

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  
Higher Tier  
November 2011

# Science B

# SCB1HP

## Unit 1 My World

# H

### Written Paper

Tuesday 8 November 2011 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 reminded of the need for good English and clear presentation in your answers.
- Question 4(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

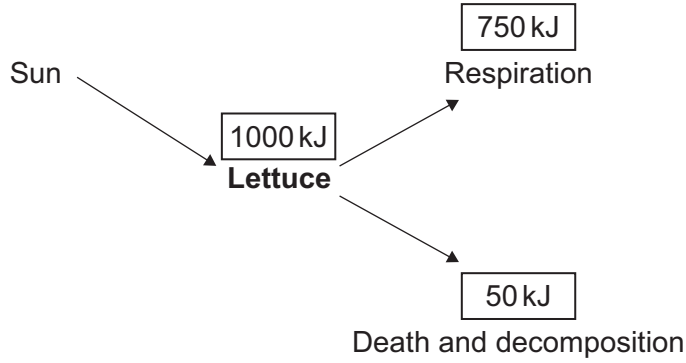
- In all calculations, show clearly how you work out your answer.



N 0 V 1 1 S C B 1 H P 0 1

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

1 The diagram shows some of the energy transfers in a lettuce plant.



1 (a) What percentage of the energy absorbed by the lettuce is available to a rabbit that eats it?

Show clearly how you work out your answer.

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Percentage of energy absorbed = ..... %  
(2 marks)

1 (b) Only 10% of the energy that a rabbit absorbs from the lettuce is used by the rabbit for growth.

Why do rabbits **not** use all of the energy absorbed from the lettuce for growth?

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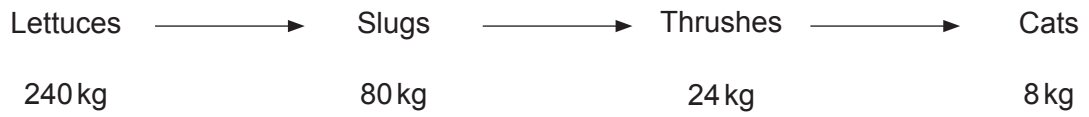
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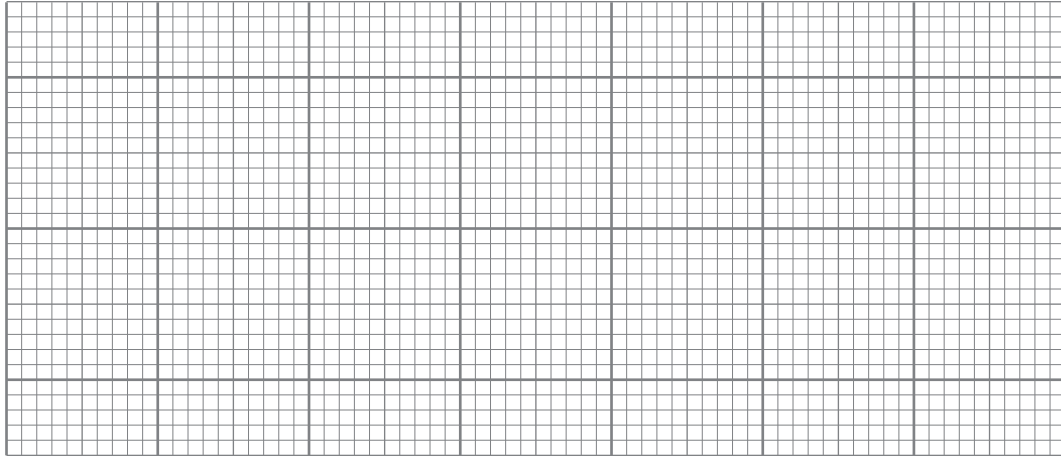
(3 marks)



**1 (c)** The food chain and values of biomass below are for organisms in a different habitat.



On the grid, draw and label a pyramid of biomass for this food chain, to scale.



(3 marks)

8

**Turn over for the next question**

**Turn over ►**



2 Astronomers study objects in the night sky.

2 (a) Astronomers study light waves from stars using telescopes.

The Doppler effect occurs when the source of a wave moves away from the observer.

