Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature							

Leave blank

General Certificate of Secondary Education
June 2005

ASSESSMENT and QUALIFICATIONS ALLIANCE

APPLIED SCIENCE (DOUBLE AWARD) 3860/2H
HIGHER TIER
Unit 2 Science for the Needs of Society

Thursday 16 June 2005 9.00 am to 10.30 am

H

In addition to this paper you will require:
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 in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

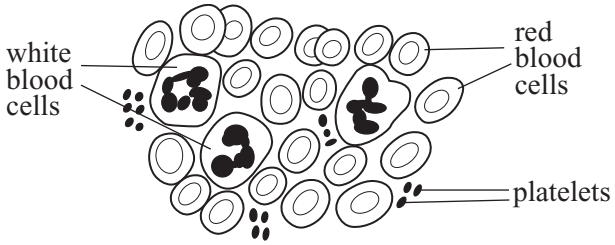
Information
- The maximum mark for this paper is 90.
- Mark allocations are shown in brackets.

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

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

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

1 .....

.....

2 .....

.....

(2 marks)

(ii) Name the process that carries dissolved substances from capillaries into cells.

.....

(1 mark)

(d) Vaccines are used to immunise patients against infections.

(i) What is a vaccine?

.....

.....

(2 marks)

(ii) Explain how immunisation protects the patient against infection.

.....

.....

.....

.....

(3 marks)

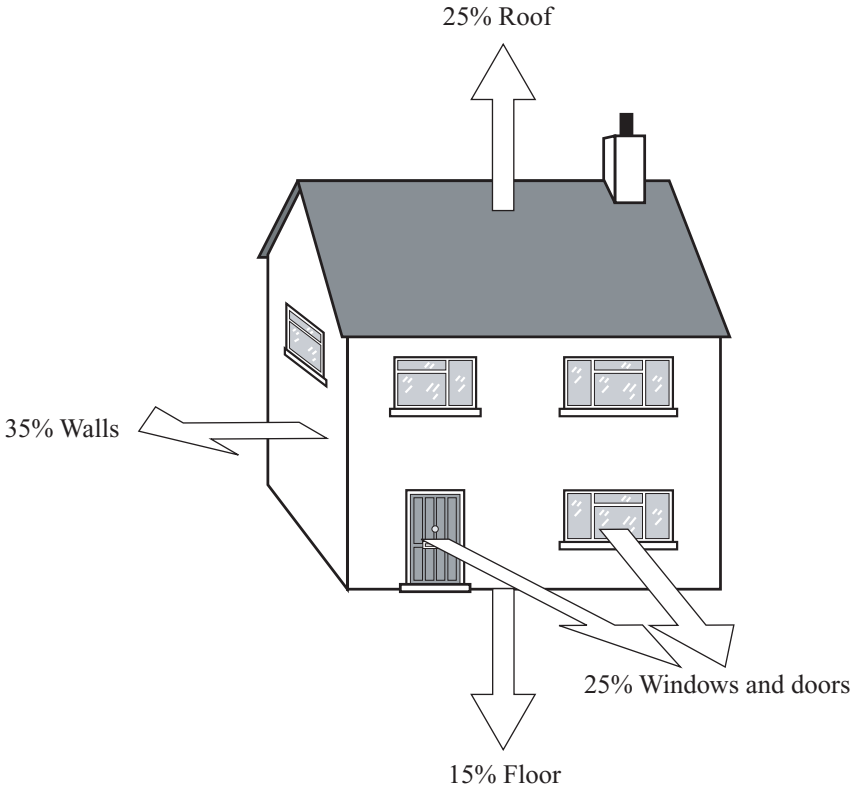
14

TURN OVER FOR THE NEXT QUESTION

NO QUESTIONS APPEAR ON THIS PAGE

2 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 different types of heat transfer.

(i) Complete the sentences 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 .....

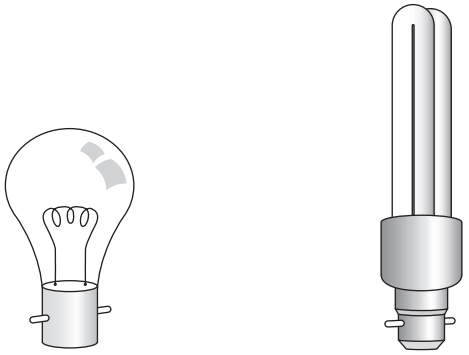
2 .....

