

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
June 2014

Science B

SCB1HP

H

Unit 1 My World

Friday 6 June 2014 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 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.



J U N 1 4 S C B 1 H P 0 1

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

1 (a) (i) Scientists have sorted all known living organisms into groups.

Give the name of the process used by scientists to sort living organisms into groups.

[1 mark]

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1 (a) (ii) Living organisms, including plants and animals, are sorted into five large groups.

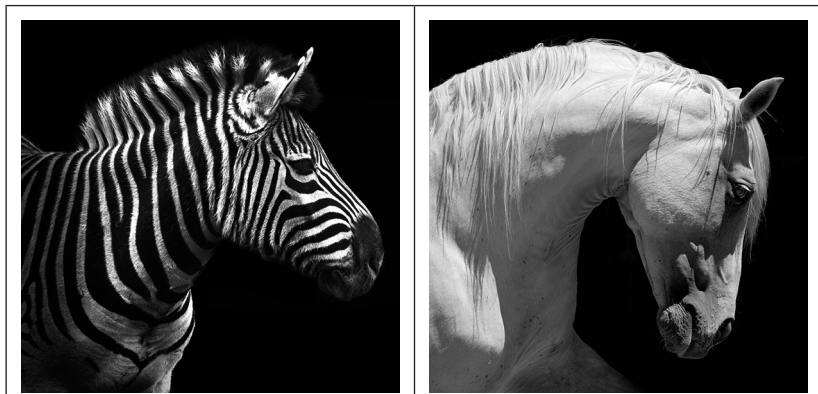
What are these large groups together called?

[1 mark]

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1 (b) **Table 1** shows information about two animals.

Table 1



Common name in England	Zebra	Horse
Common name in Finland	Seepra	Hevonen
Scientific name	Equus quagga	Equus ferus

1 (b) (i) How does the scientific name show that the two animals are closely related?

[1 mark]

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1 (b) (ii) Why is the scientific name more useful than the common names?

Give **one** reason.

[1 mark]

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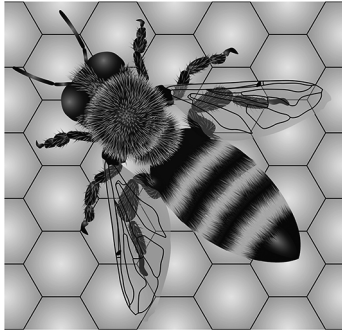
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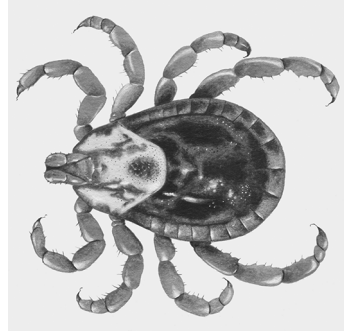
1 (c) Figure 1 shows four different animals.

Figure 1

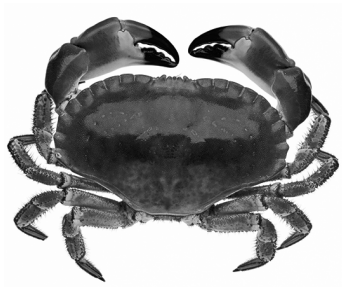
A



B



C



D



A and D are more closely related to each other than to B and C.

Compare the features shown in Figure 1 to suggest the reasons why.

[3 marks]

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Turn over ►



2 Astronomers use telescopes to observe the universe.

Telescopes can be used to detect different types of electromagnetic radiation on the Earth's surface.