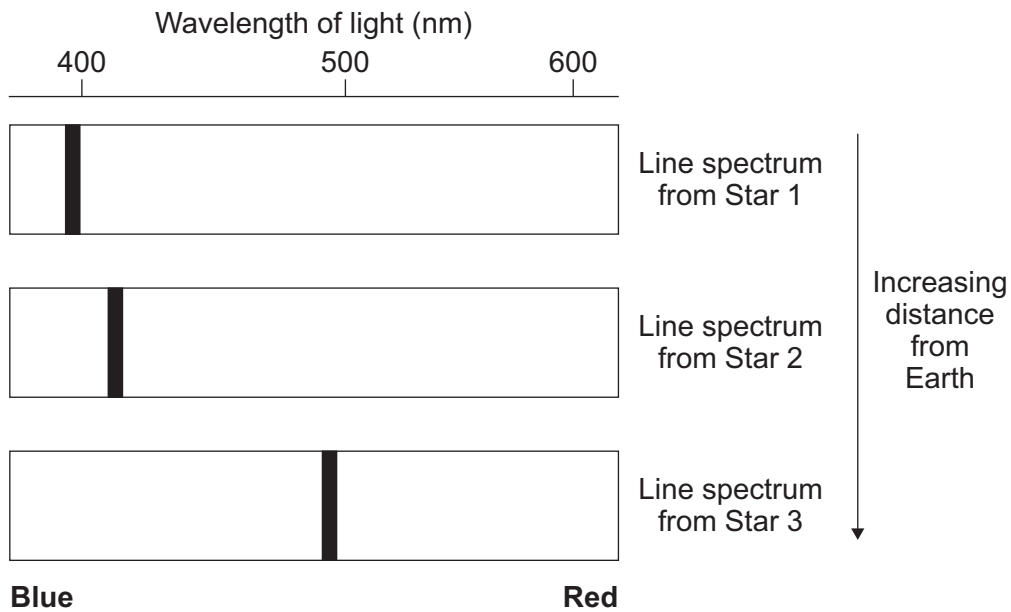
Describe the Doppler effect.

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(2 marks)

2 (b) The visible part of the electromagnetic spectrum from a star includes a dark line. This line is at a specific wavelength.

The diagram shows the position of the dark line in the spectra from three stars.



How does the evidence in these spectra support the theory that the universe is expanding?

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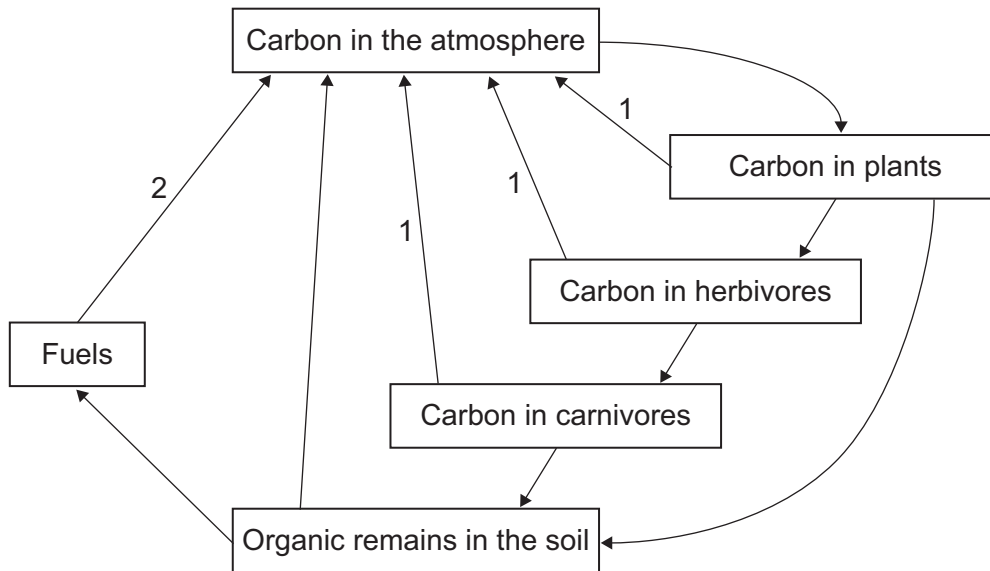
(2 marks)

4



**3** Carbon is an essential element in all living organisms. Carbon is found in many compounds.

**3 (a)** The diagram shows the carbon cycle.



**3 (a) (i)** Name process 1.

..... (1 mark)

**3 (a) (ii)** Name process 2.

..... (1 mark)

