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
Foundation Tier
June 2013

Science B

SCB2FP

Unit 2 My Family and Home

F

Written Paper

Monday 10 June 2013 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 7 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 The pH scale can be used to show if a substance is acidic, neutral or alkaline.

1 (a) Draw **one** line from each substance to its pH.

Substance	**pH**
antacid	2
stomach acid	7
water	9
	13

(3 marks)

1 (b) (i) Stomach acid is hydrochloric acid.

Dilute hydrochloric acid is used in school laboratories.

Draw a ring around the hazard label that would be on a bottle of **dilute** hydrochloric acid.

(1 mark)

1 (b) (ii) Using acids in school can be dangerous.

Suggest **two** ways to reduce the risks for students when working with acids.

1 .....

2 .....

(2 marks)

6

Turn over for the next question

2 Coal, oil and natural gas can be used in power stations.

2 (a) Draw a ring around the correct answer to complete each sentence.

Coal, oil and natural gas are

- alternative fuels.
- fossil fuels.
- nuclear fuels.

Coal is a

- bio fuel.
- non-renewable fuel.
- sustainable fuel.

(2 marks)

2 (b) Power stations generate electricity.

The sentences describe how coal is used to generate electricity.

The sentences are not in the correct order.

A Electricity is produced.

B Coal is burnt in a furnace.

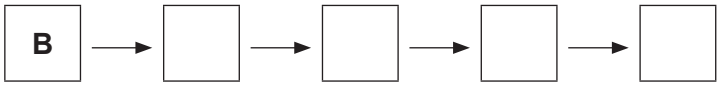
C Water is heated and changes into steam.

D The turbine turns a generator.

E Steam turns a turbine.

Put the sentences in the correct order.

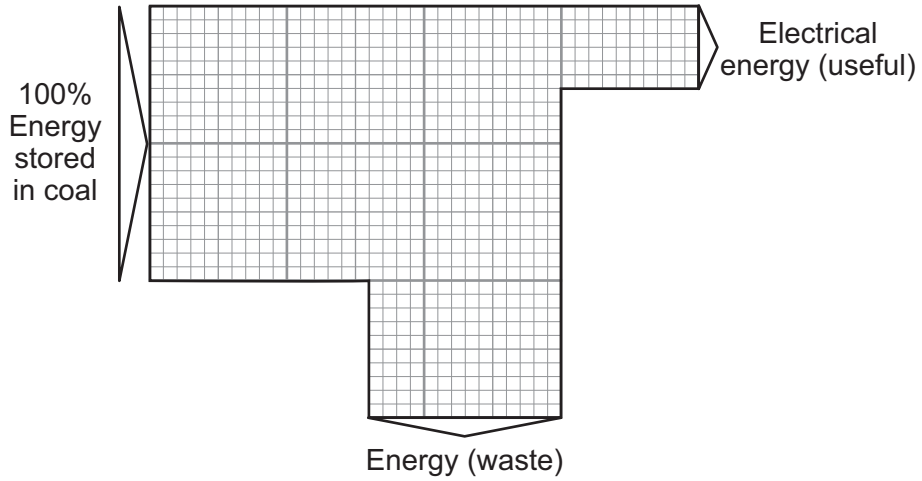
The first one has been done for you.



(3 marks)

2 (c) A coal-fired power station is not efficient at generating electricity.

The Sankey diagram shows the efficiency of a coal-fired power station.



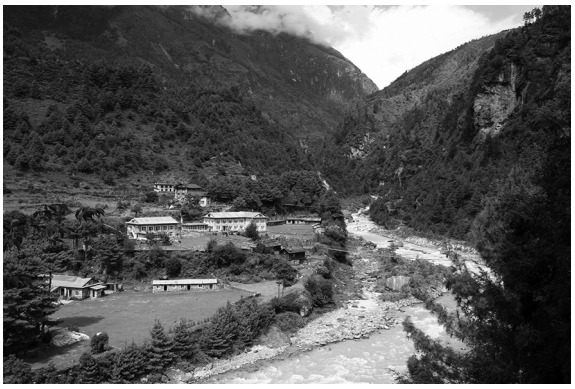
Use the Sankey diagram to give the efficiency of a coal-fired power station.

..... %

(1 mark)

2 (d) Hydroelectric power stations are being used in the mountains of Nepal.

The hydroelectric power stations can be used instead of coal-fired power stations to produce electricity.



Suggest **two** advantages of using hydroelectric power instead of a coal-fired power station to generate electricity.

1 .....

.....

2 .....

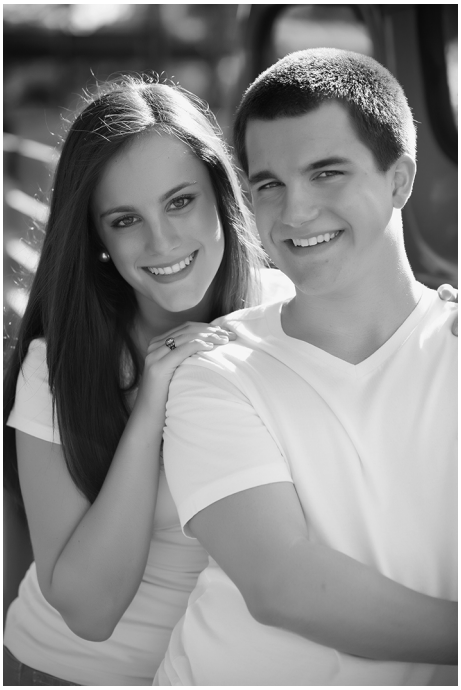
.....