(2 marks)

QUESTION 2 CONTINUES ON THE NEXT PAGE

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

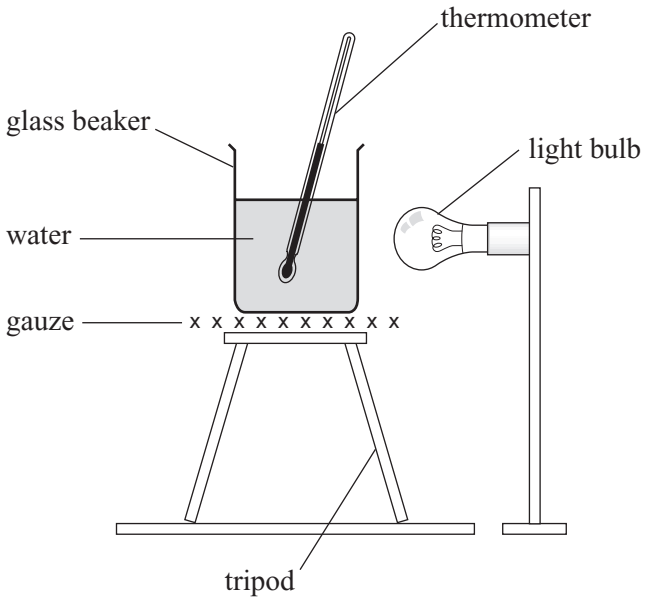
Low energy light bulbs are more efficient than filament bulbs because they give out less heat energy.



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.

(i) Use the formula to calculate the power of the bulb in watts.

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

.....

.....

..... watts

(3 marks)

(ii) Calculate the current passing through the bulb if it has a voltage of 240 volts.

.....

.....

..... amps

(3 marks)

(d) A low energy light bulb is more expensive than a filament bulb. Explain how the homeowner can still save money by replacing all the filament bulbs with low energy light bulbs.

.....

.....

.....

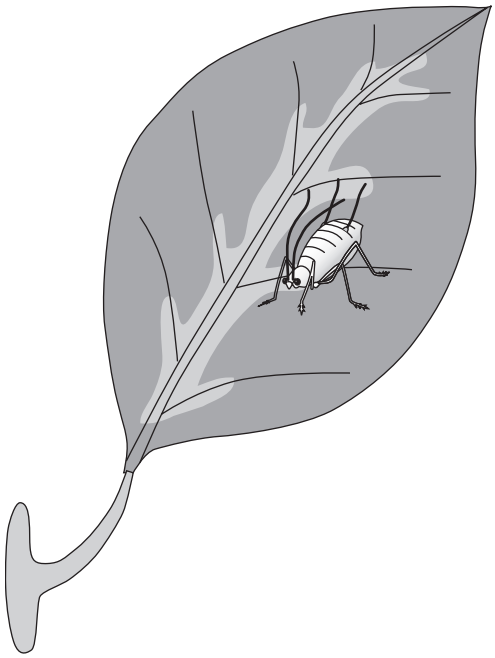
.....

(3 marks)

20

Turn over ▶

3 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.

.....

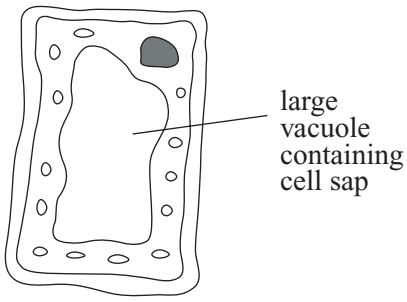
How does it remove the aphids?

.....

(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

4 (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.

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

.....

(2 marks)

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

.....

(1 mark)

(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) Give **two** reasons why propane is classified as an organic compound.

1 .....

.....

2 .....

.....

(2 marks)

(iii) Name the type of bonding between the atoms in a molecule of propane.

.....

(1 mark)

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

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

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

1 .....

2 .....

