

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Higher Tier
June 2013

Science B

Unit 1 My World

Written Paper

Wednesday 5 June 2013 1.30 pm to 2.30 pm

For this paper you must have:

- a ruler.
- You may use a calculator.

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 4(b) 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.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

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SCB1HP

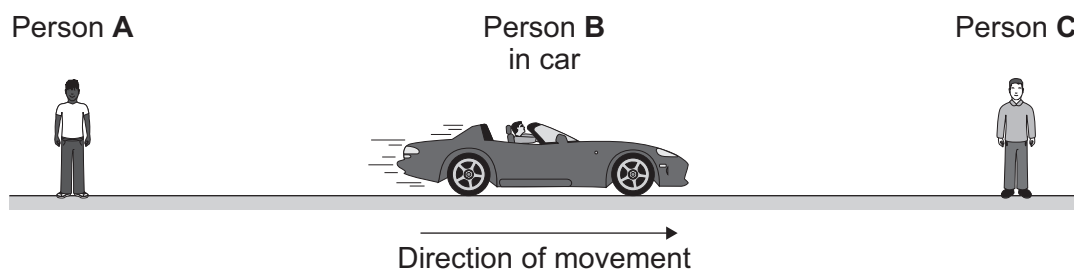
Answer **all** questions in the spaces provided.

1 Light and sound both travel as waves.

When a wave source moves towards or away from an observer, the wavelength and frequency of a wave the observer senses will be changed.

A sports car engine is a wave source.

Three people listen to the sound produced by a sports car moving quickly away from Person **A** towards Person **C** at a constant speed. Person **B** is in the car. The people and car are shown in the diagram.



All three people hear a different frequency (pitch) of sound.

1 (a) (i) What do scientists call this change in frequency?

.....
(1 mark)

1 (a) (ii) Which person hears the frequency of sound that the car is actually making?

Give a reason for your answer.

Person

Reason

.....
(2 marks)

1 (a) (iii) Which person hears the lowest frequency sound? (The sound with the longest wavelength).

Give a reason for your answer.

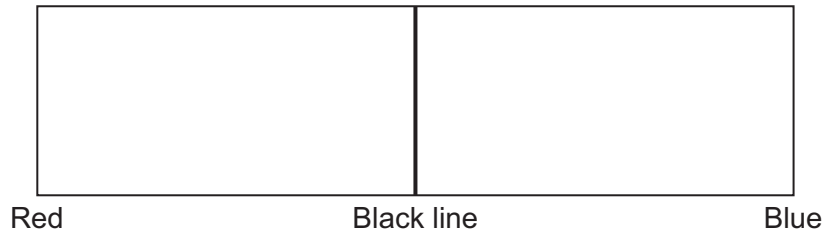
Person

Reason

.....
(2 marks)



- 1 (b)** Stars produce light. The light can be split to produce a spectrum. The light from the Sun has a black line in its spectrum. This is shown in the diagram.



Astronomers have found a star in a distant galaxy. The star is almost identical to our Sun.

- 1 (b) (i)** Draw a line on the diagram to show where the black line on the spectrum of light from the distant star would be.

(1 mark)

- 1 (b) (ii)** What is the name of the movement of the line?

.....

(1 mark)

- 1 (b) (iii)** Scientists think that this movement supports two theories about the Universe.

What are these two theories?

Theory 1

Theory 2

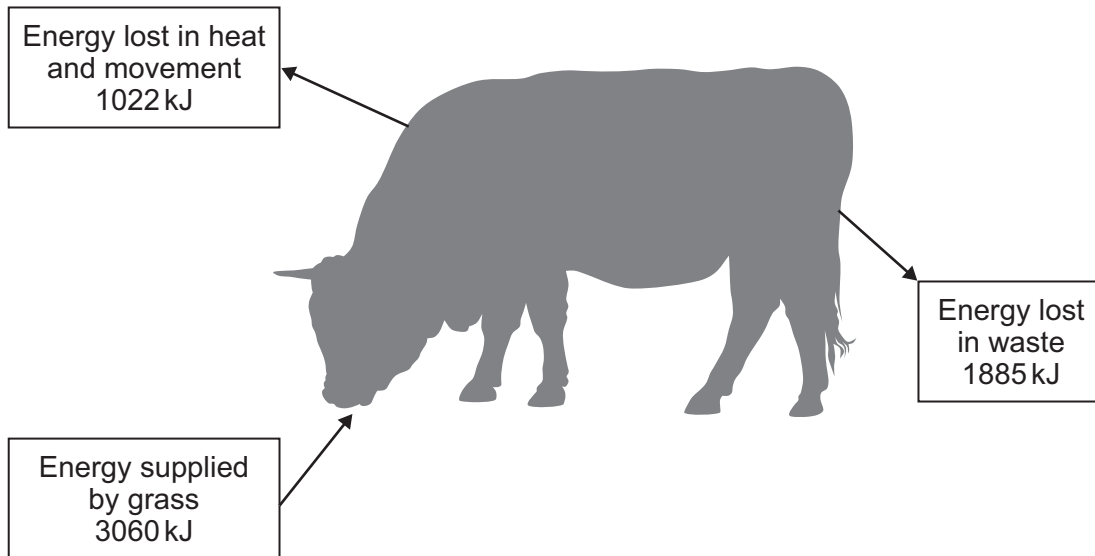
(2 marks)

