Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
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7	
8	
9	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
March 2012

Science B

SCB2FP

Unit 2 My Family and Home

F

Written Paper

Tuesday 6 March 2012 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.

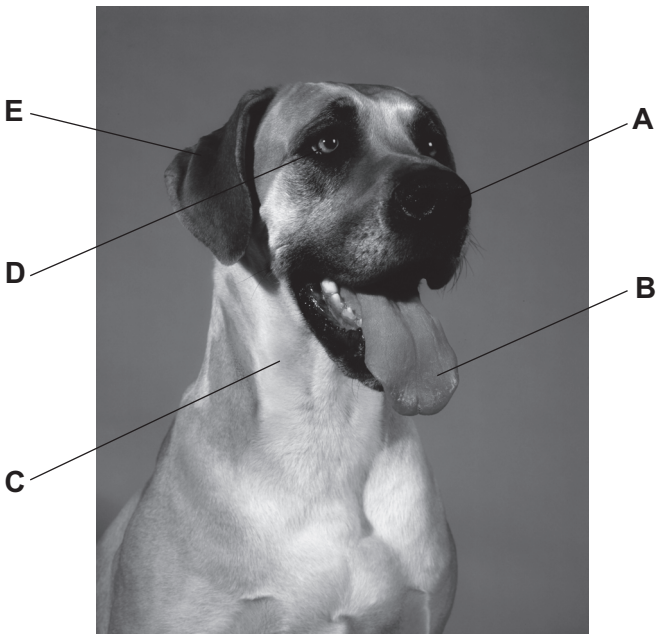
Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 9 (a) should be answered in continuous prose. 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.

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

1 Animals have receptors. The receptors detect stimuli from the environment.

1 (a) In the table, write the correct letter from the photograph next to the stimulus detected.



Stimulus detected	Letter from the photograph
Taste	
Light	
Sound	
Smell	

(4 marks)

1 (b) Animals respond to stimuli.

Which part of an animal coordinates the responses to stimuli? Draw a ring around the correct answer.

Brain **Heart** **Pancreas**

(1 mark)

5

2 Electromagnetic radiation has many uses in the home.

Draw **one** line from each type of radiation to its use in the home.

Type of radiation	Use in the home
	Lighting
Ultraviolet	
	Fibre optic cable
Radio waves	TV remote control
	Sun beds
Infrared	
	Television

(3 marks)

3

3 Use words from the box to complete the sentences about limestone.

drilling	**slaked lime**	**oxygen**	**quicklime**
quarrying	**glass**	**cement**	**carbon dioxide**

Limestone is usually obtained from the ground by ..... .

When heated strongly, limestone is converted into ..... ,

which reacts with water to make ..... .

When an acid is added, limestone fizzes because .....

is produced.

Limestone is heated with sand and sodium carbonate to make ..... .

(5 marks)

5

4 The colour of universal indicator shows how acidic or alkaline a solution is.

The chart shows the colours of universal indicator. The arrows show increasing acidic or alkaline strength of the solution.

4 (a) Give the name of the scale that the numbers on the chart represent.

.....

(1 mark)

4 (b) (i) The stomach contains an acid to help digestion.

Give the name of the acid found in the stomach.

.....

(1 mark)

4 (b) (ii) Use the chart to decide the colour that stomach acid would produce with universal indicator.

.....

(1 mark)

4 (c) Too much stomach acid can cause discomfort. The excess acid can be removed using alkaline substances called antacids.

4 (c) (i) Give the name of the reaction between an acid and an alkali.

.....

(1 mark)

4 (c) (ii) Sodium bicarbonate is used as an antacid.

The word equation for the reaction of sodium bicarbonate with an acid is given below.

acid + sodium bicarbonate → a salt + water + carbon dioxide

Use information in the word equation to suggest **one** disadvantage of using sodium bicarbonate as an antacid.

.....

.....

(1 mark)

4 (d) Sodium hydroxide has a value of 13 on the chart.

Sodium hydroxide is **not** used as an antacid.

Suggest why.

.....

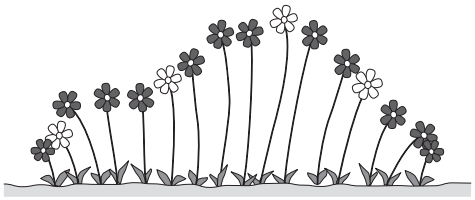
.....

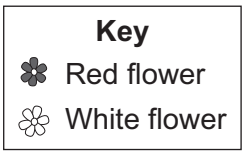
(1 mark)

6

Turn over for the next question

5 The plants in the diagram show variation. They are all the same age.





The variation in flower colour is genetic.

5 (a) Give a full description of where genes are found in a cell.

