

Centre Number						Candidate Number				
Surname										
Other Names										
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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  
June 2015

## Science B

SCB2HP

### Unit 2 My Family and Home

H

Tuesday 9 June 2015 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

**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 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.



J U N 1 5 S C B 2 H P 0 1

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

**1** Polydactyly is a genetic disorder.

**Figure 1** shows an X-ray of a hand of a person with polydactyly.

**Figure 1**



**1 (a) (i)** Polydactyly is caused by the dominant allele of a gene.

Where are genes found in our cells?

Draw a ring around the correct answer.

**[1 mark]**

**In the cytoplasm**

**In the nucleus**

**On the cell membrane**



1 (a) (ii) A child has polydactyly.

The father of the child has one dominant allele (**G**) and one recessive allele (**g**) of the gene that causes polydactyly.

The mother of the child does **not** have the polydactyly allele.

Complete the Punnett square to show the inheritance of polydactyly for the child.

Use **G** for the dominant allele and **g** for the recessive allele.

[3 marks]

		<b>Father</b>	
		.....	.....
<b>Mother</b>		.....	.....
	.....	.....	.....
		.....	.....

1 (a) (iii) What is the probability of their next child having polydactyly?

Draw a ring around the correct answer.

[1 mark]

**25%**

**50%**

**75%**

**100%**

1 (b) Cystic fibrosis is another genetic disorder.

The life expectancy of babies born with cystic fibrosis has increased over the past 50 years.

Suggest **one** reason why.

[1 mark]

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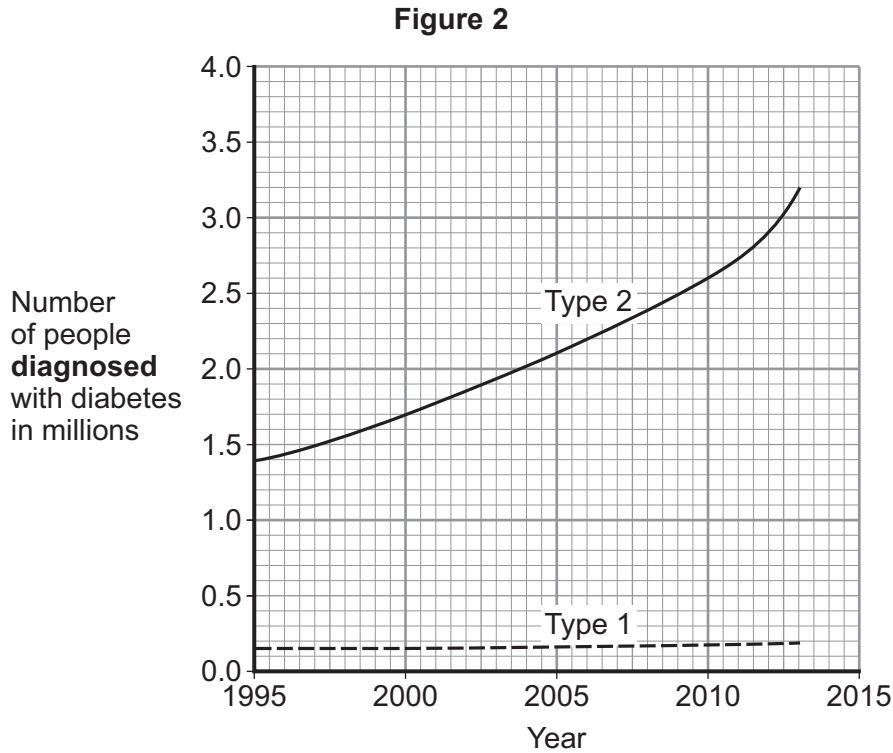
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**Question 1 continues on the next page**

**Turn over ►**



1 (c) **Figure 2** shows some information about the number of people **diagnosed** with type 1 diabetes and type 2 diabetes in the UK.



