Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Secondary Education
June 2006

APPLIED SCIENCE (DOUBLE AWARD) **3860/2F**
Unit 2 Science for the Needs of Society
Foundation Tier

F

Friday 16 June 2006 9.00 am to 10.30 am

For this paper you must have:
- a ruler

You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

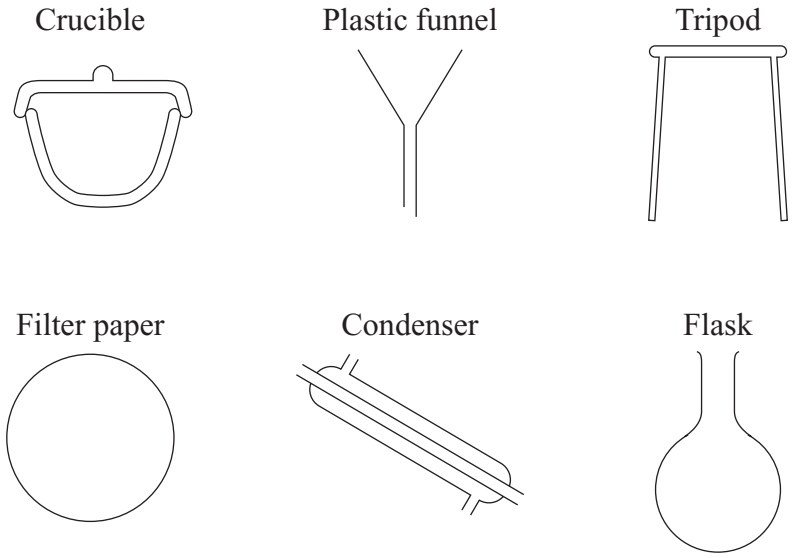
Information
- The maximum mark for this paper is 80.
- The marks for questions are shown in brackets.

For Examiner's Use			
Number	Mark	Number	Mark
1		5	
2		6	
3		7	
4		8	
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

1 It is important to choose the correct equipment when you are doing an experiment in the laboratory.

A selection of laboratory equipment is shown below.



(a) Which **two** pieces of equipment are used when an ore is heated with carbon to extract the metal?

1 .....

2 .....

(2 marks)

(b) Which **two** pieces of equipment are used to separate salt solution from sand?

1 .....

2 .....

(2 marks)

(c) Which **two** pieces of equipment are used for a distillation experiment?

1 .....

2 .....

(2 marks)

(d) Name **one** piece of equipment that is likely to be made from each of the following materials.

(i) Metal .....

(ii) Polymer .....

(iii) Ceramic .....

(3 marks)

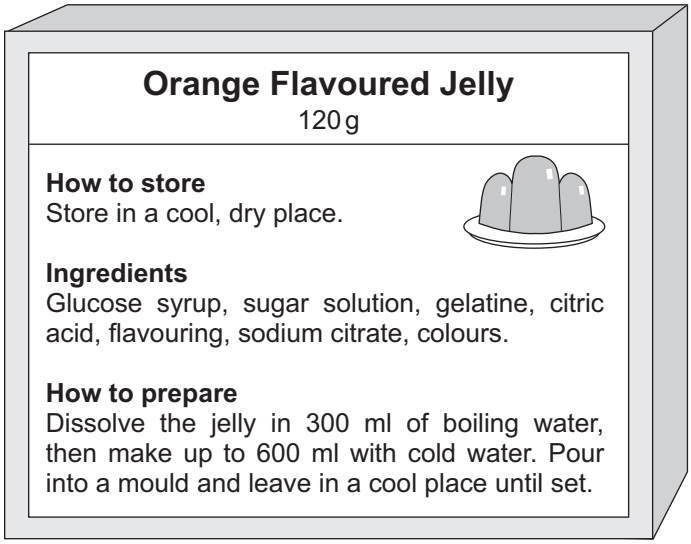
9

Turn over for the next question

2 A caterer needs to make twenty portions of orange jelly for a children's party.

The label from a packet of jelly is shown below.

Use the information on the label to help you answer the questions.



(a) Use words from the list to complete the following sentences.

foam **gel** **suspension** **solution**

When jelly dissolves in water it forms a ..... .

When it sets it turns into a ..... . *(2 marks)*

(b) Give **two** ways to make the jelly dissolve in water quickly.

1 .....

2 .....

(2 marks)

(c) Each child's portion of jelly has a volume of 100 ml.

(i) How many portions can be made from one packet of jelly?

.....

(1 mark)

(ii) How many packets of orange flavoured jelly does the caterer need to make enough jelly for the party?

.....

(2 marks)

(d) The caterer did an experiment to find out how temperature affects the time taken for jelly to set.

Write a method for the experiment.

.....

.....

.....

.....

.....

.....

