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General Certificate of Secondary Education
June 2005



**APPLIED SCIENCE (DOUBLE AWARD)
FOUNDATION TIER
Unit 2 Science for the Needs of Society**

3860/2F

F

Thursday 16 June 2005 9.00 am to 10.30 am

In addition to this paper you will require:
a ruler.
You may use a calculator.

| For Examiner's Use | | | |
|---------------------|------|--------|------|
| Number | Mark | Number | Mark |
| 1 | | | |
| 2 | | | |
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| Total (Column 1) | → | | |
| Total (Column 2) | → | | |
| TOTAL | | | |
| Examiner's Initials | | | |

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 in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

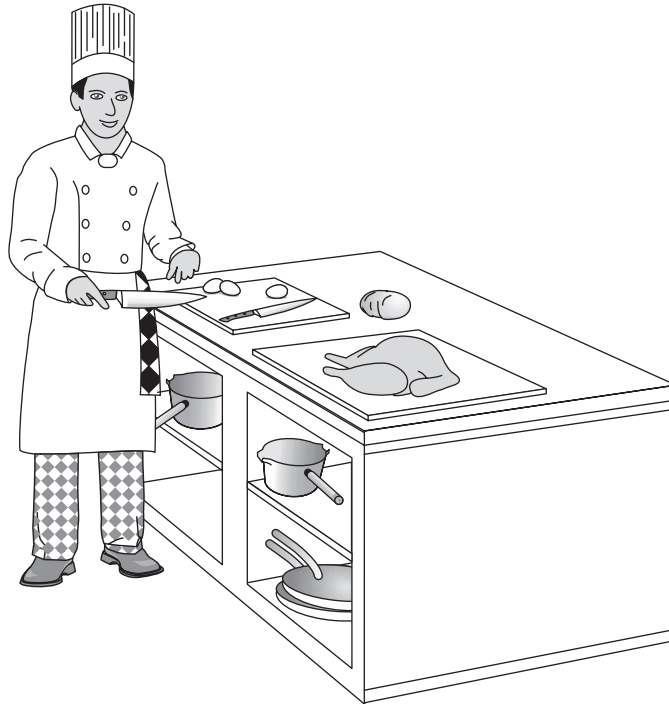
Information

- The maximum mark for this paper is 80.
- Mark allocations are shown in brackets.

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

1 The drawing shows a food preparation area in a restaurant.

Bad standards of hygiene can cause food to be infected with harmful microorganisms.



(a) Several methods, including the use of chemicals, can be used to protect against infection by harmful microorganisms.

(i) Which method is used when food is cooked at a high temperature to kill the microorganisms?

Draw a ring around this method.

antiseptics

disinfectants

immunisation

sterilisation

(1 mark)

(ii) Which method is used when surfaces are wiped down with a chemical to kill the microorganisms?

Draw a ring around this method.

antiseptics

disinfectants

immunisation

sterilisation

(1 mark)

- (iii) Which method is used when a chemical stops microorganisms from growing on a graze on the skin?

Draw a ring around this method.

antiseptics

disinfectants

immunisation

sterilisation

(1 mark)

- (b) Food is kept in a refrigerator to stop infection by microorganisms.

Explain how this method works.

.....

.....

(2 marks)

- (c) (i) Give **one** other method that you can use to stop food from being infected when you are preparing it.

.....

(1 mark)

- (ii) How does this method work?

.....

(1 mark)

- (d) Some diseases are caused by microorganisms.

Put a tick in the boxes next to the **three** diseases that are caused by microorganisms.

| | |
|----------------|--|
| Athlete's foot | |
| Heart disease | |
| Lung cancer | |
| Measles | |
| Obesity | |
| Tuberculosis | |

(3 marks)

10

Turn over ►

2 Substances can be classified into groups because they have different properties.

The names of six different substances are given below.

glass reinforced plastic iron oxide lead

phosphorus polyethene silica

(a) Write the name of the substance next to the correct description in the table.

One has been done for you.

| Description | Name of substance |
|---------------------|-------------------|
| A ceramic | Silica |
| A polymer | |
| A composite | |
| A metal element | |
| A non-metal element | |
| An ore | |

(4 marks)

(b) (i) Draw a ring around the property that best describes how the polymer behaves.

conducts heat flexible high melting point high density

(1 mark)

(ii) Draw a ring around the property that best describes how silica behaves.

conducts heat flexible high melting point high density

(1 mark)

(c) Elements have been given chemical symbols.

