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	
TOTAL	

General Certificate of Secondary Education
Higher Tier
November 2012

Science B SCB2HP

Unit 2 My Family and Home

H

Written Paper

Wednesday 7 November 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 2 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.

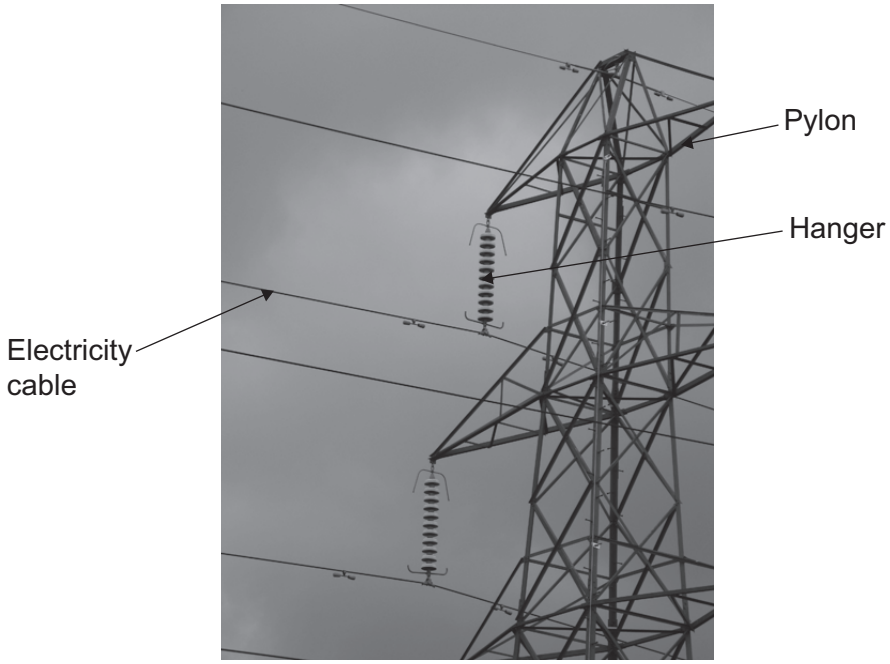
Advice
- In all calculations, show clearly how you work out your answer.

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

1 **Photograph 1** shows part of a pylon used to support electricity cables of the National Grid.

Electricity is carried at very high voltage along the cables.

Photograph 1



1 (a) The table gives information about some metals.

	Steel	**Copper**	**Aluminium**	**Titanium**
Mass in grams per cm^3	7.9	8.9	2.7	4.5
Strength in units	18	4.5	4.0	21
Ability to conduct electricity in units	1.1	6.5	4.1	0.5
Cost per tonne in £	530	7061	2109	6200

Use the information in the table to answer the questions.

1 (a) (i) Steel is a good metal for making the pylon.

Suggest **two** reasons why.

1 .....

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2 .....

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(2 marks)

1 (a) (ii) The cables used in the picture are made from aluminium.

Suggest **one** advantage and **one** disadvantage of using aluminium instead of copper for the cables.

Advantage .....

.....

Disadvantage .....

.....

(2 marks)

1 (b) (i) The hanger is made from a ceramic material.

Suggest why.

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(1 mark)

1 (b) (ii) The pylon is **not** made from a ceramic material.

Suggest why.

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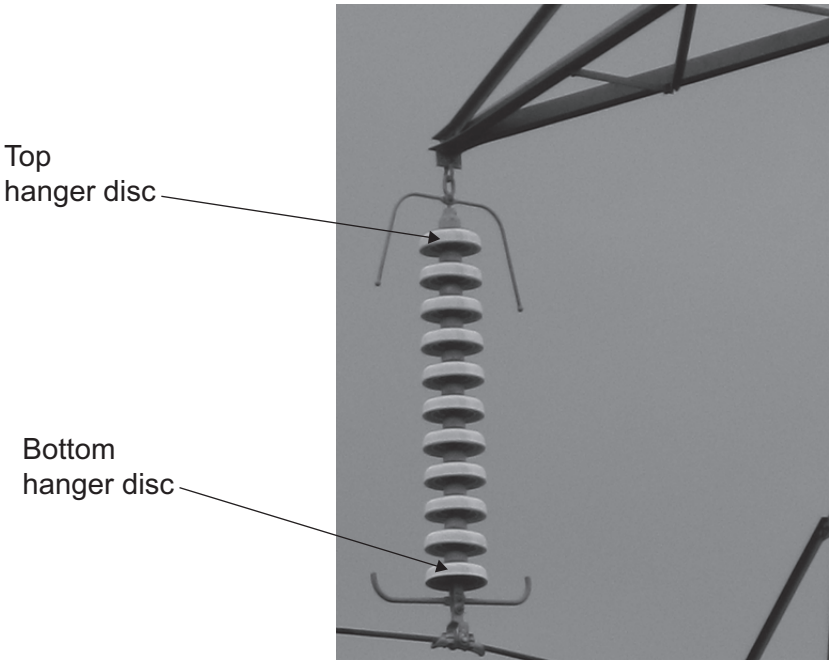
(1 mark)

Question 1 continues on the next page

1 (c) **Photograph 2** is an enlarged picture of a ceramic hanger.