(2 marks)

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

.....

.....

.....

(2 marks)

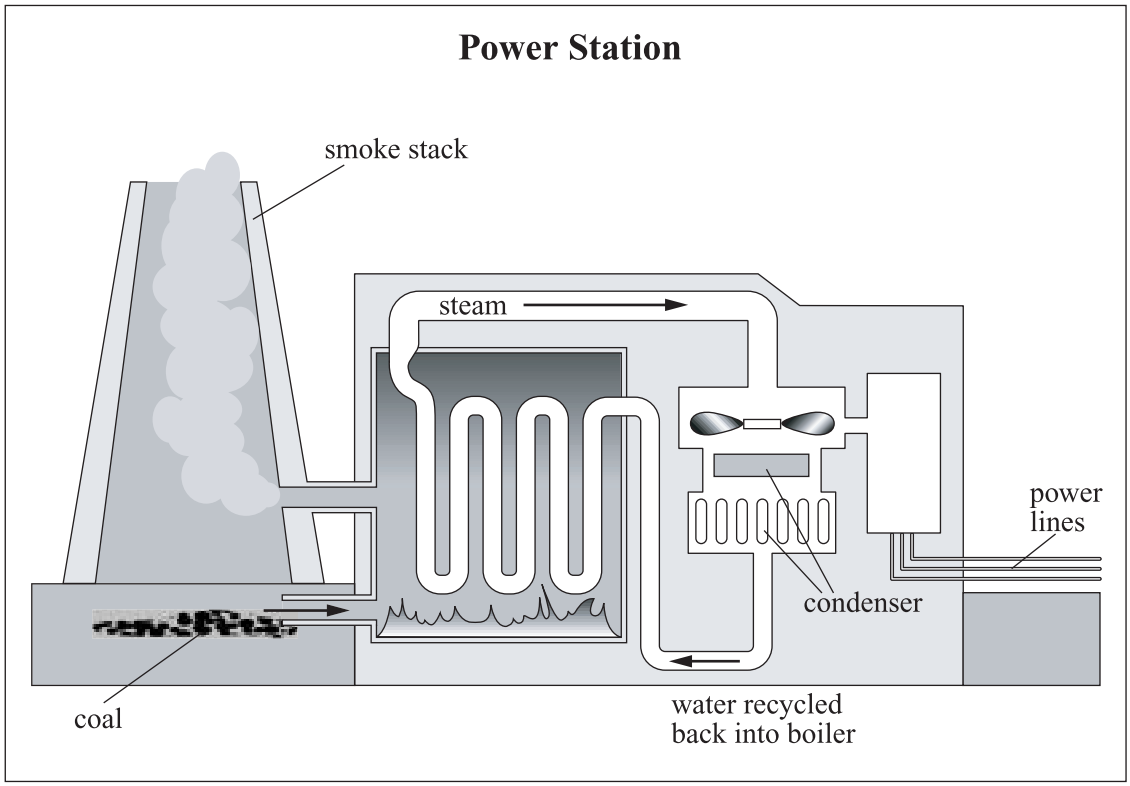
15

TURN OVER FOR THE NEXT QUESTION

5 Coal is a primary energy resource.

The chemical energy contained in coal can be used to generate electricity.

The diagram shows a coal-fired power station.



(a) The large scale generation of electricity in a coal-fired power station involves several steps.

Use the diagram to help you explain these steps.

.....

.....

.....

.....

.....

(4 marks)

(b) In a power station, 2.3 tonnes of coal contain 67.4 million kilojoules of energy.

(i) Calculate the amount of energy in 1 tonne of coal.

.....

.....

(2 marks)

(ii) A coal-fired power station produces 12.6 million kilojoules of electrical energy for every tonne of coal burned.

Calculate the efficiency of the power station.

.....

.....

.....

.....

(3 marks)

(c) What happens to the energy from the coal that is not converted into electricity at the power station?

.....

(1 mark)

10

TURN OVER FOR THE NEXT QUESTION

6 Materials can be classified as metals, polymers, ceramics and composites.

(a) (i) Name a metal that you have studied.

.....

(ii) Give **two** important properties of the metal.

1 .....

2 .....