(i) Give the name of the metal element that has the symbol Mg.

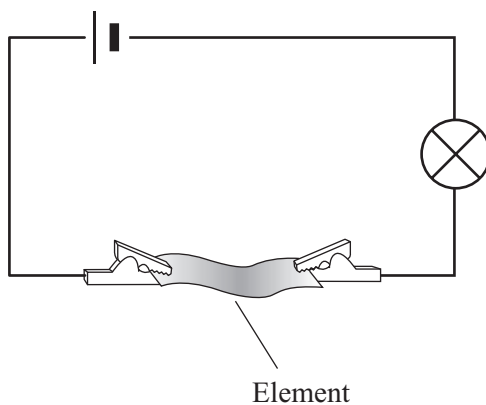
.....
(1 mark)

(ii) Sulphur is a non-metal element.

Give the chemical symbol for sulphur.

.....
(1 mark)

(iii) Describe how this circuit could be used to show the difference between a metal element and a non-metal element.



.....
.....
(2 marks)

(d) Complete the following sentences by choosing the correct words from the list.

carbon

oxygen

neutralisation

reduction

A metal can be extracted from its ore by heating with

This reaction is known as a reaction.

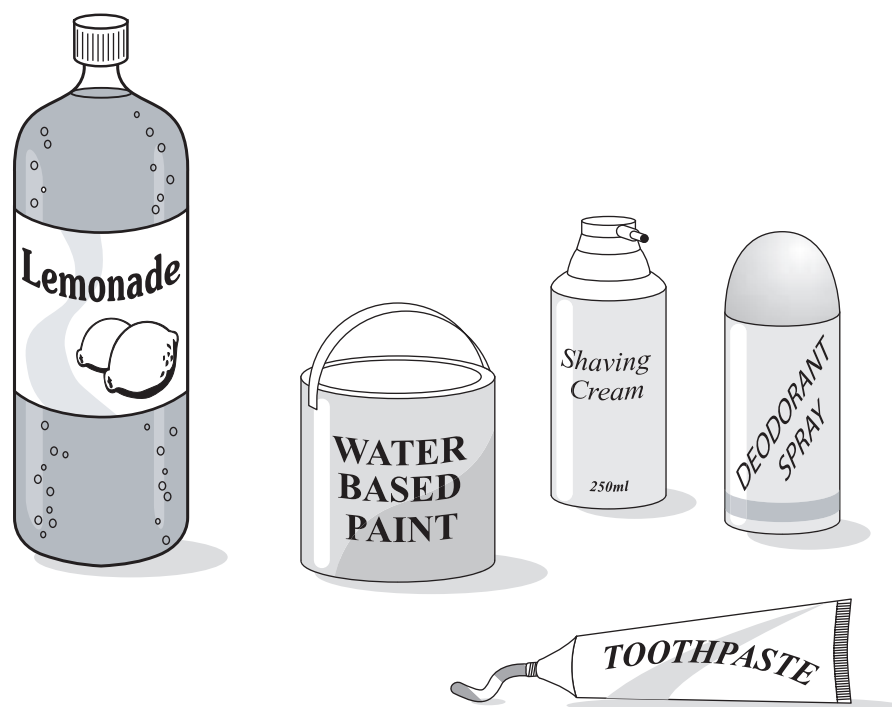
(2 marks)

12

Turn over ►

- 3 (a) A shopper bought five products from a supermarket.

Each product is a different type of mixture.



Complete the table below by writing the name of the product next to the type of mixture that it contains.

Deodorant spray

Lemonade

Shaving cream

Toothpaste

Water-based paint

| Name of product | Type of mixture |
|-----------------|-----------------|
| | Suspension |
| | Emulsion |
| | Aerosol |
| | Foam |
| | Solution |

(4 marks)

- (b) Give **one** other type of mixture.

.....