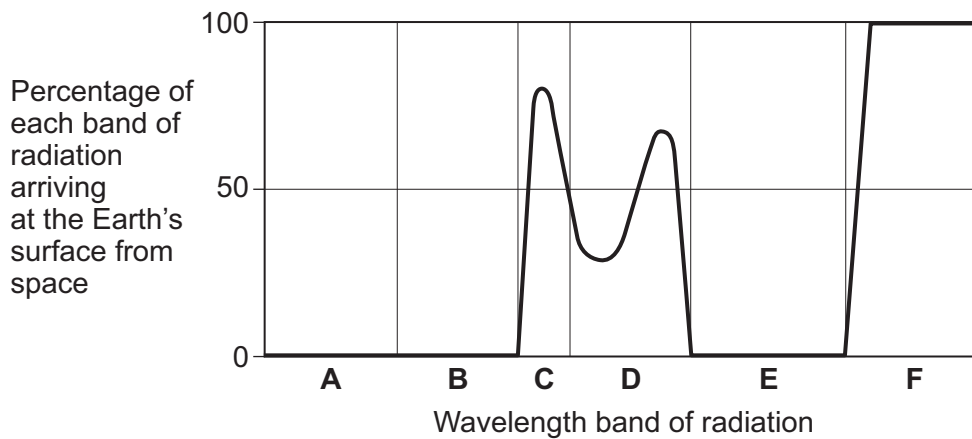
Table 2 shows the wavelength of types of radiation divided into bands.

Table 2

Type of radiation	Wavelength band of radiation
X-rays	A
Ultra-violet	B
Visible light	C
Infrared	D
Far infrared	E
Radio waves	F

Figure 2 shows the percentage of each band of radiation arriving at the Earth's surface from space.

Figure 2



2 (a) (i) Name the types of radiation that **are not** detected by telescopes on the Earth's surface.
Use the information given in **Table 2** and **Figure 2**. **[2 marks]**

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2 (a) (ii) Explain your answer to part **(a)(i)**. **[2 marks]**

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2 (b) Name the type of radiation that **can** be detected equally well on the Earth's surface and in space. **[1 mark]**

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2 (c) Suggest **two** advantages of using telescopes on the Earth's surface instead of in space. **[2 marks]**

1

2

7

Turn over for the next question

Turn over ►



3 Scientists think that the Earth formed about 4.5 billion years ago.

3 (a) During the first billion years that the Earth existed, the surface of the Earth was different from the present surface.

Give **two** ways in which the surface of the Earth was different during the first billion years.

[2 marks]

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3 (b) (i) How was the Earth's atmosphere formed during the first billion years that the Earth existed?

[1 mark]

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3 (b) (ii) During the first billion years that the Earth existed, the atmosphere was different from the atmosphere today.

Give **two** ways in which the atmosphere was different.

[2 marks]

1

2

3 (b) (iii) The Earth's early atmosphere was changed by the development of plant life.

What was the change to the Earth's early atmosphere caused by plants?

[1 mark]

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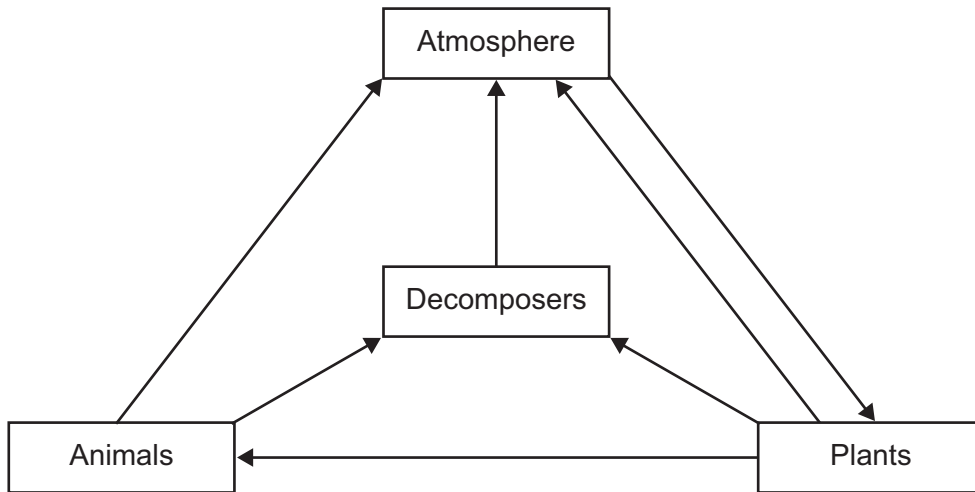
4 In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

All living organisms need carbon-containing compounds.

The carbon in these compounds is recycled all the time.

Figure 3 shows how carbon is recycled all the time (the carbon cycle).

Figure 3



Describe how carbon is recycled.

In your answer you should:

- name the processes involved
- describe how plants and animals and decomposers get their carbon-containing compounds
- describe how living organisms return carbon to the environment.

