| Centre Number | | | | | | Candidate Number | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Surname | | | | | | | | | | |
| Other Names | | | | | | | | | | |
| Candidate Signature | | | | | | | | | | |

| For Examiner's Use | |
|---|---|
| Examiner's Initials | |
| Question | Mark |
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| TOTAL | |

General Certificate of Secondary Education
Higher Tier
June 2014

# Science B

# SCB2HP

## Unit 2 My Family and Home

H

Tuesday 10 June 2014 1.30 pm to 2.30 pm

**For this paper you must have:**
- a ruler
- a calculator
- the Equations Sheet (enclosed).

**Time allowed**
- 1 hour

A

**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 5(c) 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.

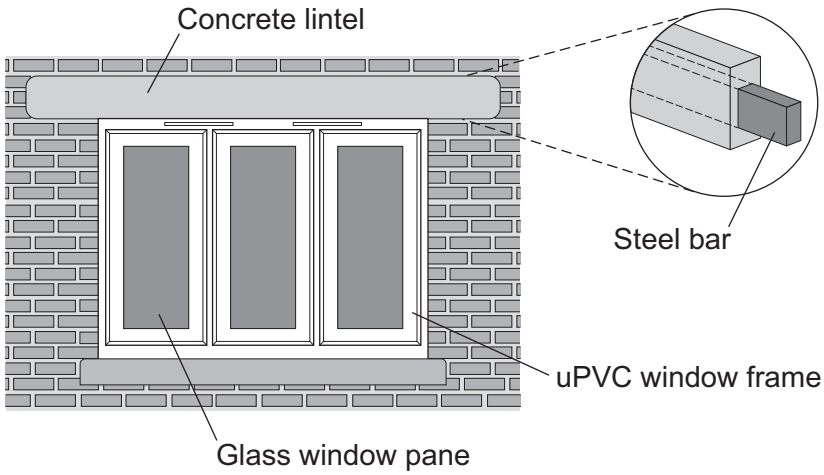
*Do not write outside the box*

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

**1** Plastics are used to make many everyday objects.

**Figure 1** shows a window frame made of uPVC (polyvinyl chloride) which is a type of plastic.

**Figure 1**




**1 (a)** Describe how plastics are produced.

**[3 marks]**

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**1 (b)** Many window frames are made from plastic instead of steel.

Give **two** reasons why.

**[2 marks]**

1 .....

.....

2 .....

.....

*Do not write outside the box*

**1 (c)** Glass is used to make windows.

Glass is a ceramic material.

**1 (c) (i)** Give **one** property of ceramic materials.

**[1 mark]**

.....

**1 (c) (ii)** Describe how glass is made from limestone.

**[2 marks]**

.....

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**1 (d)** Concrete is used as a building material.

**1 (d) (i)** What materials are mixed to make concrete?

**[2 marks]**

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**1 (d) (ii)** Suggest why a steel bar is added to the concrete lintel as shown in **Figure 1**.

**[1 mark]**

.....

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11

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**2 (a)** Genetic disorders affect millions of people in the United Kingdom.

Name **two** disorders that are caused by defects in genes (genetic disorders).

**[2 marks]**

1 .....

2 .....

**2 (b)** Some genetic disorders are recessive.

Draw a Punnett square to show how a child may inherit a recessive genetic disorder from parents who do not have the disorder.

Use **G** to be the dominant allele and **g** to be the recessive allele in your answer.

**[3 marks]**

**2 (c)** Describe fully where genes are located within our cells.

**[2 marks]**

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**2 (d)** Genetic screening can take place when a foetus is developing within the uterus.

Genetic screening may involve removing cells from the foetus.

A pregnant woman has a family history of a genetic disorder. She is concerned that her child may inherit the disorder. The woman is considering genetic screening to check the foetus.

Suggest **two** factors that the woman might consider before deciding whether to have the foetus screened for genetic disorders.

**[2 marks]**

1 .....

.....

2 .....

.....

9

**Turn over for the next question**

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**3** **Table 1** shows the hearing ranges for some different species of animal.

**Table 1**

| Species of animal | Approximate hearing range in Hz |
|---|---|
| Bat | 20 to 120 000 |
| Cat | 45 to 64 000 |
| Chicken | 125 to 2000 |
| Human | |
| Porpoise | 75 to 150 000 |

**3 (a) (i)** Which animal in **Table 1** has the largest hearing range?

**[1 mark]**

.....

**3 (a) (ii)** What is the range of human hearing for a healthy young person?

**[1 mark]**

..... to ..... Hz

**3 (a) (iii)** What type of wave is a sound wave?

**[1 mark]**

.....

