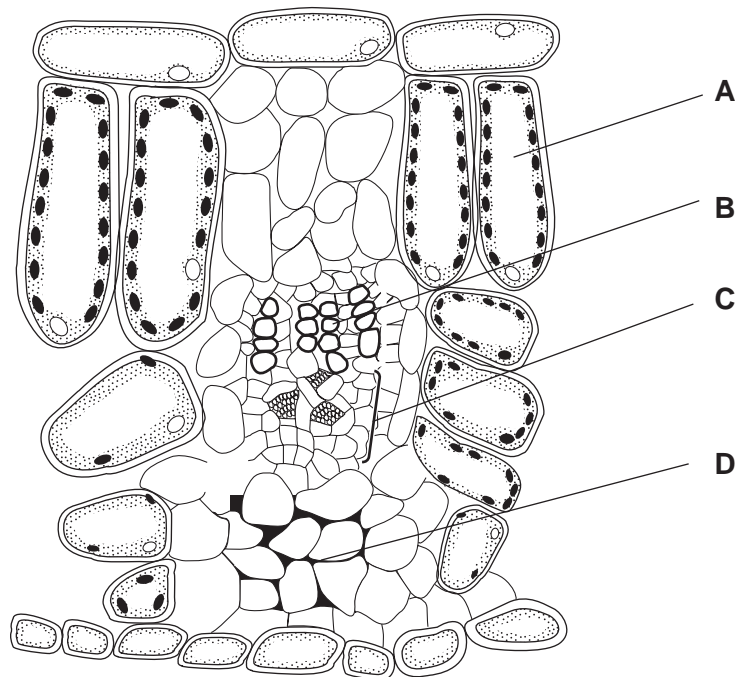
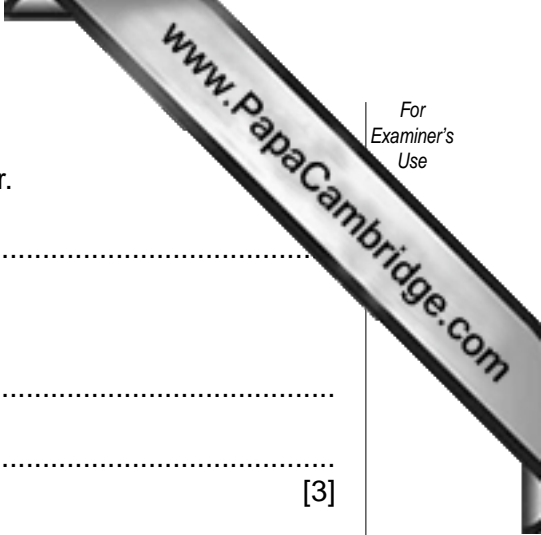


Fig. 5.2

- (i) In which region, **A**, **B**, **C** or **D** will the coloured dye be seen?

.....

- (ii) Name the tissue chosen in (a)(i).



(b) (i) Name the chemical process for which the leaf uses water.

.....

(ii) Suggest two other uses for water in a plant.

1.

2.

[3]

(c) A healthy seedling is growing in a sunny place, but there is not enough water around its roots.

(i) Describe how the appearance of the seedling changes after several hours.

.....

.....

.....

(ii) Explain why the changes in **(c)(i)** take place.

.....

.....

.....

[3]

- 6 Fig. 6.1 shows a balanced uniform metre rule. The knife edge is at the 50.0 cm mark and a 0.1 N weight is at the 20.0 cm mark.

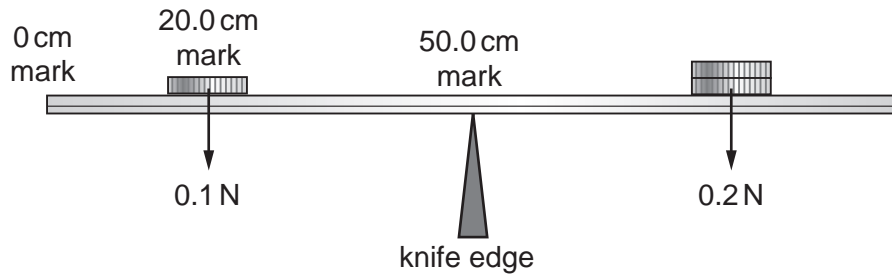


Fig. 6.1

- (a) Calculate the anticlockwise moment of the 0.1 N weight about the knife edge.

.....N cm [2]

- (b) Calculate the distance of the 0.2 N weight from the knife edge.