**3 (a) (iii)** Name a group of organisms that break down organic remains in the soil.

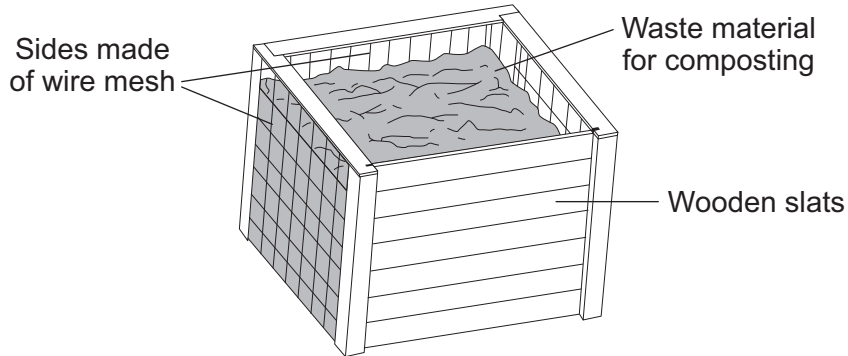
..... (1 mark)

**Question 3 continues on the next page**

**Turn over ►**



**3 (b)** Household waste can be made into compost. The compost is used in gardens.  
The diagram shows a compost heap.



What conditions must the waste be kept in to make sure that it breaks down into compost?

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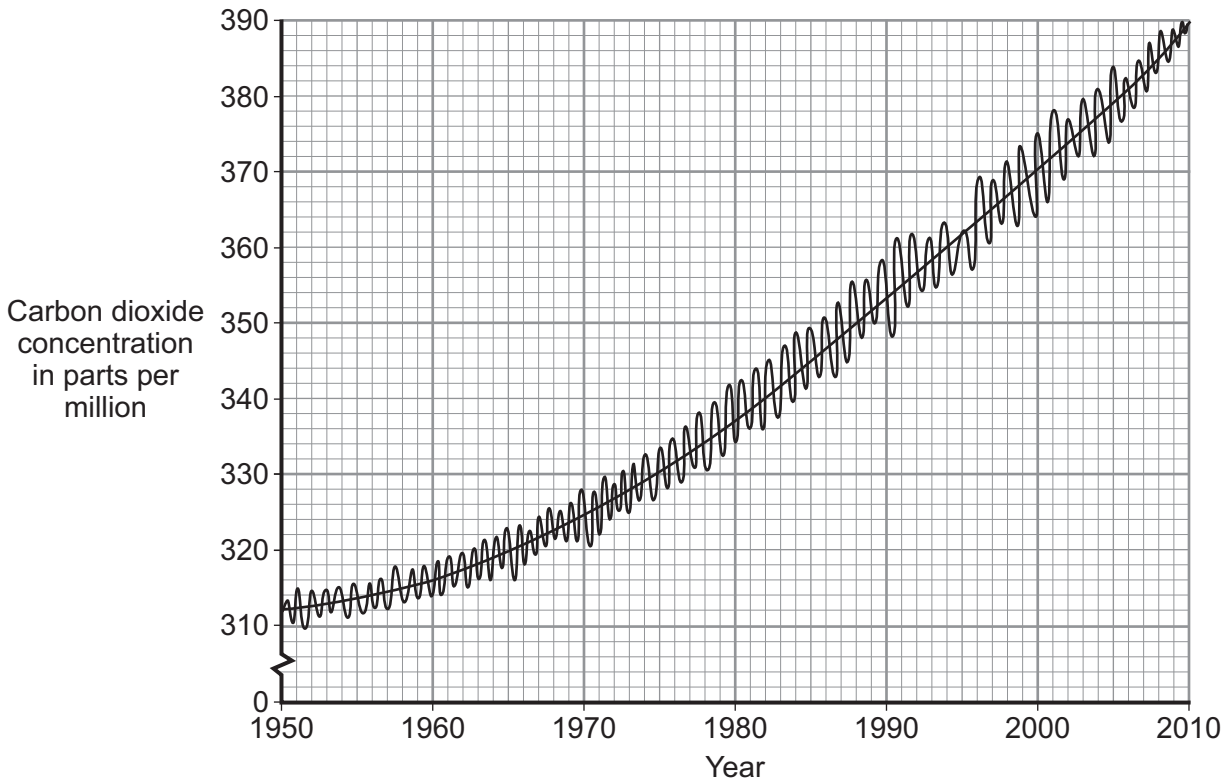
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(3 marks)



**3 (c)** The graph shows the changes in atmospheric carbon dioxide concentration measured at Mauna Loa, Hawaii, between 1950 and 2010.