**3 (a) (iv)** Sound waves and electromagnetic waves are both types of wave.

Give **one** other similarity and **one** difference between sound waves and electromagnetic waves.

**[2 marks]**

Similarity .....

.....

Difference .....

.....

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**3 (b)** The government recommends that you do not listen to music above 85 dB.

Most MP3 players can play music in headphones up to 96 dB.

A boy listens to his MP3 through his headphones on the way to and from school.

**3 (b) (i)** Suggest **one** health implication and **one** social implication of the boy listening to loud music through his headphones.

**[2 marks]**

Health implication .....

.....

Social implication .....

.....

**Question 3 continues on the next page**

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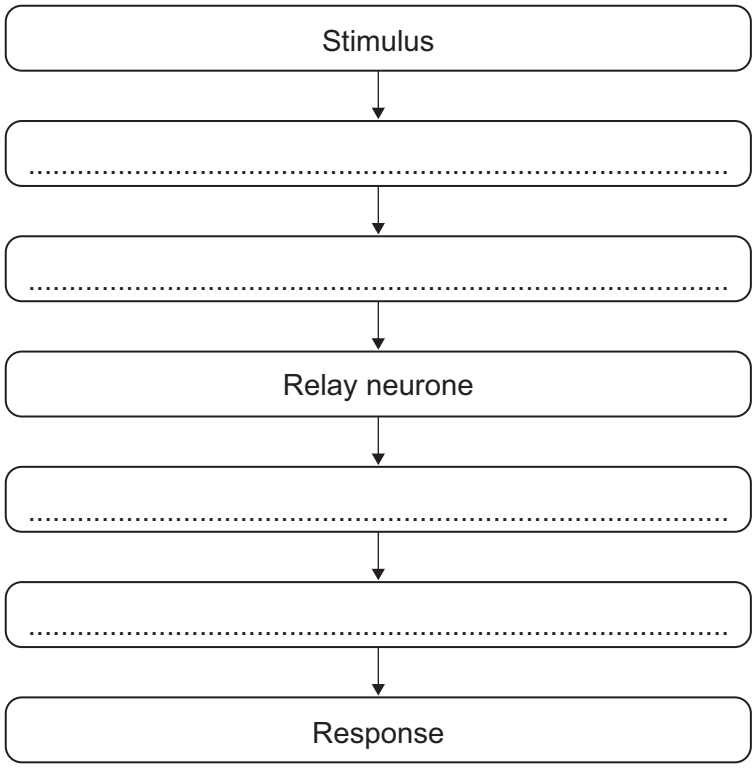
**3 (b) (ii)** The boy was tapped on the shoulder while he was listening to his MP3 player and he jumped.

The jump was a reflex action.

Complete the flow chart (**Figure 2**) for the route taken by an impulse in a reflex action from the stimulus to the part causing the response.

**[3 marks]**

**Figure 2**




**3 (b) (iii)** One sound wave produced by the headphones, worn by the boy, had a wavelength of 15 cm and a velocity of 330 m/s.

Calculate the frequency of the sound wave.

Use the Equations Sheet to help you answer the question.

**[3 marks]**

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Frequency = ..... Hz

13

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**Turn over for the next question**

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**4** A student is planning an experiment to investigate neutralisation using dilute hydrochloric acid.

**4 (a)** State **one** safety precaution that the student should take to minimise the risks when handling dilute hydrochloric acid.

Explain why the precaution is used.

**[1 mark]**

Precaution .....

.....

Explanation .....

.....

**4 (b) (i)** What makes all acids acidic?

**[1 mark]**

.....

**4 (b) (ii)** Give the ionic equation for the neutralisation reaction between an acid and an alkali.

**[2 marks]**

.....

**4 (c)** The student investigated which antacid tablet, **A** or **B**, neutralised the most stomach acid.

He used dilute hydrochloric acid to represent stomach acid in his experiment.

To carry out the experiment the student:

- crushed the antacid tablet **A**
- added the antacid tablet to 100 $cm^3$ of water
- used a pH meter to measure the pH of the mixture
- added drops of dilute hydrochloric acid until the pH of the mixture fell just below pH7.

The experiment was repeated with the antacid tablet **B**.

**4 (c) (i)** Suggest why the student crushed the antacid tablets.

**[1 mark]**

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**4 (c) (ii)** Suggest why a pH meter was used to measure the pH instead of universal indicator.

**[1 mark]**

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The student's results are shown in **Table 2**.