.....cm [2]

7 Fig. 7.1 shows a blast furnace for the extraction of iron from haematite, Fe₂O₃.

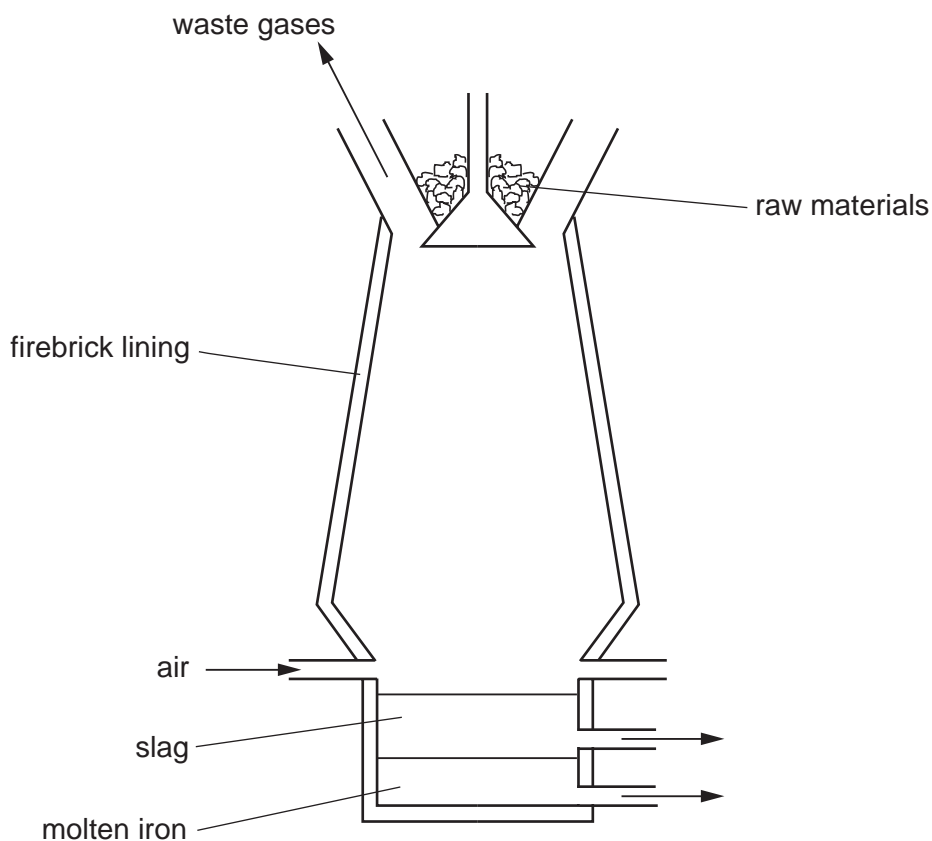
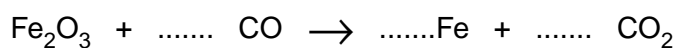


Fig. 7.1

(a) Name the raw materials put in at the top of the blast furnace with the haematite.

..... and [2]

(b) (i) Balance the following equation for the reduction of haematite to iron.



(ii) Carbon monoxide acts as a reducing agent in the reaction. Explain the meaning of the term *reducing agent*.

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

(c) (i) Name the **two** substances that cause iron to rust.

..... and

(ii) State what is meant by *galvanising* and explain how it prevents iron from rusting.

.....
.....
.....

8 Fig. 8.1 shows a longitudinal section through a blood vessel.

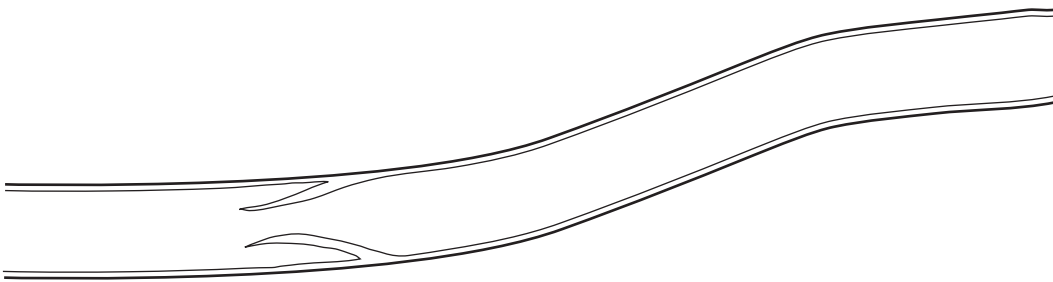


Fig. 8.1

(a) State whether Fig. 8.1 shows an artery or a vein and give a reason for your choice.

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

(b) State two other differences between arteries and veins.

1.
.....
2.
.....[2]

- (c) Fig. 8.2 shows blood flowing towards the small intestine and away from it, digestion of a meal.