Use **Photograph 2** to help you answer the questions.

Photograph 2



The hanger is made of separate discs. The number of discs needed in the hanger increases as the voltage in the cable increases.

The cables in the photograph carry 165 kV.

Calculate the number of discs needed in a hanger for cables carrying 390 kV.

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Answer ..... discs

(3 marks)

1 (d) The high voltage in the overhead cables is stepped down to 230 volts to supply houses.

Give the name of the equipment that 'steps down' the voltage.

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(1 mark)

10

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

The human body needs to keep a constant internal environment.

An athlete goes for a training run for 30 minutes.

Explain how the athlete's body responds to get her core temperature back to normal.

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(6 marks)

6

3 Proteins are an important part of a healthy diet.

3 (a) The human stomach digests proteins.

Name the **two** chemicals produced by the stomach for protein digestion.

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(2 marks)

3 (b) The stomach sometimes produces too much acid. Metal hydroxides neutralise acids.

Name **two** other types of chemical that neutralise acid.

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(2 marks)

3 (c) Write the ionic equation for the neutralisation reaction between an acid and an alkali.

.....

(2 marks)

6

4 (a) The conditions inside the human body are called the 'internal environment'. For the human body to survive, the internal environment must be kept constant.

Complete the sentence.

The process the human body uses to maintain a constant internal environment using negative feedback is called ..... .

(1 mark)

4 (b) *Negative feedback* is used to control some functions of the human body.

Give the meaning of *negative feedback*.

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(1 mark)

Question 4 continues on the next page

4 (c) The human body uses hormones to control some of its activities.

The pancreas produces the hormones insulin and glucagon.

Describe the effects of insulin and glucagon on the human body.

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(5 marks)

7

5 Many of the cars we drive are powered by burning fossil fuels such as petrol.

5 (a) One litre of petrol contains 35 MJ of energy.

A car engine usefully transfers only 40% of the energy in a litre of petrol.

5 (a) (i) Calculate the energy usefully transferred from one litre of petrol by the car engine.

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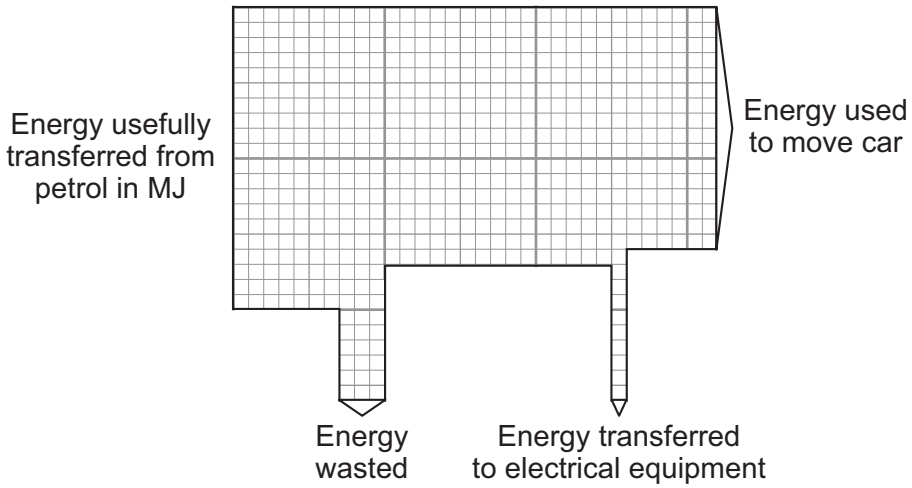
Energy usefully transferred ..... MJ

(2 marks)

5 (a) (ii) The Sankey diagram shows what happens to the energy usefully transferred from one litre of petrol used in a car engine.

The amount of energy usefully transferred is your answer to **5 (a) (i)**.

If you could not work out an answer to **5 (a) (i)**, use a value of 28 MJ.



Calculate the efficiency of the car in using the energy in one litre of petrol for movement.

Use the Equations Sheet to help you answer the question.

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Efficiency .....