1 (c) (i) Compare the trends shown in **Figure 2** for the number of people diagnosed with type 1 diabetes and type 2 diabetes.

[1 mark]

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1 (c) (ii) Suggest **two** reasons why genetic (inherited genes) and environmental factors (lifestyle) contribute to the differences in the number of people diagnosed with type 1 diabetes and type 2 diabetes.

[2 marks]

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2 The human body is kept at a constant temperature.

2 (a) Name the centre in the brain that controls body temperature.

[1 mark]

.....

2 (b) Describe **two** ways in which the human body reduces heat loss on a cold winter's day.

[4 marks]

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Turn over for the next question

Turn over ►



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

Electromagnetic waves, such as radio waves, have many uses.

Identify other electromagnetic waves and describe their uses and hazards.

**[6 marks]**

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<b>6</b>



**Turn over for the next question**

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ANSWER IN THE SPACES PROVIDED**

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0 7

- 4 Many people like to watch firework displays, as shown in **Figure 3**.

**Figure 3**



Fireworks make a loud sound when they explode.

- 4 (a) (i) Receptor cells in a person's ear detect the loud sound from the firework explosion.

Complete the following sentence.

[1 mark]

The loud sound detected by receptor cells in the ear acts as a .....

- 4 (a) (ii) The loud sound travels as a wave from the firework explosion to the person's ears.

What type of wave is a sound wave?

[1 mark]

.....





4 (a) (iii) Some of the firework explosions are **not** heard by a person watching the fireworks.

The sound waves caused by these explosions may be above or below normal human hearing range.

What is the normal human hearing range?

[1 mark]

.....

4 (a) (iv) A very loud sound from a firework explosion causes a person to cover their ears.

This type of response is called a reflex action.

Give **both** properties of a reflex action.

[1 mark]

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4 (b) The very loud sound from a firework has a frequency of 3120 Hz and a velocity of 315 m/s.

4 (b) (i) What does a frequency of 3120 Hz mean?

[1 mark]

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.....

4 (b) (ii) Calculate the wavelength of the very loud sound in part (b).

Use the Equations Sheet to help you.

Give the correct unit in your answer.

[3 marks]

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Wavelength = .....

8

Turn over ►



5 **Figure 4** shows a sailing boat.

**Figure 4**



5 (a) **Table 1** shows some information about four different materials people can use to build sailing boats.

**Table 1**

Material	Tensile strength in arbitrary units	Density in g per cm <sup>3</sup>	Ease of maintenance
Aluminium	300	2.70	Medium
Fibreglass	500	1.20	Easy
Steel	800	7.60	Hard
Wood	100	0.75	Hard

Use the information in **Table 1** to suggest **two** reasons why fibreglass is often used to build sailing boats.

**[2 marks]**

1 .....

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2 .....

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**5 (b)** Fibreglass is made from glass fibres embedded in a polymer.

What type of material is fibreglass?

[1 mark]

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**5 (c)** Some fibreglass is made using recycled glass.

Suggest **two** advantages of recycling glass.

[2 marks]

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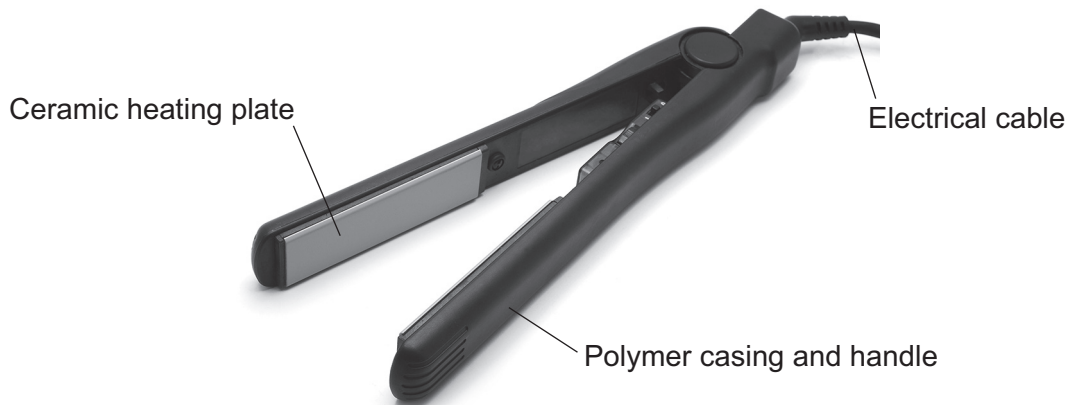
**Turn over ►**