(2 marks)

8

3 Anna and Mark are non-identical twins.

Non-identical twins have different characteristics.



3 (a) Variation can be due to genetics, the environment or both.

Use the correct answer from the box to complete each sentence.

environmental	**environmental and genetic**	**genetic**

Eye colour is an example of ..... variation.

Weight is an example of ..... variation.

(2 marks)

3 (b) (i) Anna has cystic fibrosis.

Cystic fibrosis is a genetic disorder. It is caused by a recessive allele.
The two alleles are G and g.

Anna's parents are both carriers of the cystic fibrosis allele (g).

Complete the Punnet square for the inheritance of cystic fibrosis.

		Mother	
		G	g
Father	.....	.....	Gg
	g	.....	.....

(3 marks)

3 (b) (ii) Anna's parents want to have another baby.

What is the probability that the baby will have cystic fibrosis?

.....

(1 mark)

3 (b) (iii) Anna's parents do not want to risk having another child with cystic fibrosis.

Doctors can produce embryos using eggs from the mother and sperm from the father.
The doctors use genetic screening to choose embryos that do not have cystic fibrosis.

Some people do not agree with genetic screening of embryos.

Tick (✓) **two** boxes next to the correct reasons why.

Some embryos will be destroyed. ☐

Screening will cure cystic fibrosis in the embryo. ☐

Healthy embryos could be harmed during the process. ☐

The mother is not harmed during genetic screening of the embryo. ☐

(2 marks)

8

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

4 Electromagnetic waves have many uses in the home.

4 (a) Complete the following sentences.

Microwave radiation is used in ..... .

Infrared radiation is used in ..... .

(2 marks)

4 (b) Radios produce a sound frequency which a human can hear.

What type of wave is a sound wave?

Tick (✓) **one** box.

	Tick (✓)
Electromagnetic	
Longitudinal	
Transverse	

(1 mark)

4 (c) A man takes his dog for a walk but the dog runs away from him.

The man uses a dog whistle to call the dog back to him.

The sound wave from the dog whistle travels at a speed of 330 m/s.
The sound wavelength is 0.01 m.

4 (c) (i) Calculate the frequency of the whistle.

Frequency can be calculated using the equation below.

$$\text{Frequency} = \frac{\text{velocity}}{\text{wavelength}}$$

.....

Frequency = ... Hz

(1 mark)

4 (c) (ii) Why would the dog owner **not** be able to hear the whistle?

.....

.....

(1 mark)

5

Turn over ▶

5 People buy electrical appliances for their homes.

It is important for people to know how much energy their electrical appliances use.

5 (a) Draw a ring around the correct answer to complete each sentence.

5 (a) (i) Energy is measured in

joules.

newtons.

watts.

(1 mark)

5 (a) (ii) One watt is one joule per

hour.

minute.

second.

(1 mark)

5 (b) A woman wants to buy a new television.

She found the following information on the Internet.

Type of television	**Power rating in kW**
Plasma TV	0.30
LCD TV	0.17
LED TV	0.10
Rear projection TV	0.19

Use the data in the table to answer the following questions.

5 (b) (i) Which television would be the cheapest to use?

.....

(1 mark)

5 (b) (ii) The woman buys a plasma TV.

In one month she watches 25 hours of television.

Calculate the number of kWh of electrical energy transferred.

The energy transferred can be calculated using the equation below.

Energy transferred = power × time

.....

.....

.....

Energy transferred = ... kWh

(2 marks)

5 (b) (iii) The woman is charged at 12 pence per kWh of electricity she uses.

Calculate the total cost of using the plasma television for one month.

(If you could not calculate an answer for **5(b)(ii)** use 4.5 kWh.)

.....

.....

.....

Total cost ..... p

(2 marks)

7

Turn over for the next question

6 Alkanes are hydrocarbon compounds.

6 (a) Name the elements in a hydrocarbon.

.....

(1 mark)

6 (b) The general formula of alkanes is:

$$C_nH_{2n+2}$$

Draw a ring around the correct formula for an alkane with 10 carbon atoms.

$C_{10}H_{20}$ **$C_{10}H_{21}$** **$C_{10}H_{22}$**

(1 mark)

6 (c) Methane (natural gas) can be used as a fuel to cook food.

Suggest **one** other use of methane as a fuel.

.....

(1 mark)

6 (d) Fuels release energy when burnt.