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- 2** The diagram shows the energy transfers by a bullock for each square metre of grass it eats in one year. Some of the energy supplied by the grass is used by the bullock for growth.



- 2 (a)** Name the process inside the bullock that transfers the energy for heat and movement from food.

.....
(1 mark)

- 2 (b)** Calculate the percentage of energy in the grass eaten which is used for growth.

.....
.....
.....
.....

Answer %
(3 marks)



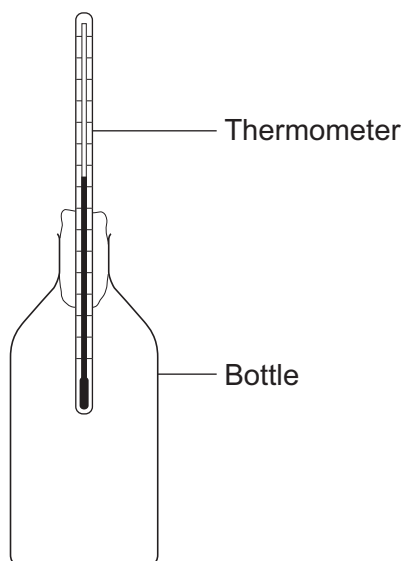
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ANSWER IN THE SPACES PROVIDED**

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- 3** A student wanted to compare the rates at which air, carbon dioxide and methane absorb radiation from the Sun. She used the apparatus shown in the diagram.



This is the method the student used:

- fill the bottle with air and stand it in the sunshine
- record the temperature every minute for 10 minutes
- repeat the experiment using carbon dioxide in the bottle and then using methane in the bottle.

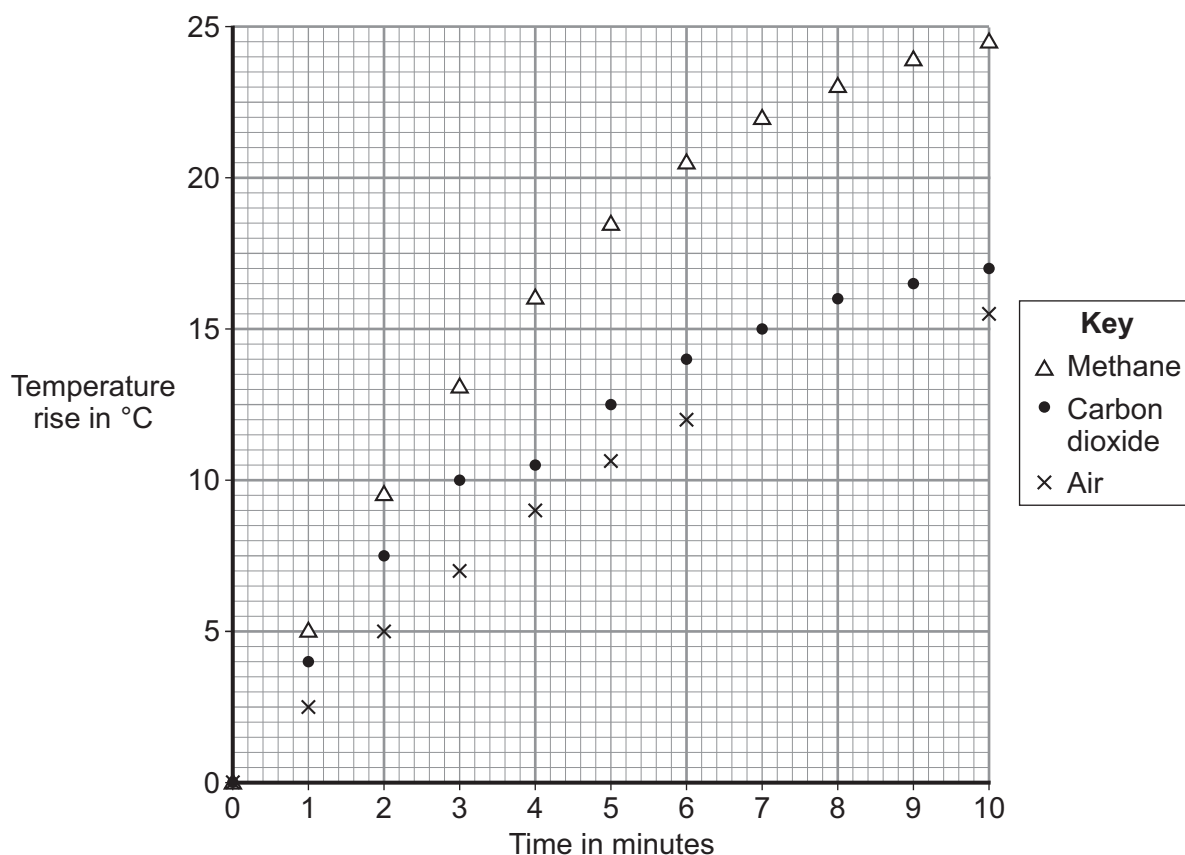
- 3 (a)** The student's results are shown in the table.

