

Centre Number						Candidate Number				
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Other Names										
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	



General Certificate of Secondary Education  
Higher Tier  
March 2013

## Science B

## SCB2HP

Unit 2 My Family and Home

# H

Written Paper

Thursday 7 March 2013 9.00 am to 10.00 am

For this paper you must have:

- a ruler
- a calculator
- the Equations Sheet (enclosed).

**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 reminded of the need for good English and clear presentation in your answers.
- Question 3(b) 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 3 S C B 2 H P 0 1

G/J91145

6/6/6

## SCB2HP

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

**1** The human body produces many different chemicals for the reactions that keep the body alive. Some chemicals help the body to get useful materials from food.

**1 (a) (i)** The stomach makes hydrochloric acid to help get useful materials from food.

Describe how hydrochloric acid helps to get useful materials from food.

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(2 marks)

**1 (a) (ii)** Name **one** problem too much acid in the stomach can cause and describe how the problem is treated.

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(2 marks)

**1 (b)** Hydrochloric acid is a strong acid. Sodium hydroxide is a strong alkali.

A student put some dilute sodium hydroxide solution in a beaker with some universal indicator solution.

She added the dilute hydrochloric acid very slowly until the colour of the universal indicator stopped changing.

The table shows the colour of universal indicator at different pH values.

<b>Indicator colour</b>	red	orange	green	blue	purple
<b>pH</b>	0–3	3–6	7	8–11	11–14



**1 (b) (i)** Describe the colour changes the student saw during the experiment.

Start from the time she added the indicator to the sodium hydroxide.

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(2 marks)

**1 (b) (ii)** How would the student know when the mixture in the beaker was neutral?

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(1 mark)

**1 (c)** Complete the sentences about sodium hydroxide (NaOH) and hydrochloric acid (HCl).

**1 (c) (i)** Sodium hydroxide is an alkali because .....

.....

(1 mark)

**1 (c) (ii)** Hydrochloric acid is an acid because .....

.....

(1 mark)

**1 (d) (i)** Complete the symbol equation for the reaction between sodium hydroxide and hydrochloric acid.



(2 marks)

**1 (d) (ii)** Give the chemical name of the salt produced in this reaction.

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(1 mark)

12
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**Turn over for the next question**

**Turn over ►**



- 2 All washing machines sold in Britain **must** have a European Union Energy Label.  
The label has letters.



The table shows the range of energy efficiency values for each letter.

Energy rating	A	B	C	D	E	F	G
Energy efficiency in kWh per kg of washing	less than 0.19	0.20–0.23	0.24–0.27	0.28–0.31	0.32–0.35	0.36–0.39	more than 0.39

- 2 (a) The washing machine shown in the photograph washes clothes at 60 °C and spins the clothes dry.

It takes 1 hour and 35 minutes to complete the wash cycle.

The average power consumed during this wash cycle is 0.96 kW.



**2 (a) (i)** Calculate the energy transferred during the wash cycle.

Use the equation below to help you answer the question.

$\text{Energy transferred during one cycle in kWh} = \text{average power consumption} \times \text{time}$
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Energy transferred during wash cycle ..... kWh  
(3 marks)

**2 (a) (ii)** The washing machine washes 6 kg of clothes during the cycle.

Calculate the energy transfer per kg of clothes and give the energy rating of the machine.

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Energy transfer per kg ..... kWh  
Energy rating .....  
(2 marks)

**2 (b)** The machine uses less energy if the washing is done at 30 °C instead of 60 °C.

Suggest why.

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(1 mark)

**Question 2 continues on the next page**

**Turn over ►**



**2 (c)** Suggest **two** reasons why the European Union started putting energy labels on appliances.

1 .....

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2 .....

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(2 marks)

<b>8</b>



**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**



0 7

**3 (a)** Metals are important materials used in the building industry.

Name **two** metals used in buildings. Give a use for each metal and a property of the metal that makes it suitable for this use.

Metal 1 .....

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Metal 2 .....

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(4 marks)

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

Limestone is also an important material for the building industry.

The photograph shows three ways of using limestone, or materials made from limestone, in a building.



Glass

Building block

Mortar





Describe how limestone, and materials made from limestone, are used **in the building in the picture.**

To gain full marks you must also include details of how **one** of the materials in the building is made from limestone.