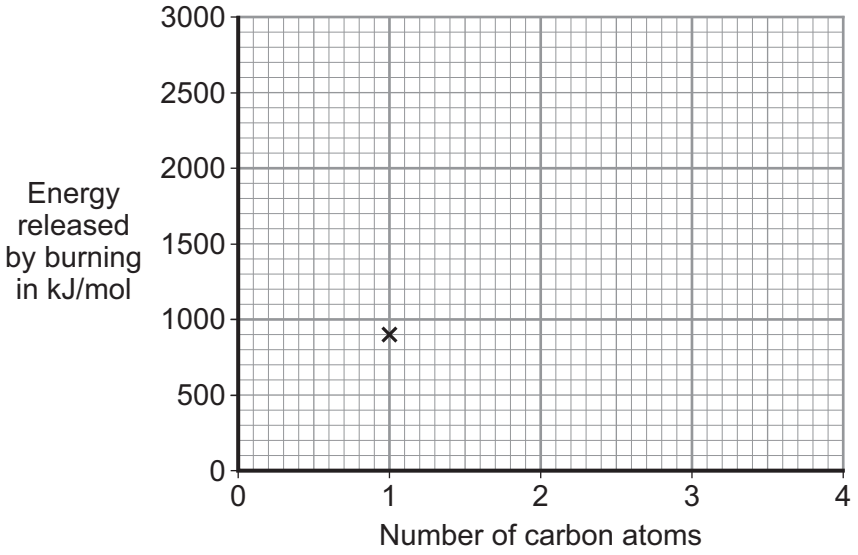
The table shows four alkane fuels and the energy released when burning the fuel.

Alkane fuel	Number of carbon atoms	Energy released when burning in kJ/mol
Methane	1	900
Ethane	2	1600
Propane	3	2200
Butane	4	2900

6 (d) (i) Use the data in the table to plot the points for ethane, propane and butane.

One has been plotted for you.

Draw a line of best fit.



(3 marks)

6 (d) (ii) In an experiment, the fuels were burned at the same rate (mol/sec) in the same burner.

Suggest which fuel would produce the hottest flame.

Give a reason.

Fuel .....

Reason .....

(2 marks)

8

Turn over ▶

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

Glucose is carried around the body in the blood so that cells can use it for energy.

Diabetes is a condition where people cannot regulate their blood sugar levels.

One reason for the development of type 2 diabetes is that the body does not produce enough of the hormone that controls blood sugar levels.

Describe the three methods that people with type 2 diabetes use to control their blood sugar levels.

In your answer you should include an explanation of how the control methods work.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6 marks)

6

8 Modern homes are made from many different materials.

8 (a) (i) Limestone is a natural material.

Limestone is important in the construction of buildings.

How is limestone obtained for use as a building material?

.....

.....

(1 mark)

8 (a) (ii) Limestone is used to make cement.

Describe how cement is made using limestone.

.....

.....

.....

.....

(2 marks)

Question 8 continues on the next page

8 (b) Concrete reinforced with metal is used as a building material.

8 (b) (i) What type of material is reinforced concrete?

.....

(1 mark)

8 (b) (ii) Name the metal used to reinforce concrete.

Give the property that makes this metal a good choice for reinforcing concrete.

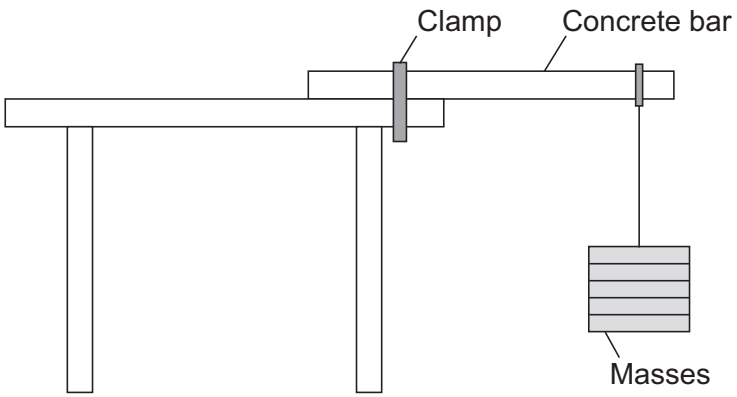
Metal .....

Property .....

(2 marks)

8 (c) An engineer tried to find out how the strength of a concrete bar changed with the thickness of the bar.

She set up the experiment shown in the diagram.



The engineer added masses to the concrete bar and recorded the mass needed to break the bar. She repeated each experiment once.

Her results are shown in the table.

Thickness of concrete bar in cm	Mass needed to break concrete bar in kg		
	1st	2nd	Mean
2	9.2	9.4	9.3
3	14.1	13.9	14.0
4	18.5	18.9	18.7
5	23.5	23.3	23.4

8 (c) (i) Give **three** variables the engineer should control to make sure that the experiment gives repeatable readings.

1 .....

.....

2 .....

.....

3 .....

.....

(3 marks)

8 (c) (ii) Use the table of results to give a conclusion about the thickness of the concrete bar and the mass needed to break the bar.

.....

.....

.....

.....

(2 marks)

8 (c) (iii) Use the information in the table to estimate the mass needed to break a concrete bar with a thickness of 6 cm.

.....

.....

Mass = ... kg

(1 mark)

12

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS

Question 2: Phadking Village – Nepal © Thinkstock
Question 3: Fraternal twins © Getty
Question 8: Exterior of modern house © Thinkstock