.....

.....

.....

.....

(2 marks)

5 (b) (i) Genes only partly control the height of the flowers.

What else has an effect on the height of the flowers?

.....

.....

(1 mark)

5 (b) (ii) Two forms of a gene control flower colour.

What is the name given to different forms of the same gene?

.....

(1 mark)

5 (c) (i) A Punnett square can be used to calculate the outcomes of a cross between two red-flowered plants.

R is the form of the gene causing red flowers.

r is the form of the gene causing white flowers.

Complete the Punnett square.

	R	**r**
R	.....	.....
r	R r	.....

(2 marks)

5 (c) (ii) Draw a ring around the pair of letters in your completed Punnett square to show the plant that would have white flowers.

(1 mark)

7

Turn over for the next question

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

Table 1

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

6 (a) Use the data in **Table 1** to answer the questions.

6 (a) (i) Which species of animal can hear the highest frequency?

.....

(1 mark)

6 (a) (ii) Which species of animal has the smallest frequency range?

.....

(1 mark)

6 (b) (i) What is the average hearing range for healthy young humans?

..... Hz

(1 mark)

6 (b) (ii) Human hearing is sensitive to a range of loudness. The units of loudness are decibels (dB).

Table 2 shows the loudness of some sounds.

Table 2

Sound	Loudness in dB
Busy road traffic	70
Disco (at the front)	110
Normal talking	60
Personal stereo (loud)	100
Vacuum cleaner	80
Whisper	20

Sounds up to 80 dB cause no damage to hearing, no matter how long you listen to the sound. They are described as 'safe sounds'.

Which sounds in **Table 2** are considered 'safe'?

.....

.....

(2 marks)

6 (c) Damage to hearing also depends on how much time you listen to the sound each day.

The maximum time that does not cause damage to hearing is shown in **Table 3**.

Table 3

Sound loudness in dB	Time limit for exposure
Up to 80	No limit
85	8 hours
90	4 hours
95	2 hours
100	1 hour
105	30 minutes
110	15 minutes
115	7.5 minutes
120	3.75 minutes

6 (c) (i) Describe the pattern shown in **Table 3** for increasing loudness from 85 dB.

.....

.....

.....

.....

(2 marks)

6 (c) (ii) Use data from **Table 2** and **Table 3** to give the maximum time you should listen to a loud personal stereo each day.

.....

(1 mark)

8

Turn over ▶

7 Crude oil is used as a raw material to make plastics. Plastics are made of many small molecules joined together to make a much larger molecule.

7 (a) What is the name that is given to these larger molecules?

.....

(1 mark)

7 (b) Plastics have many useful properties. What property of plastic makes it useful for the following uses:

7 (b) (i) plumbing .....

(1 mark)

7 (b) (ii) 13 amp plug cases .....

(1 mark)

7 (b) (iii) cavity wall fillers .....

(1 mark)

7 (b) (iv) rope. .....

(1 mark)

7 (c) Mud bricks have been used to build houses for thousands of years. Mud bricks are made by mixing mud and straw in a mould. The bricks are allowed to dry and harden.

7 (c) (i) Name the type of material that is made when two or more materials are combined.

.....

(1 mark)

7 (c) (ii) This type of combined material is useful. Explain why.

.....

.....

.....

(1 mark)

7 (c) (iii) Suggest **one** advantage and **one** disadvantage of using mud bricks for building.

.....

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(2 marks)

9

Turn over for the next question

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

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

8 (a) (i) fossil fuels .....

(1 mark)

8 (a) (ii) nuclear fuels. .....

(1 mark)

8 (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?

.....

(1 mark)

8 (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)

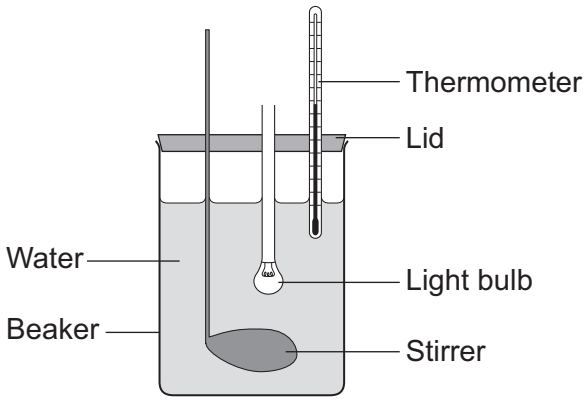
6

Turn over for the next question

9 (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)

9 (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	

9 (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.

.....

.....

.....

Efficiency = ...

(3 marks)

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

.....

.....

.....

.....

(2 marks)

11

END OF QUESTIONS

There are no questions printed on this page

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