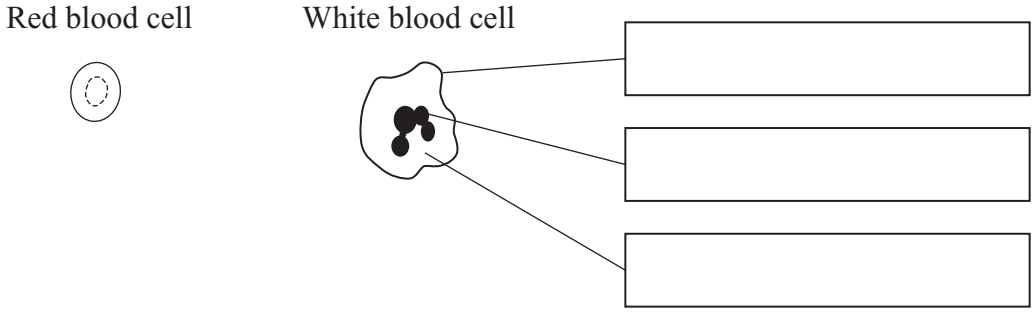
(3 marks)

10

Turn over for the next question

3 A hospital laboratory technician can tell a lot about the health of patients by looking at their blood cells under a microscope.

The diagrams below show two different types of blood cell.



(a) Use words from the list below to label the diagram of the white blood cell.

cell wall **cytoplasm** **cell membrane** **nucleus** **chloroplast**

(3 marks)

(b) Give **two** differences between the blood cells that you can see in the diagrams.

1 .....

2 .....

(2 marks)

(c) Use words from the list below to complete the following sentence.

heart **lungs** **photosynthesis** **red** **respiration** **white**

..... blood cells pick up oxygen from the ..... and carry it to all the other cells in the body so that ..... can take place.

(3 marks)

(d) In the list below, draw a ring around the correct name for the liquid part of the blood.

cell sap **cytoplasm** **mucus** **plasma**

(1 mark)

9

4 Chemical products are used on a farm to help produce a better crop.

(a) In the table below, write the name of a chemical product next to its use.

Use names from the list.

One has been done for you.

Antiseptic **Artificial fertiliser** **Fungicide** **Herbicide** **Pesticide**

Name of chemical product	Use
	Kills insects that might eat the crop
	Kills weeds that are growing with the crop
	Protects the crop from diseases
Artificial fertiliser	Supplies minerals to increase the growth of the crop

(3 marks)

(b) Why does killing the weeds help to increase the yield of a crop?

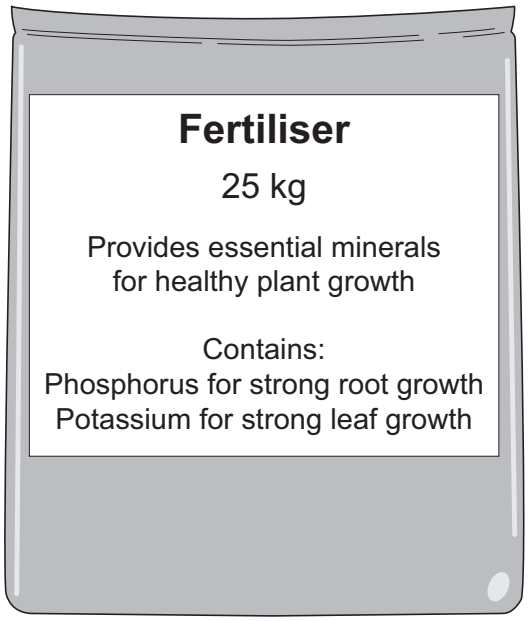
.....

.....

(1 mark)

Question 4 continues on the next page

(c) The diagram shows a bag of artificial fertiliser.



(i) Give the chemical symbols for the **two** elements in the fertiliser.

.....

.....

(2 marks)

(ii) Name **two** other elements needed for healthy plant growth.

1 .....

2 .....

(2 marks)

(d) Organic farmers increase crop yields without using chemical products.

(i) How does an organic farmer supply essential minerals to the crop?

.....

.....

(1 mark)

(ii) How does an organic farmer get rid of weeds?

.....

.....

(1 mark)

(iii) How does an organic farmer get rid of insects that might eat the crop?

.....

.....

(1 mark)

(e) The following table compares the cost and the yield of wheat produced by intensive farming methods and by more traditional organic methods.

	Intensive farming	**Traditional methods**
Cost to produce in £ per acre	83	52
Yield in tonnes per acre	4.0	2.3
Cost per tonne	£20.75	

(i) Explain why traditional methods produce a lower yield per acre.

.....

.....

(2 marks)

(ii) Calculate the cost per tonne of wheat produced by traditional methods.

Show your working.

.....

.....

Cost ..... £ per tonne
(2 marks)

15

Turn over for the next question

5 Metals are useful materials. An engineer will choose a metal for a particular use because it has the right properties.

(a) Metals are strong, and they have other important properties.

Complete the table by choosing the property from the list that best suits the use for **each** metal.

One has been done for you.

attractive appearance **corrodes easily** **good electrical conductivity** **high boiling point** **high density**

Metal	Use	Property
Copper	Making wires	
Lead	Weights for divers	
Silver	Making jewellery	
Zinc	Protecting iron from corrosion	Corrodes easily

(3 marks)

(b) High tensile strength shows that there are strong forces of attraction between the atoms in a metal structure.