(3 marks)

Turn over ▶

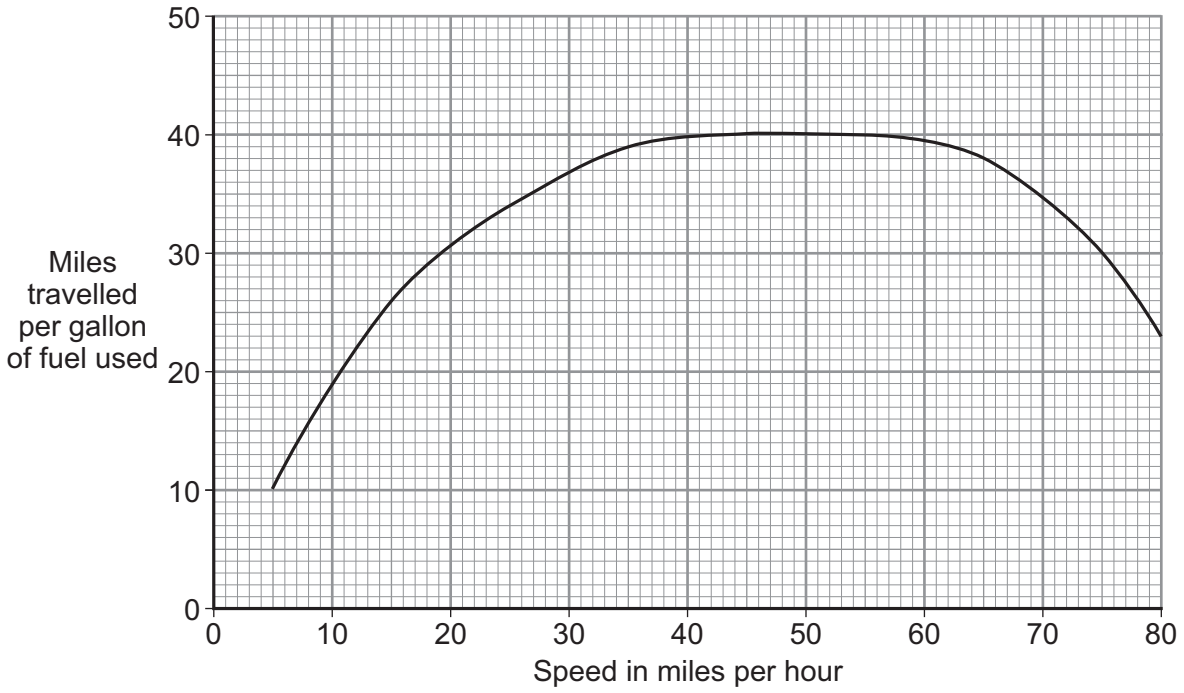
5 (a) (iii) A car engine burns fuel to transfer energy. Petrol contains pentane (C_5H_{12}).

Write the balanced equation for the complete combustion of pentane.

..... + ... ⟶ ..... + ...

(3 marks)

5 (b) The graph gives some information about the fuel use of a car.



5 (b) (i) How does the speed of the car affect the miles travelled per gallon?

Use the data in the graph in your answer.

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(2 marks)

5 (b) (ii) The government is thinking of increasing the speed limit on UK motorways from 70 miles per hour to 80 miles per hour. Some people think this is a bad idea.

Suggest **three** reasons, other than safety, why people think this is a bad idea.

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(3 marks)

13

Turn over for the next question

6 A scientist studied variation in two characteristics in a group of 50 children.

The children were aged from 5 years to 10 years and included boys and girls from different ethnic groups.

The scientist measured the height of the children. She also tested the children to find out whether they could taste a chemical called PTC. To some people PTC tastes bitter. To other people PTC has no taste.

The scientist wanted to find out if there is a link between height and being able to taste PTC.

6 (a) Suggest **four** ways the scientist could improve the investigation.

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(4 marks)

6 (b) Some characteristics are **not** just controlled by genes.

Which characteristic the scientist investigated is **not** just controlled by genes?

Explain your answer.

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(2 marks)

6 (c) The gene for tasting PTC has two alleles, **T** and **t**.

A man and a woman who can both taste PTC have a child who can **not** taste PTC.

6 (c) (i) Draw the Punnett square for the inheritance of tasting PTC for the children of this man and woman.

(3 marks)

6 (c) (ii) What proportion of their children would you expect **not** to be able to taste PTC?

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(1 mark)

6 (c) (iii) The parents have six children. Only three can taste PTC.

Explain why this is possible.

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(1 mark)

11

Turn over for the next question

7 Electromagnetic radiation transfers energy as waves.

7 (a) The name given to different types of electromagnetic radiation depends on the wavelength or frequency of the waves.

Gamma rays, microwaves, radio waves, ultraviolet and visible light are types of electromagnetic radiation.

Write the types of electromagnetic radiation listed in order, from the longest wavelength to the shortest wavelength.

Longest wavelength

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.....

Shortest wavelength .....

(3 marks)

7 (b) Different types of electromagnetic radiation have different frequencies.

7 (b) (i) Write down the meaning of the word 'frequency'.

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(1 mark)

7 (b) (ii) Describe the relationships between the frequency, the wavelength and the energy of an electromagnetic wave.

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(3 marks)

7

END OF QUESTIONS

There are no questions printed on this page

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