Some scientists believe that increased carbon dioxide concentration in the atmosphere is linked to global warming.

Suggest why other scientists think that the evidence in the graph is not enough to support a link between carbon dioxide concentration and global warming.

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(3 marks)

9
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Turn over ▶



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

The photographs show an Arctic fox and a Desert fox.

The Arctic fox has white fur and lives in the Arctic. The Desert fox is sand coloured and lives near the equator.



**Arctic fox**  
Height 25–30 cm  
Length 75–115 cm  
Weight 3–8 kg

**Desert fox**  
Height 18–22 cm  
Length 40–70 cm  
Weight 1–1.5 kg

Each fox is adapted to survive in its own environment.

Use the information to explain how.

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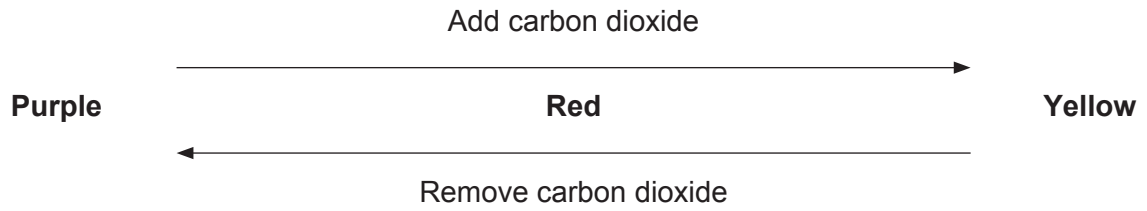
(6 marks)



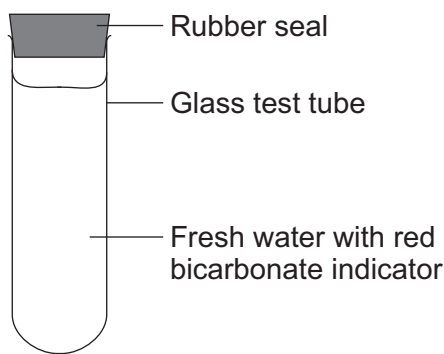




**5** Bicarbonate indicator is a mixture of dyes. The colour of the indicator depends on the concentration of carbon dioxide.



A student used the apparatus below for some experiments.



**5 (a)** The student put a pond snail into the test tube and sealed the tube. She put the tube on a well-lit bench and left it for 30 minutes.

What would happen to the bicarbonate indicator in the test tube?

Give a reason for your answer.

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(2 marks)



**5 (b)** The student repeated the experiment but this time used some pond weed.

What would happen to the bicarbonate indicator in this experiment?

Give a reason for your answer.

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(2 marks)

**5 (c)** The student repeated the experiment with the pond weed but kept the tube in the dark.

Suggest what you would expect to happen to the indicator in the tube.

Give reasons for your answer.

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(3 marks)

7

**Turn over for the next question**

**Turn over ►**



**6** Crude oil is a mixture of hydrocarbons.

**6 (a)** Describe the relationship between the number of carbon atoms in a molecule and the boiling point of the molecule.

.....

.....

(1 mark)