**Table 2**

| **Antacid** | **Volume of dilute hydrochloric acid in $cm^3$ needed to give the mixture a pH of just below 7** | | |
|---|---|---|---|
| | **Reading 1** | **Reading 2** | **Mean** |
| **A** | 9.00 | 8.70 | 8.85 |
| **B** | 4.20 | 4.20 | 4.20 |

**4 (c) (iii)** Antacid **A** neutralised more acid than antacid **B**.

The packaging of antacid **A** says that it may not be suitable for mild cases of heartburn.

Explain why antacid **B** would be more suitable than antacid **A** for treating mild cases of heartburn.

**[3 marks]**

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**5** Methane (natural gas) is used in power stations to generate electricity.

**5 (a)** Methane is combusted (burned) in air.

Complete the word equation for the combustion of methane.

**[2 marks]**

methane + ..... → carbon dioxide + .....

**5 (b)** Some fuels are non-renewable.

What does 'non-renewable' mean?

**[1 mark]**

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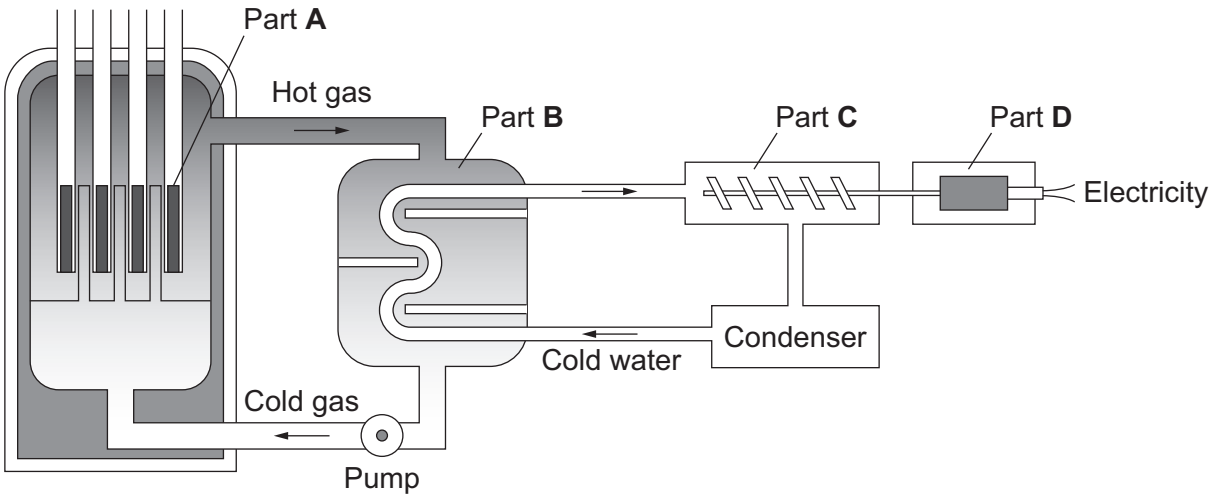
**5 (c)** **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

A nuclear power station is an alternative to a natural gas power station.

**Figure 3** shows how nuclear fuels can be used in a nuclear power station to generate electricity.

**Figure 3**



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Use **Figure 3** to describe how a nuclear power station uses nuclear fuels to generate electricity.

In order to gain full marks you should name parts **A**, **B**, **C** and **D** and describe what each part does.

**[6 marks]**

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Extra space .....

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**6** A woman decides to buy a microwave oven to cook her jacket potatoes.

The woman chooses a 1100 W microwave oven.

The microwave oven takes 6 minutes to cook a small potato on full power.

**6 (a) (i)** Calculate the energy transferred, in kilowatt-hours, to cook the potato.

Use the Equations Sheet to help you answer the question.

**[3 marks]**

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energy transferred = ..... kilowatt-hours

**6 (a) (ii)** Electricity costs 16p per kilowatt-hour.

Calculate the cost of using the microwave oven to cook the potato.

**[1 mark]**

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Cost = .....p

*Do not write outside the box*

**6 (b)** Another microwave is 65% efficient.

It has a power rating of 1200 W. In this microwave oven, a potato can be cooked in 5 minutes.

Calculate the amount of energy that has been usefully transferred into heat by this new microwave oven.

Give the correct unit in your answer.

Use the Equations Sheet to help you answer this question.

**[4 marks]**

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Useful energy = .....

**6 (c)** Microwaves are used for heating in microwave ovens.

Give another use for microwaves.

**[1 mark]**

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9

**END OF QUESTIONS**

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