

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



General Certificate of Secondary Education
Higher Tier
March 2012

Science B

SCB2HP

Unit 2 My Family and Home

H

Written Paper

Tuesday 6 March 2012 9.00 am to 10.00 am

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • a ruler • a calculator • the Equations Sheet (enclosed).
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Time allowed

- 1 hour

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 3(a) should be answered in continuous prose. In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.



M A R 1 2 S C B 2 H P 0 1

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

1 Fuels can be used as a source of heat energy to generate electricity.

1 (a) Name the process that releases heat energy from:

1 (a) (i) fossil fuels
(1 mark)

1 (a) (ii) nuclear fuels.
(1 mark)

1 (b) Electricity generated in power stations is carried around the UK in a network of overhead high-voltage cables.

What is the name of this distribution system?

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(1 mark)

1 (c) Some scientists have suggested that living near to overhead high-voltage cables can increase the chances of developing disease **A** and disease **B**.

The table shows how age group and distance of home from cables are related to the risk of developing disease **A** and disease **B**.

In the table, the value '×1.0' means the chance of getting a disease is the same as for the general population.

		Distance of home from cables in m				
Disease	Age group in years	100 m	200 m	300 m	400 m	500 m
A	Under 15	×2.8	×1.7	×1.3	×1.15	×1.0
	Over 15	×1.5	×1.5	×1.2	×1.0	×1.0
B	Under 15	×4.1	×2.1	×1.2	×1.0	×1.0
	Over 15	×2.9	×1.7	×1.1	×1.0	×1.0



Describe the patterns shown in the table about the relationship between disease type, age group and distance of home from the cables.

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(3 marks)

6

2 Metals have different properties that make them useful.

2 (a) Name the metal that is used for wiring in the home. Give **one** property that makes this metal a good choice.

Metal

Property

(2 marks)

2 (b) Name the metal that is used for modern window frames in the home. Give **one** property that makes this metal a good choice.

Metal

Property

(2 marks)

4

Turn over for the next question

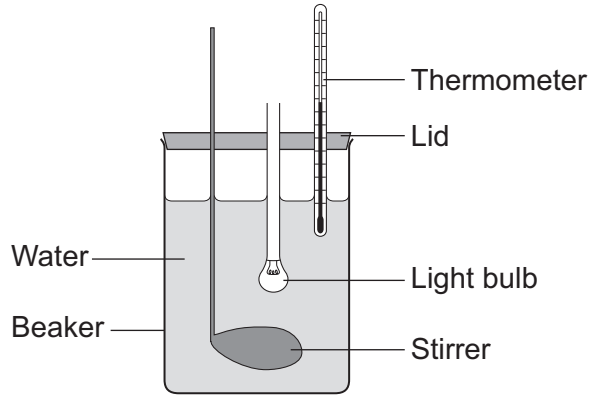
Turn over ►



3 (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

An electric light bulb transfers electrical energy to heat energy and light energy.

The apparatus shown in the diagram can be used to investigate how quickly a low-voltage electric light bulb heats water.



Describe how you would use this apparatus to compare how quickly a 20 watt bulb and a 50 watt bulb heat up the water.

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(6 marks)



3 (b) Light bulbs sometimes contain a substance called a halogen.

The table shows some information about non-halogen and halogen bulbs.

	Power in watts	Efficiency of light production
Non-halogen bulbs	40	0.018
	60	0.019
	100	0.020
	200	0.022
Halogen bulbs	40	0.020
	60	0.022
	100	0.024
	200	

3 (b) (i) The 200-watt halogen light bulb transfers 194.6 watts as heat.

Calculate the efficiency of the bulb in transferring power as light.

Use information from the Equations Sheet to help you.

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Efficiency =
(3 marks)

3 (b) (ii) Give **two** conclusions that can be made about the efficiency of non-halogen and halogen bulbs.