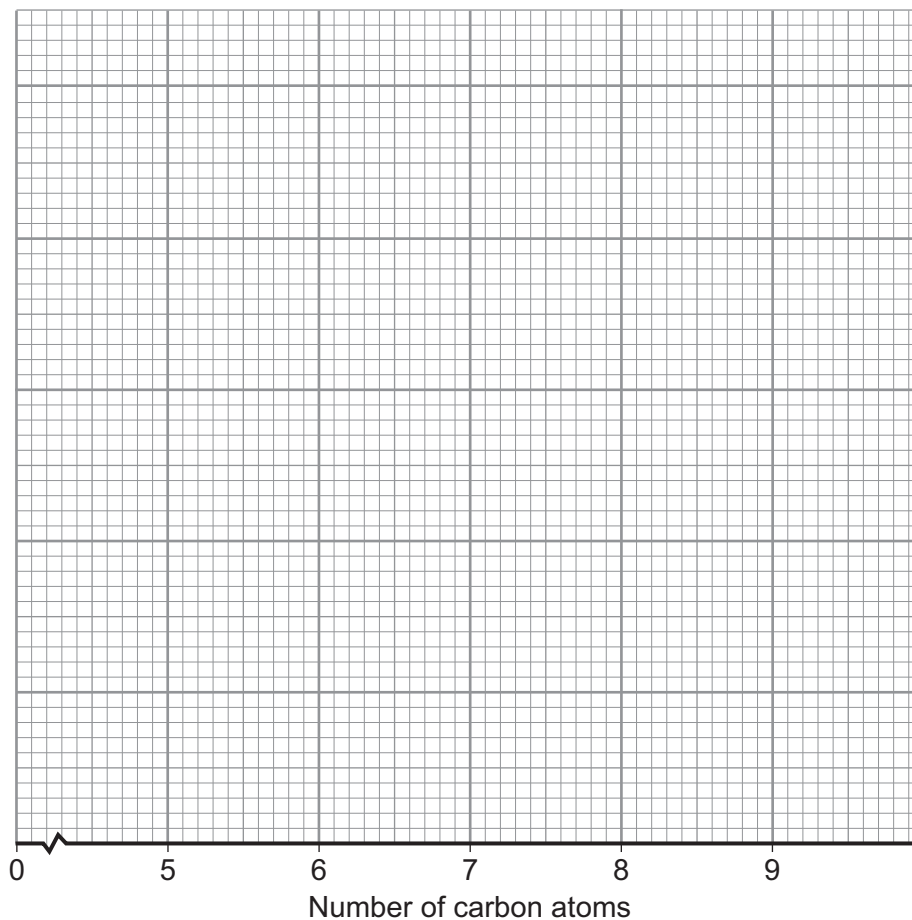
**6 (b)** The table shows the properties of some of the hydrocarbons in crude oil.

Number of carbon atoms	Viscosity (cP) at 20°C	Boiling point (°C)
4		-0.5
5	0.24	36
6	0.28	69
7	0.38	98
8	0.54	125
9	0.71	151

Use the data in the table to answer the questions.



- 6 (b) (i)** Draw a vertical axis on the grid with a suitable scale and label. Then plot a line graph to show the relationship between viscosity and the number of carbon atoms.



(3 marks)

- 6 (b) (ii)** Describe the pattern shown by the graph.

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(2 marks)

- 6 (b) (iii)** The viscosity data for the hydrocarbon with 4 carbon atoms has not been given.

Use the data in the table to suggest why.

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(1 mark)

7
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Turn over ►

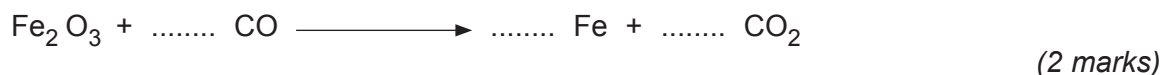


7 Metals can be extracted from their ores.

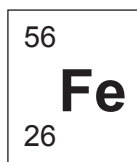
7 (a) Lead can be extracted from lead ore using carbon. Complete the equation to show this reaction.



7 (b) The equation below shows the reaction of iron oxide with carbon monoxide. Balance the equation by writing the correct numbers in the spaces provided.



7 (c) The diagram shows some information about iron.



Use the information in the diagram to determine the number of protons **and** the number of neutrons in an atom of iron.

.....  
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(2 marks)

5



**8 (a)** Carbon dioxide and oxygen are two gases in Earth’s modern-day atmosphere. These two gases were also in Earth’s early atmosphere.

Compare the percentages of carbon dioxide and oxygen in the Earth’s early atmosphere with the percentages in Earth’s modern-day atmosphere.

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(2 marks)

**8 (b)** Two scientists called Miller and Urey did experiments on a mixture of gases to show how organic compounds essential for life could have been made.

**Apart from** carbon dioxide and oxygen, name **two** of the gases that Miller and Urey used in their experiments.

.....  
.....

(2 marks)

**8 (c) (i)** Earth’s modern-day atmosphere contains small amounts of helium and argon. Helium and argon are useful gases that can be extracted from the atmosphere.

Name the process that is used to extract helium and argon from the atmosphere.

.....

(1 mark)

**8 (c) (ii)** Give **one** use for helium and **one** use for argon.

.....  
.....

(2 marks)

**Question 8 continues on the next page**

**Turn over ►**



- 8 (d)** Nitrogen gas can also be extracted from the atmosphere. Nitrogen is converted into a useful compound by reacting it with hydrogen.

Name the useful compound and give **one** use for the compound.

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(2 marks)

9

**END OF QUESTIONS**

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