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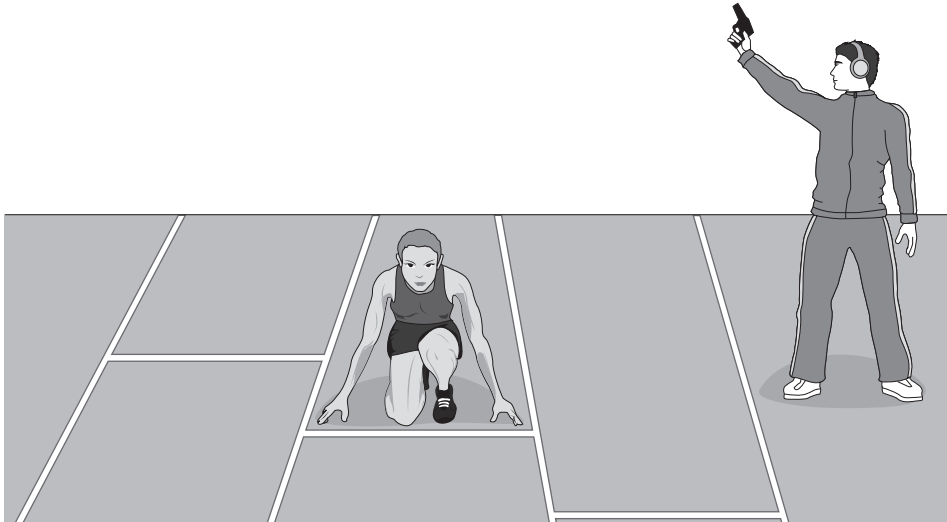
(6 marks)

10
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**Turn over ►**



4 The picture shows a sprinter waiting for the start of a race.



4 (a) To start the race the starter fires a pistol.

Name the type of wave that carries the sound of the pistol to the sprinter.

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(1 mark)

4 (b) The starter stands 25 m away from the sprinter. The pistol produces a sound wave with a frequency of 13 kHz and a wavelength of 0.026 m.

How much time does the sound take to reach the sprinter?

Use the Equations Sheet to help you work out your answer.

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Answer ..... seconds  
(3 marks)



**4 (c)** The sprinter's body detects the stimulus of the sound and her body responds by contracting the leg muscles needed to run.

Describe in detail how the body detects the stimulus and coordinates the muscle contractions needed to run.

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(5 marks)

**4 (d)** After a race the sprinter should not cool down too quickly.

Describe how the body detects a decrease in body temperature and how changes in the blood circulation stop body temperature decreasing any further.

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(4 marks)



- 5 Some people inherit a changed gene. The people who inherit this changed gene cannot make the brown colour found in hair and skin. These people are called albinos.

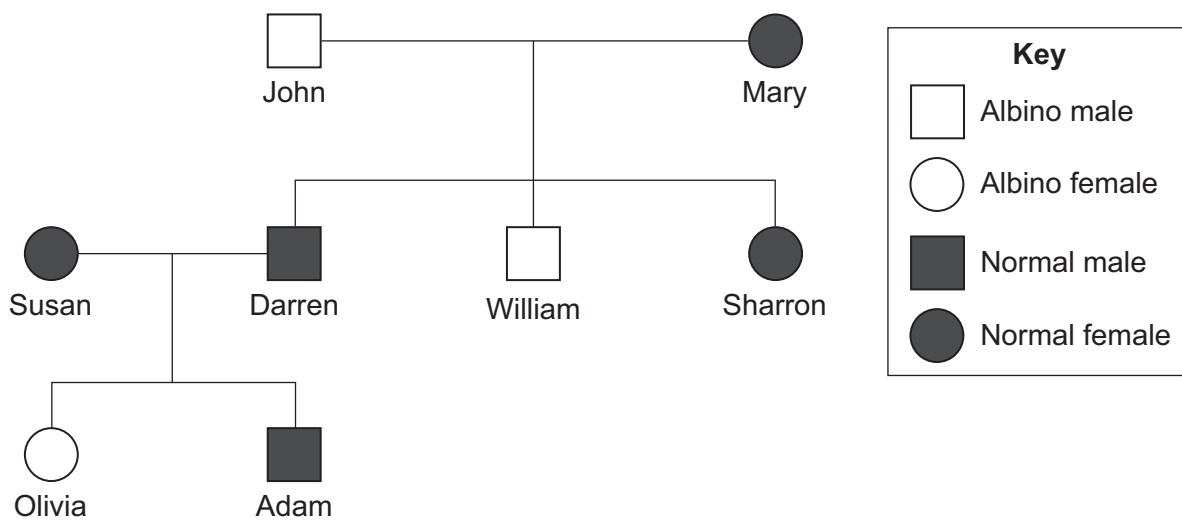
The photograph shows a boy with his sister. The boy is an albino.