(1 mark)

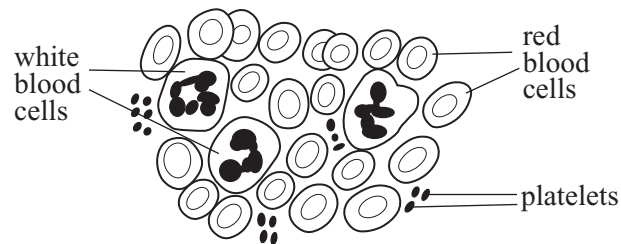
NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

Turn over ►

4 The blood of a patient was examined in hospital by a laboratory technician.

The diagram shows what the blood looked like under the microscope.



(a) The parts of the blood have different functions.

(i) What is the function of the red blood cells?

.....
(1 mark)

(ii) What is the function of the platelets?

.....
(1 mark)

(iii) What is the function of the white blood cells?

.....
(1 mark)

(b) The liquid part of the blood carries dissolved substances around the body.

(i) Name the liquid part of the blood.

.....
(1 mark)

(ii) Name **two** dissolved substances that are carried around the body.

1

2

(2 marks)

(c) Blood is pumped around the body in arteries, veins and capillaries.

(i) Name the organ that pumps blood around the body.

.....
(1 mark)

(ii) Give **two** differences between an artery and a vein.

1

.....

2

.....
(2 marks)

(iii) Draw a ring around the word that describes how dissolved substances move from capillaries into cells.

diffusion **evaporation** **osmosis**

(1 mark)

(iv) The hospital laboratory technician measured 10 000 million white blood cells per litre of blood.

The patient has 5 litres of blood.

Calculate the total number of white blood cells in the patient's body.

.....

.....
(2 marks)

12

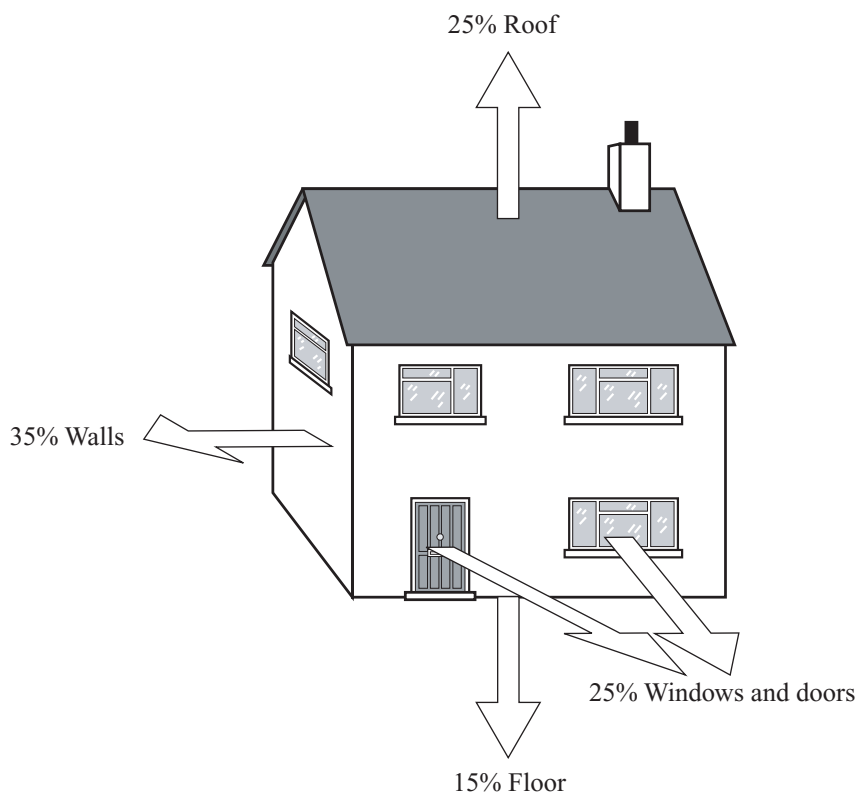
TURN OVER FOR THE NEXT QUESTION

Turn over ►

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5 A homeowner can save money by reducing energy costs.

The diagram shows how heat energy is lost from a house.



(a) Heat energy is lost from the house by **conduction, convection** and **radiation**.

(i) Complete the sentences below by naming the type of heat transfer.

The movement of hot air in the house can lead to heat loss by

Dark surfaces emit heat energy by

Heat energy can travel along a metal by

(3 marks)

(ii) Give **two** ways in which heat loss from the house can be reduced.