6 Ceramic hair straighteners can be used to style hair.

Figure 5 shows a pair of ceramic hair straighteners.

Figure 5



6 (a) (i) A polymer is used for the casing and handle of the ceramic hair straighteners in Figure 5.

Give **two** reasons why.

[2 marks]

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6 (a) (ii) A ceramic material is used for the heating plate of the ceramic hair straighteners in Figure 5.

Give **one** reason why.

[1 mark]

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**6 (b)** The ceramic hair straighteners have a power of 35 watts.

**6 (b) (i)** Give the definition of 'watt'.

**[1 mark]**

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**6 (b) (ii)** The ceramic hair straighteners are used for 10 minutes.

How much energy (kJ) do the hair straighteners transfer when used for 10 minutes?

Use the Equations Sheet to help you.

**[3 marks]**

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..... kJ

**Question 6 continues on the next page**

**Turn over ►**



6 (c) A power company sent a customer a plug-in power and energy meter.

The customer used the plug-in power and energy meter to monitor how much energy the ceramic hair straighteners used.

Figure 6 shows the meter reading after the ceramic hair straighteners had been used for a normal period of time.

Figure 6



On one occasion the customer accidentally left the ceramic hair straighteners on after using them.

Figure 7 shows the meter reading after the ceramic hair straighteners were turned off.

Figure 7



Calculate the cost of **wasted** electricity when the ceramic hair straighteners were accidentally left on.

One unit of electricity cost 15p.

[2 marks]

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.....

Cost of wasted electricity = ..... p

9
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**Turn over for the next question**

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ANSWER IN THE SPACES PROVIDED**

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**7** Insulin is a chemical substance in the blood that controls blood glucose levels.

**7 (a)** What name is given to chemicals in the blood that control processes within the body?

**[1 mark]**

.....

**7 (b)** A teacher forgets to eat his sandwich at lunchtime.

During the afternoon the teacher's blood glucose concentration has fallen and is low.

Explain how the teacher's body responds to the low blood glucose concentration.

**[4 marks]**

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**7 (c) (i)** The teacher quickly eats his sandwich. The sandwich is then digested in his stomach.

What substance in the stomach helps to break down the sandwich?

**[1 mark]**

.....





**7 (c) (ii)** The teacher ate his sandwich too quickly and has heartburn.

He takes an indigestion tablet, which contains a hydroxide.

Write a balanced ionic symbol equation to show how this indigestion tablet works.

You should include state symbols in your equation.

**[3 marks]**

..... + ..... → .....

9
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**Turn over for the next question**

**Turn over ►**



8 Energy can be released from fossil fuels and nuclear fuels.

8 (a) Propane ( $C_3H_8$ ) is made from a fossil fuel and releases energy through combustion.

Write a balanced symbol equation for the complete combustion of propane.

[3 marks]

..... + .....  $\longrightarrow$  ..... + .....

8 (b) Nuclear fission provides the energy used in nuclear power stations.

Figure 8 is a clip from a national newspaper.

Figure 8

## New nuclear power plant to open in Anglesey



In 2012 only 19% of the electricity produced in the UK came from nuclear energy. However, nuclear power is a cleaner method of producing electricity compared with fossil fuels.

The local council is happy about the news because local communities will benefit from the new power station.

Some pressure groups are unhappy about the news because they think nuclear power is not safe.





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