A substance called melanin is responsible for brown colour in the skin.

The gene for melanin production has two alleles, **R** and **r**.

The pedigree diagram shows the inheritance of the albino characteristic in another family.



**5 (a)** The albino allele is recessive. We know that the albino allele is recessive by looking at the children of Susan and Darren in the pedigree diagram.

Explain how.

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(3 marks)

**5 (b)** Write down the alleles Sharron has. Give reasons for your answer.

Alleles .....

Reasons .....

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(3 marks)

**Question 5 continues on the next page**

**Turn over ►**



**5 (c)** Scientists can detect some inherited disorders by genetic screening.

Genetic screening helps couples to find out if they have recessive alleles that can cause health-threatening disorders in any children they might have.

In genetic screening:

- the woman is given hormone treatment so she releases eggs
- the eggs are collected from her using a minor operation
- the eggs are fertilised in a test tube and incubated so that they develop into embryos
- one cell is removed from a young embryo and tested to find the embryo's sex, its blood group and if it has the disorder
- an embryo that does not have the disorder is then implanted into the woman's uterus to develop into a baby.

Carefully consider the process. Use your own knowledge and understanding to evaluate the use of genetic screening of embryos. To gain full marks you **must** give a justified opinion about the use of genetic screening.

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*(4 marks)*

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**6** Substances that contain carbon are used as fuels. Some of these fuels are hydrocarbons.

**6 (a)** Ethanol is used as a fuel. The formula of ethanol is  $C_2H_5OH$ .

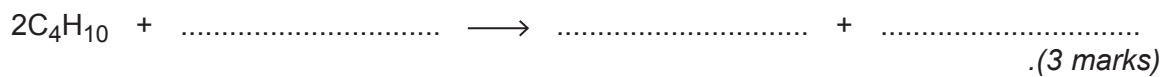
Is ethanol a hydrocarbon? Explain your answer.

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(1 mark)

**6 (b)** Butane has the formula  $C_4H_{10}$ .

Complete and balance the symbol equation for the complete combustion of butane.



**Question 6 continues on the next page**

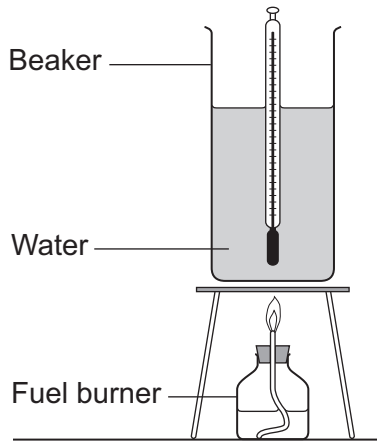
**Turn over ►**



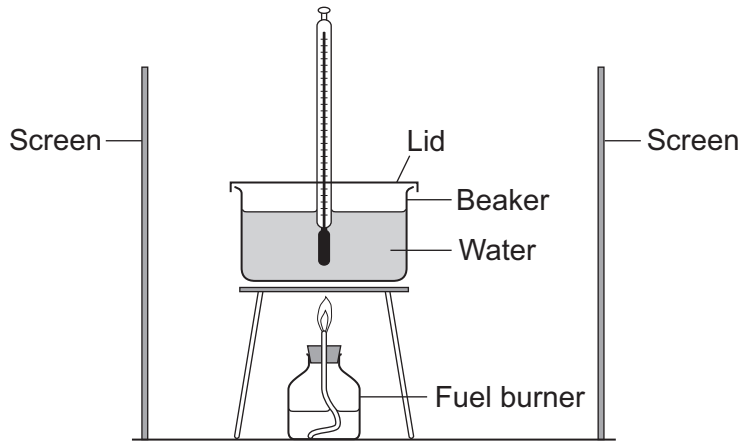
6 (c) A student did two experiments to measure the energy in one type of fuel. In each experiment she burned the same mass of fuel.

The beakers had the same mass and contained the same volume of water. The student measured the temperature rise in each beaker.

Experiment A



Experiment B



Experiment B produced a higher value for the energy from the fuel than Experiment A.

Suggest **three** reasons why.

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(3 marks)

7

END OF QUESTIONS

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