The forces of attraction between the atoms affect the melting point of the metal.

The tensile strength of some metals is given in the table below.

Metal	Tensile strength in MPa
Copper	230
Lead	15
Silver	190
Zinc	140

Which metal in the table would you expect to have the highest melting point?

Give a reason for your answer.

.....

.....

(2 marks)

(c) Brass is an alloy made by mixing copper and zinc together.

The table shows how the amount of zinc in the alloy affects its tensile strength.

Percentage zinc by mass in the alloy	Tensile strength in MPa
0	230
10	260
20	300
30	330

Describe how the amount of zinc affects the tensile strength of the alloy.

.....

.....

.....

.....

(2 marks)

(d) Brass is used to make taps and ornaments.

Give **two** reasons why brass is a better choice for making taps and ornaments than zinc.

Use the information that was given in parts (a), (b) and (c) to help you.

1 .....

2 .....

(2 marks)

9

Turn over for the next question

6 The skin is an important organ that protects us from infection and helps us to control our body temperature.

Control of body temperature involves the sweat glands and changes to the diameter of blood capillaries in the skin.

(a) In the sentences below, draw a ring around the correct answer in each box.

(i) When we are cold, the diameter of the blood capillaries

decreases.
increases.
stays the same.

(ii) When we are hot, the amount of the blood flowing to the skin

decreases.
increases.
stays the same.

(iii) Sweat cools the skin by

condensation.
evaporation.
osmosis.

(3 marks)

(b) Some people are born without any colouring in their skin.

This is an inherited condition known as albinism.

To have a child with albinism, both parents must carry the affected gene.

(i) Although both parents carry the gene for albinism, they do not have the condition.

What is the correct word used to describe the gene for albinism?

.....

(1 mark)

(ii) Using the symbols

A for the unaffected gene

a for the affected gene

draw and label a diagram to show how albinism can be inherited from two unaffected parents who both carry the affected gene.

(4 marks)

(iii) What is the chance of the parents having a child with albinism?

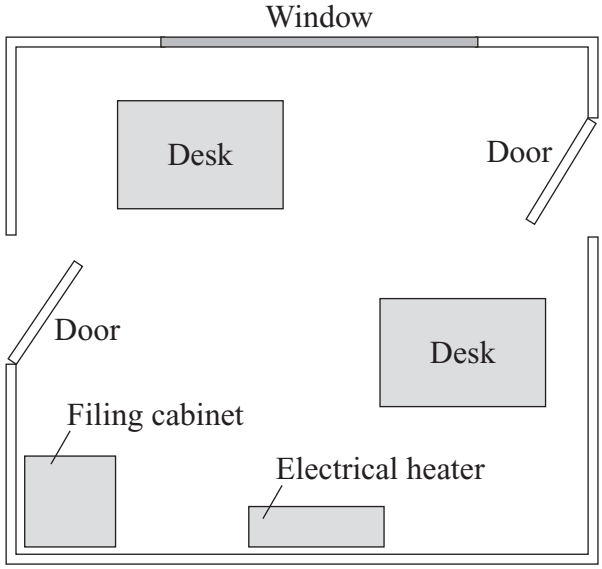
.....

(1 mark)

9

Turn over for the next question

7 An oil filled electrical heater is used to heat a small office.



The electrical heater has a power output of 3 kilowatts.

The electrical heater is switched on for 8 hours each day.

(a) Use the equation below to calculate the electrical energy used by the heater when it is switched on for 8 hours.

Energy used (kilowatt-hours) = power (kilowatts) × time (hours)

.....

.....

..... kilowatt-hours
(2 marks)

(b) One kilowatt-hour of electricity costs 7p.

Calculate the cost of using the electrical heater for one day.

.....

.....

Cost = ... p
(2 marks)

(c) Give **two** ways in which heat is transferred from the electrical heater to the room.

1 .....

2 .....

(2 marks)

(d) Give **two** ways to stop heat escaping from the room.

1 .....

2 .....

(2 marks)

(e) Suggest **one** reason why it is better to have the radiator filled with oil and not water.

.....

.....

(1 mark)

9

8 Methane is a fossil fuel used for heating homes.

Methane is classified as an organic compound.

(a) Name **one** other fossil fuel.

.....

(1 mark)

(b) Choose **two** reasons why methane is a suitable fuel for heating homes.

Tick **two** boxes.

Burns with a clean flame ☐

Renewable ☐

Easy to light ☐

Does not cause global warming ☐

(2 marks)

(c) Explain why methane is classified as an organic compound.

.....

.....

(1 mark)

(d) The chemical equation for the burning of methane is given below.

The equation is not balanced.

$$CH_4 + 2O_2 \rightarrow CO_2 + \ldots\ldots\ldots\ldots H_2O$$

(i) Name the elements in methane.

.....

(1 mark)

(ii) Balance the equation by writing a number in the space provided. *(1 mark)*

(iii) Name the products formed when methane burns.

.....

.....

(2 marks)

(iv) Draw a ring around the **two** words that correctly describe this reaction.

combustion **endothermic** **exothermic** **neutralisation**

(2 marks)

10

END OF QUESTIONS