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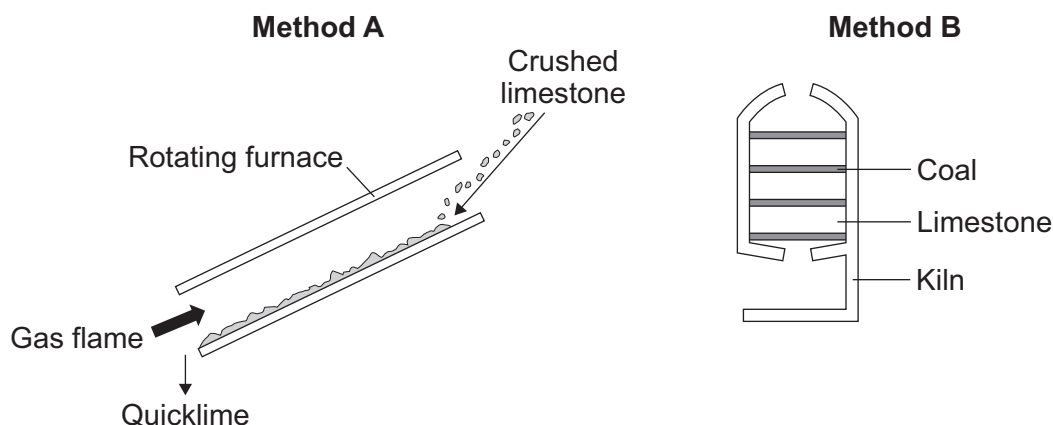
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(2 marks)



- 4 Limestone is a form of calcium carbonate. High temperatures convert limestone into quicklime.

The diagram shows two methods of converting limestone into quicklime.



Method **A** is a modern method. The crushed limestone is fed continuously into a rotating furnace by machinery. Quicklime falls out at the bottom and is removed by machine.

Method **B** is an old method where layers of limestone and coal are put into a kiln. The coal is set alight. When all the coal is burnt the kiln is allowed to cool. The products are removed from the kiln by men with spades.

- 4 (a) Suggest **one** advantage of the modern method.

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 (1 mark)

- 4 (b) Write a symbol equation for the production of quicklime from limestone.

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 (2 marks)



4 (c) Many useful products can be made when limestone is heated strongly with other materials.

Complete the sentences below.

4 (c) (i) Glass is made when limestone is heated with
and

(2 marks)

4 (c) (ii) Cement is made when limestone is heated with

(1 mark)

4 (d) Describe how concrete is made using cement.

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(3 marks)

4 (e) Alkalis such as slaked lime can be used to neutralise acids.

Write the symbol equation that represents **all** neutralisation reactions.

Remember to include state symbols.

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(3 marks)



6 The box shows a label on an American kettle.

120V	60Hz
1500W	
Capacity 0.75 litres	

Calculate the current flowing through the kettle element.

Use information from the Equations Sheet to help you.

Give the unit in your answer.

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Current =
(4 marks)

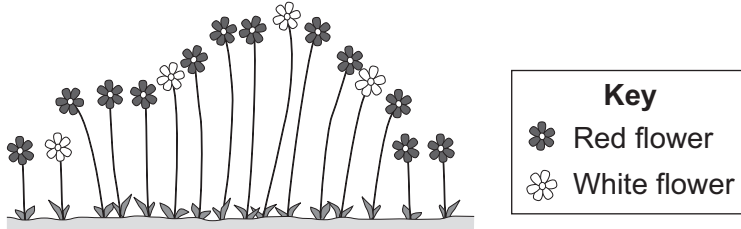
4

Turn over for the next question

Turn over ►



7 A plant scientist crossed two red-flowered plants and collected the seeds. She planted the seeds and let them flower. Her results are shown in the diagram.



7 (a) (i) What word describes the differences seen in the plants?

..... (1 mark)

7 (a) (ii) What are the **two** differences you can see in the plants?

Give the reason for each difference.

Difference 1

Reason

Difference 2

Reason

(4 marks)



7 (b) Explain in as much detail as you can how it is possible for two plants with red flowers to produce offspring with white flowers.

You may use a Punnett square diagram to help your answer.

The two forms of gene for flower colour are G and g.

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(5 marks)

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Turn over for the next question

Turn over ►



8 People are worried about the effect on the environment of using fossil fuels as a source of energy because burning fossil fuels produces greenhouse gases.

Some people think that biofuels produced from plant material are less harmful than fossil fuels because biofuels do not increase the concentration of greenhouse gases in the atmosphere.

The box contains some information about the production of biofuels.

13 million hectares of tropical rainforest are cut down each year. Some of the land is used to grow crops to make biofuels. The area destroyed increases every year.

Some crops are used as raw materials in the production of biofuels instead of being used as food.

As the demand for biofuels increases, the cost of these raw materials increases.

Use this information and your own knowledge to evaluate the ethical issues of biofuel production.

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(5 marks)

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END OF QUESTIONS