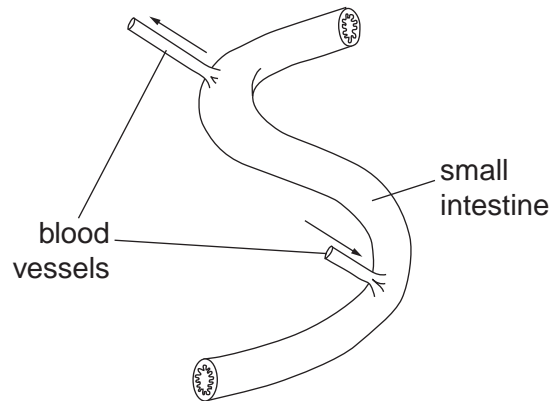


Fig. 8.2

The blood leaving the intestine has changed.
State **one** change that has taken place in

- (i) the oxygen content of the blood,

.....

- (ii) the pressure of the blood,

.....

- (iii) the concentration of glucose dissolved in the blood.

.....

[3]

- 9 (a) Heat is transferred in solids by conduction. Explain how the molecules in a solid are involved in conduction.

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

- (b) Fig. 9.1 shows a convector heater in a room. This produces a convection current in the air in the room.

Draw arrows on Fig. 9.1 to show the directions of the flow of air in the room.

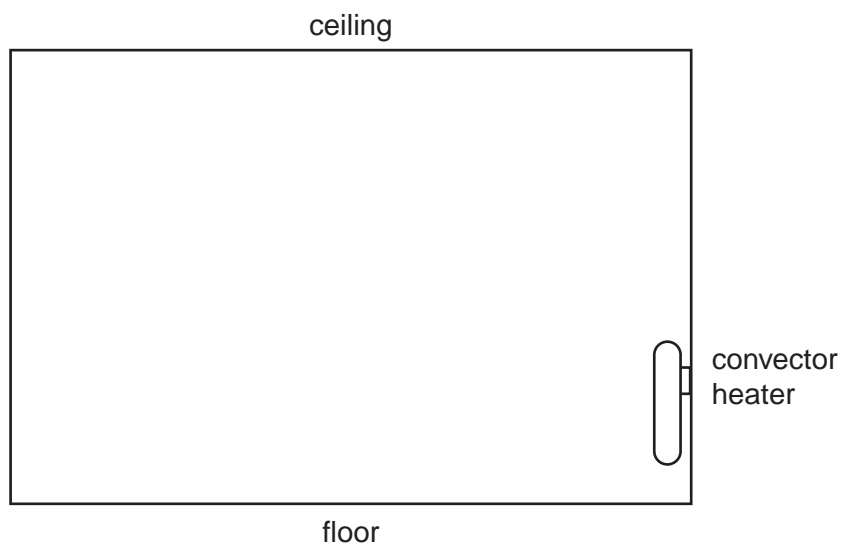


Fig. 9.1

[2]

- 10 Argon is an element in Group 0 of the Periodic Table. One isotope of argon is represented below.



- (a) How do isotopes of an element differ from one another?

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

- (b) How many neutrons are present in one atom of ${}_{18}^{40}\text{Ar}$?

.....[1]

- (c) Explain why argon has no chemical reactions.

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

- (d) State **one** use of argon.

.....[1]

11 The ammeter in Fig. 11.1 reads 0.2 A.

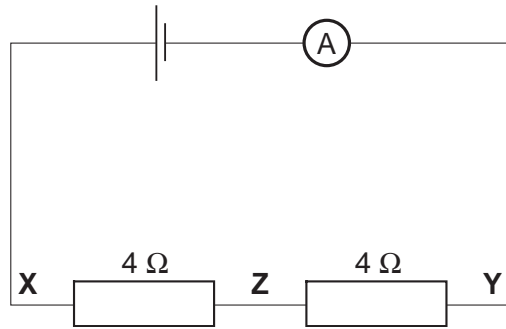


Fig. 11.1

(a) State the current at Z.[1]

(b) Calculate the potential difference between

(i) X and Z,

(ii) X and Y.

[3]

12 Fig. 12.1 shows the female reproductive system.

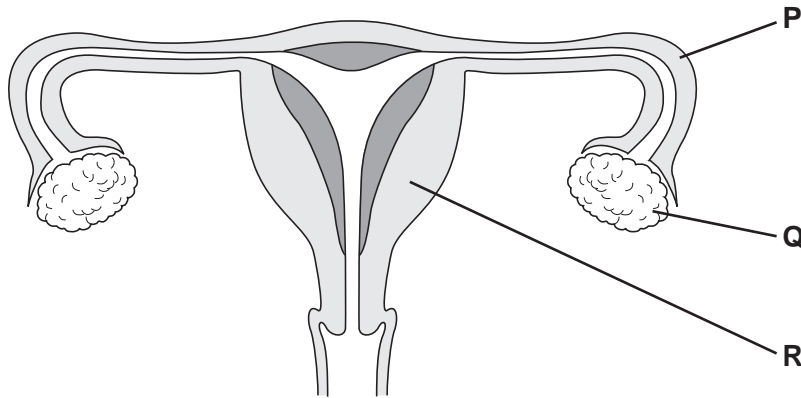


Fig. 12.1

(a) Name and state the function of the parts labelled P, Q and R.