Time in minutes	Temperature rise in °C		
	air	Carbon dioxide	methane
0	0.0	0.0	0.0
1	2.5	4.0	5.0
2	5.0	7.5	9.5
3	7.0	10.0	13.0
4	9.0	10.5	16.0
5	10.7	12.5	18.5
6	12.0	14.0	20.5
7	13.5	15.0	22.0
8	14.5	16.0	23.0
9	15.0	16.5	24.0
10	15.5	17.0	24.5



The student plotted most of her results on the graph.

3 (a) (i) Complete the graph for air and draw a line of best fit **for air**.



(2 marks)

3 (a) (ii) The results for air and methane show a clear pattern. The results for carbon dioxide are not as consistent.

Between which times did the change in pattern for carbon dioxide become noticeable?

.....
(1 mark)

3 (a) (iii) Suggest **one** reason for the change in pattern for carbon dioxide.

.....
.....
(1 mark)

3 (a) (iv) Use your answer to part **3(a)(iii)** to suggest **one** improvement to the method on page 6.

.....
(1 mark)

Turn over ►



3 (a) (v) Suggest a conclusion for the experiment.

.....

.....

.....

(2 marks)

3 (b) The Earth's atmosphere contains small amounts of methane and carbon dioxide.

Give **one** advantage and **one** disadvantage of the presence of these gases in the atmosphere.

Advantage

.....

Disadvantage

.....

(2 marks)

3 (c) Air is a mixture of gases. Gases in the air are used in many industrial processes.

3 (c) (i) Two of the gases in air are helium and argon.

Give **one** use for helium and **one** use for argon.

Helium

Argon

(2 marks)

3 (c) (ii) Describe how gases such as argon can be separated from air.

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(4 marks)



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4 (a) Some microbes are adapted to live in very harsh environments.

4 (a) (i) Microbes that live in very harsh environments are called
(1 mark)

4 (a) (ii) Suggest **two** types of environment where these microbes might live.

1

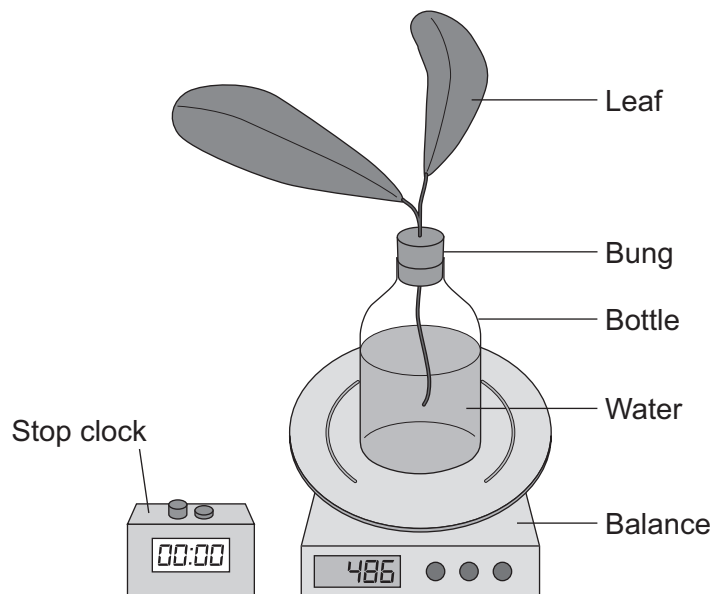
2
(2 marks)