1

2

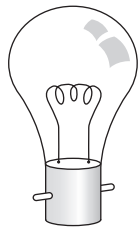
(2 marks)

QUESTION 5 CONTINUES ON THE NEXT PAGE

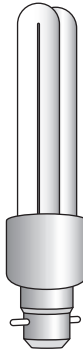
Turn over ►

(b) The homeowner can save money by using efficient electrical appliances.

Low energy light bulbs are more efficient than filament bulbs because they give out less heat energy.



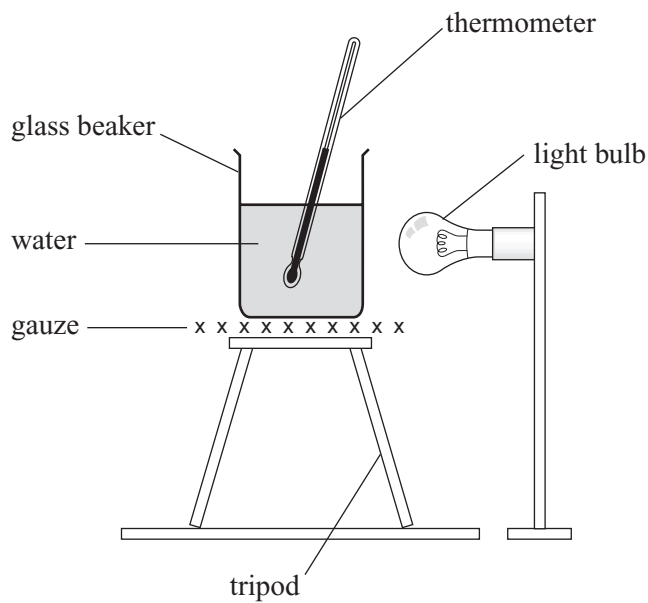
Filament bulb



Low energy light bulb

A student designed an experiment to measure the amount of heat energy given out by a light bulb.

The diagram below shows her design.



(i) Give **two** ways to make her experiment more accurate.

- 1
-
- 2
-

(2 marks)

(ii) Describe how the experiment could be used to show that a low energy bulb gives out less heat energy than a filament bulb.

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

(4 marks)

(c) The homeowner fitted a filament bulb.

The light bulb used 2 kWh of electricity when it was switched on for 20 hours.

Use the formula to calculate the power of the bulb in watts.

$$\text{power (kilowatts)} = \frac{\text{energy used (kilowatt hours)}}{\text{time (hours)}}$$

.....
.....

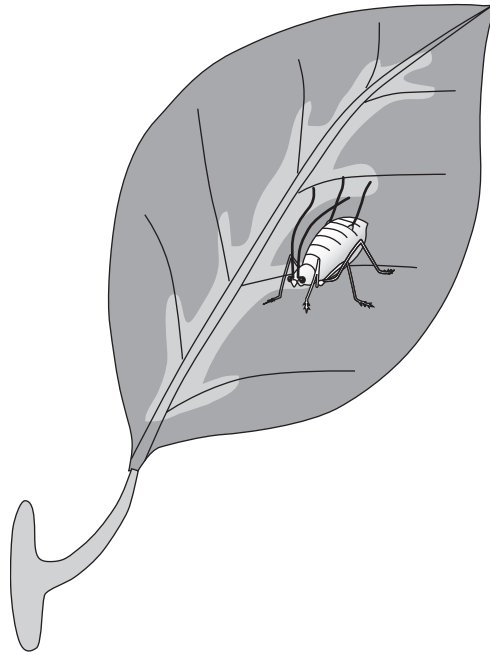
..... watts
(3 marks)

14

TURN OVER FOR THE NEXT QUESTION

Turn over ►

6 Aphids are insect pests which suck out the cell sap from plant cells.



(a) The cell sap contains glucose.

Why do aphids need a supply of glucose?

.....
(1 mark)

(b) When a plant is infested with aphids, it does not grow very well.

A farmer must find a way to remove the aphids from his crops.

(i) Give a method used in intensive farming to remove aphids from crops.

.....

How does it remove the aphids?

.....

(2 marks)

(ii) Give a method used in organic farming to remove aphids from crops.