P name.....
 function.....

Q name.....
 function.....

R name.....
 function.....

[6]

(b) On Fig. 12.1

- (i) label with an **X** the place where sperm are deposited,
 - (ii) label with a **Y** where eggs are normally fertilised.
- [2]

(c) A woman begins to menstruate on July 1st.
 When is the next date that she is likely to ovulate?

.....[1]

13 (a) State the difference between magnetic and non-magnetic materials.

.....

(b) Insulated wire is wrapped round a core as shown in Fig. 13.1. A current is passed through the wire to form an electromagnet.

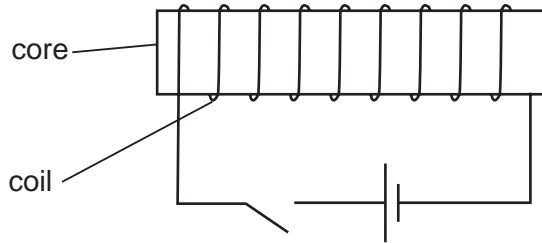


Fig. 13.1

(i) Suggest a suitable material for the core.

.....

(ii) State two ways by which the strength of the electromagnet may be increased.

1.

2.

[3]

14 (a) Name two gases that pollute the atmosphere. For each one, state a source of the pollutant.

gas 1

source

.....

gas 2

source

.....[4]

(b) Describe an effect of **one** of these gases on the environment.

.....

.....

.....[1]

15 Alpha-particles, beta-particles and gamma-rays are three types of radioactive emissions.

(a) State which type is

(i) the most penetrating,

(ii) the most ionising,

(iii) part of the electromagnetic spectrum.

[3]

(b) State what is meant by the *half-life* of a radioactive material.

.....

.....[2]

(c) A radioactive material emits beta-particles. Fig. 15.1 shows the number of beta-particles emitted in one second at two different times.

time/hours	number of particles emitted in one second
0	400
24	100

Fig. 15.1

Calculate the half-life of the radioactive material.

[2]

16 The first member of the alkene homologous series is ethene. Ethene, C_2H_4 , is an unsaturated hydrocarbon.

(a) Explain what is meant by *unsaturated*.

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

(b) State the general formula of the alkenes.

.....[1]

(c) Ethanol, C_2H_5OH , can be produced by reacting ethene with steam.

(i) State **one** condition required for this reaction.

.....

(ii) Deduce the equation for the reaction.

.....
[2]

(d) Ethene undergoes polymerisation to form poly(ethene). Draw the structure of the polymer molecule.

[2]

17 (a) Name the products of digestion of protein.

.....

(b) Suggest two uses of protein in the body.

1.

.....

2.

.....[2]

(c) Some molecules from the digestion of protein are not used by the body. They are changed into urea.

(i) In which organ does this change occur?

.....

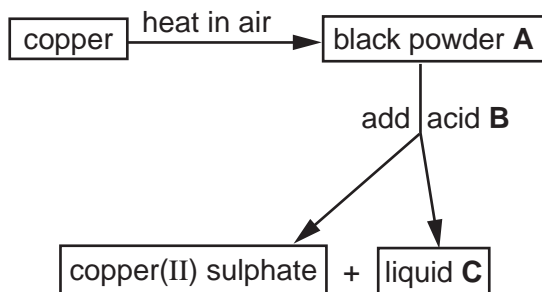
(ii) What happens to the urea that is formed?

.....

.....

[2]

18 Study the following reaction scheme.



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

black powder **A**

acid **B**

liquid **C**[3]

(b) Liquid **C** has a pH value of 7.
What is the colour of Universal Indicator in this liquid?

.....[1]

(c) What type of reaction does copper undergo when heated in air?

.....[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 4	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 12	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 20	40 Ca Calcium 20		45 Sc Scandium 21	48 Ti Titanium 22	59 Co Cobalt 27	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 38	88 Sr Strontium 38		89 Y Yttrium 39	91 Zr Zirconium 40	103 Rh Rhodium 45	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 56	137 Ba Barium 56		139 La Lanthanum 57	178 Hf Hafnium 72	192 Ir Iridium 77	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
226 Fr Francium 88	226 Ra Radium 88		227 Ac Actinium 89										

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	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

3-71 Lanthanoid series
0-103 Actinoid series

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.).