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

Plants lose water through their leaves. Plants that live in areas where there is a lack of water sometimes have a waxy coating on their leaves to reduce the rate of water loss.

A student investigated how much water is lost through leaves.

The apparatus the student used is shown. As water is lost through the leaves the mass shown on the balance goes down.

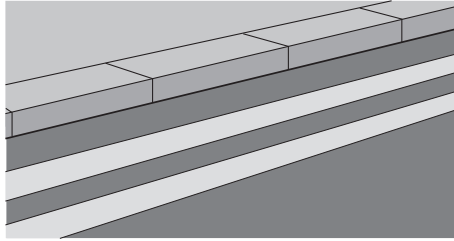


- how you would use the apparatus
- what you would have to measure
- how you would use the results.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

9

- 5 Some roads in towns have yellow lines painted on them to show where people can and cannot park.



Read the two articles about lead chromate and answer the question.

Article 1

Lead chromate is a bright yellow compound containing lead and chromium. Lead chromate is insoluble in water and sunlight has no effect on its colour. Lead chromate is used for yellow road markings.

Article 2

Soluble compounds of lead and chromium are very toxic. In America some chromium compounds were allowed to escape from a factory and get into the ground water. Many people who drank the contaminated water have since suffered from life threatening illness and some have died.

- 5 (a) Give **two** advantages and **two** disadvantages of the production and use of lead chromate for road markings. Use information from article 1 and article 2 to answer the question. There are no marks for direct quotations from the articles.

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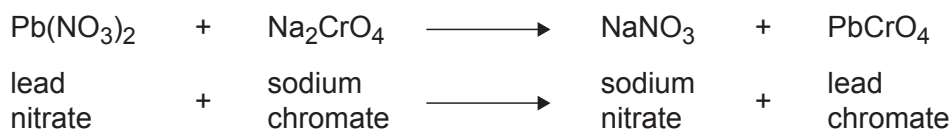
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(4 marks)



5 (b) The equation for making lead chromate is;



5 (b) (i) Balance the symbol equation.

(1 mark)

5 (b) (ii) How many **different types** of atom are shown in the chemical equation?

.....
(1 mark)

5 (b) (iii) How many atoms **in total** are there in one molecule of sodium chromate?

.....
(1 mark)

5 (c) (i) A scientist found that if she mixed a solution containing 3.31 g of lead nitrate with a solution containing 1.62 g of sodium chromate she made 1.70 g of sodium nitrate.

What mass of lead chromate was made?

.....
.....
.....

Answer grams
(2 marks)

5 (c) (ii) Explain how the idea of conservation of mass enabled you to complete the calculation in 5(c)(i).

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(2 marks)



6 The photograph shows a male elephant. Male elephants usually have large tusks.

A very small number of elephants in each generation do not have tusks.

Elephants are hunted and killed for their tusks.

In recent years the number of male elephants born that do not have tusks has increased.

Suggest how tuskless elephants evolved from elephants with tusks and why the number of male elephants that do **not** have tusks is increasing.



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(5 marks)

5

Turn over for the next question

Turn over ►



- 7 A plant pot containing a plant fell over. The photograph shows what the plant in the pot looked like after 3 days. Plants in pots which had not fallen over continued to grow straight up.



- 7 (a) (i) Give the name of the growth response shown in the photograph.

..... (1 mark)

- 7 (a) (ii) Explain fully how this response happens.

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.....
.....
..... (4 marks)



7 (b) (i) Some plants flower in the spring and other plants flower in the summer.

Give the environmental factor that causes plants to flower at different times of the year.

.....
(1 mark)

7 (b) (ii) Suggest why it is an advantage for the plants to flower in the spring or the summer.

.....
.....
(1 mark)

7

END OF QUESTIONS



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