(2 marks)

(iii) Describe a use for the metal, which depends on **one** of the properties.

.....

.....

(1 mark)

(b) (i) Name a polymer that you have studied.

.....

(ii) Give **two** important properties of the polymer.

1 .....

2 .....

(2 marks)

(iii) Describe a use for the polymer, which depends on **one** of the properties.

.....

.....

(1 mark)

(c) (i) Name a composite that you have studied.

.....

(ii) Give **two** important properties of the composite.

1 .....

2 .....

(2 marks)

(iii) Describe a use for the composite, which depends on **one** of the properties.

.....

.....

(1 mark)

(d) Describe an experiment to compare the strength of the **three** materials that you have chosen in (a)(i), (b)(i) and (c)(i).

You may use a diagram to help you explain your answer.

.....

.....

.....

.....

(3 marks)

12

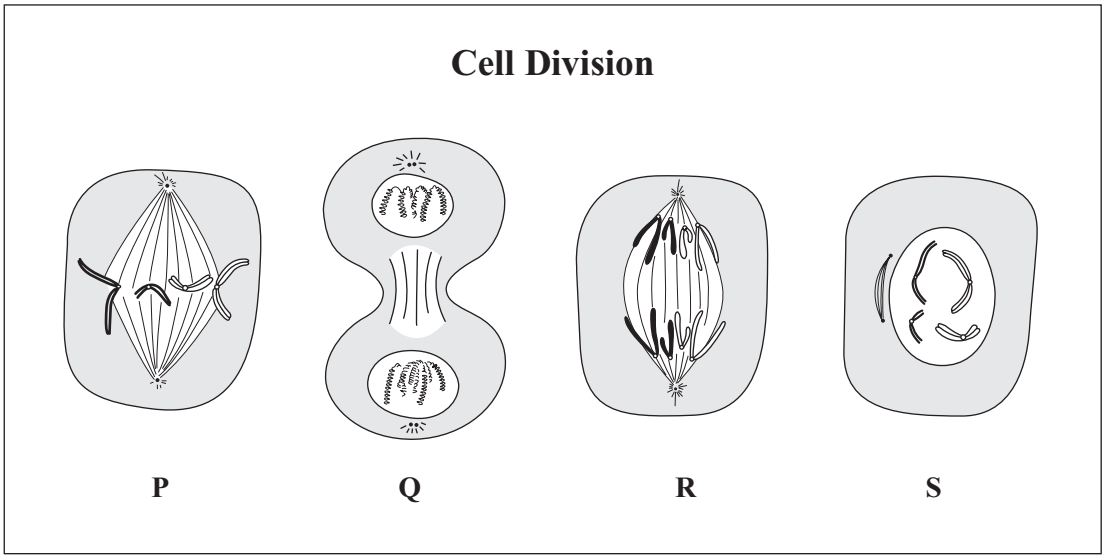
TURN OVER FOR THE NEXT QUESTION

7 Animal breeders study genetics to help them predict the results of selective breeding.

The following diagrams show the main stages in the process of cell division.

The stages are not shown in the correct order.

At the start of the process, there are two pairs of chromosomes.



(a) (i) Write the letters in the correct order to show the events in cell division.

.....

(1 mark)

(ii) What is this type of cell division called?

.....

(1 mark)

(b) How many pairs of chromosomes would be found in the cell at stage **R**?

.....

(1 mark)

(c) The chromosomes contain genes which determine our characteristics. Sometimes, one particular characteristic is controlled by a single pair of genes.

What is this type of inheritance called?

.....

(1 mark)

(d) (i) A farmer bought some brown rabbits and let them breed. Some of the offspring turned out to be white. He was quite amazed and asked you to explain how it happened.

Explain, with the aid of genetic diagrams, why some of the offspring were white.

Use the symbol **B** for brown fur and the symbol **b** for white fur.

.....

.....

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.....

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.....

.....

(4 marks)

(ii) The farmer decided to breed only white rabbits.

Explain how he could do this, starting with his brown rabbits.

.....

.....

.....

(2 marks)

10

END OF QUESTIONS

THERE ARE NO QUESTIONS PRINTED ON THIS PAGE

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