.....

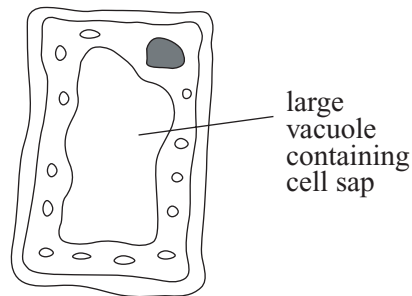
How does it remove the aphids?

.....

(2 marks)

- (c) Aphids suck the sap from the large vacuole of a plant cell.

The diagram shows the structure of a typical plant cell.



- (i) Apart from the vacuole, name **two** other parts of a plant cell that are **not** in an animal cell.

1

2

(2 marks)

- (ii) Name **two** parts that are in both plant **and** animal cells.

1

2

(2 marks)

9

TURN OVER FOR THE NEXT QUESTION

Turn over ►

7 (a) Crude oil is a non-renewable energy resource.

(i) Why is crude oil called a non-renewable energy resource?

.....
(1 mark)

(ii) Name **two** other non-renewable energy resources.

1

2

(2 marks)

(b) Crude oil is separated into fractions at the refinery.

The table shows the percentage of each fraction present in a barrel of crude oil.

| Fraction | Percentage |
|--------------------|------------|
| Light hydrocarbons | 5% |
| Naphtha | 20% |
| Kerosene | |
| Gas oil | 35% |
| Residue | 10% |

(i) The percentage for kerosene is missing.

Calculate the percentage of kerosene in the crude oil.

.....

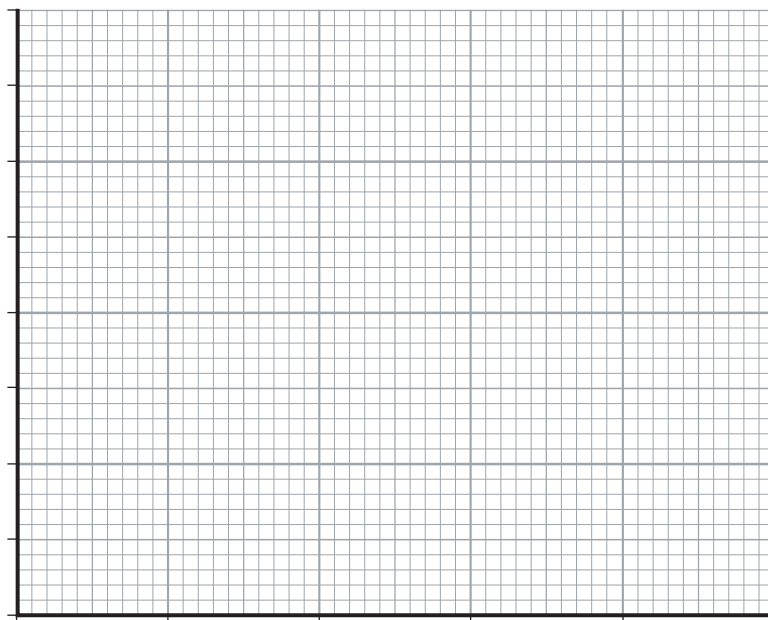
.....

(2 marks)

- (ii) Draw a bar chart to represent the information in the table.

Label the axes on your bar chart.

Include your value for kerosene on the chart.



(4 marks)

- (iii) Name the method used to separate crude oil into fractions.

.....
(2 marks)

- (iv) Give **one** difference between the fractions that allows them to be separated.

.....
(1 mark)

QUESTION 7 CONTINUES ON THE NEXT PAGE

Turn over ►

- (c) One of the chemicals in crude oil is propane, C_3H_8 .

Propane is used as a fuel.

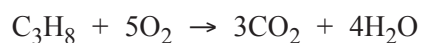
- (i) Name the **two** elements in propane.

1.....

2.....

(2 marks)

- (ii) The chemical equation for the burning of propane is given below.



Name the **two** products of this reaction.

1.....

2.....

(2 marks)

- (iii) Explain why the burning of propane may cause damage to the environment.

.....

.....

.....

(2 marks)

END OF QUESTIONS

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THERE ARE NO QUESTIONS PRINTED ON THIS PAGE