[6 marks]

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5 All matter is made from atoms.

5 (a) Give a detailed description of the structure of an atom.

You may use a labelled diagram to help your description.

[6 marks]

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5 (b) Describe the differences between atoms, ions and molecules.

[3 marks]

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5 (c) Describe the differences between an element, a compound and a mixture.

[3 marks]

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12

Turn over for the next question

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- 6** A student is growing cabbages in a garden.
There are a lot of snails eating the cabbages.
The student did an investigation to estimate the total number of snails in the garden.

Figure 4



The student collected as many snails as she could find in the garden.

She counted the snails and put a dot of white paint on their shells (**Figure 4**). She then released the snails back into the garden.

One week later she collected as many snails as she could find in the garden.

Her results are shown in **Table 3**.

Table 3

	Total number of snails collected	Number of snails with marked shells
First collection	61	
Second collection	41	



6 (a) (i) The estimated total number of snails in the garden was 104.

Calculate the number of snails with marked shells in the second collection.

Use the equation to help you.

$$\begin{array}{l} \text{Estimated} \\ \text{total number} \\ \text{of snails} \end{array} = \frac{\begin{array}{l} \text{Total number of snails in the} \\ \text{first collection} \end{array} \times \begin{array}{l} \text{Total number of snails in the} \\ \text{second collection} \end{array}}{\begin{array}{l} \text{The number of snails with marked shells in the second collection} \end{array}}$$

[3 marks]

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Number of snails with marked shells in the second collection =

6 (a) (ii) Suggest how she could estimate the total mass of snails in the garden using five of the snails she collected.

[3 marks]

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Question 6 continues on the next page

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6 (b) The student saw a bird eat one of the snails.

The mass of the bird was 100 g.

She made a food chain for cabbages, snails, and the bird.

She then estimated the mass of the cabbages and the mass of the snails.

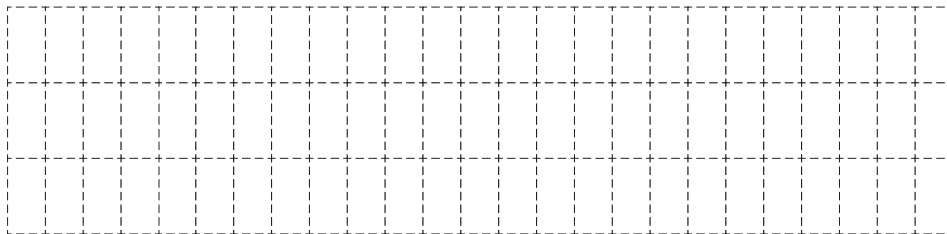
The estimated mass of the snails was 700 g.

The estimated mass of the cabbages was 2300 g.

6 (b) (i) Draw and label a pyramid of biomass in **Figure 5** for the food chain, using the values given.

[3 marks]

Figure 5



6 (b) (ii) 10% of the biomass in each stage of a food chain is passed on to the next stage.

The student concluded that for the bird in the garden to have a mass of 100 g:

- the snails must eat other plants as well as cabbages
- the bird must eat other animals as well as snails.

Use the information from part **(b)** to suggest the reasons for this conclusion.

[4 marks]

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- 7 When electrical heaters are used to heat hard water, calcium carbonate builds up on the heater.

This calcium carbonate is called limescale.

Limescale is a problem because it reduces the efficiency of the heater and may cause it to stop working.

Figure 6 shows an electrical heater covered with limescale.

Figure 6



- 7 (a) (i) Dilute hydrochloric acid is used as a limescale remover.

The word equation for the reaction between calcium carbonate and hydrochloric acid is:

calcium carbonate + hydrochloric acid \longrightarrow calcium chloride + water + carbon dioxide

The formula for hydrochloric acid is HCl

The formula for calcium chloride is CaCl₂

Write the balanced symbol equation for the reaction between calcium carbonate and hydrochloric acid.

[3 marks]

..... + HCl \longrightarrow CaCl₂ + +

Question 7 continues on the next page

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7 (a) (ii) A group of students was asked to design an experiment to find out which one of three liquid limescale removers, **A**, **B** or **C**, would dissolve the most limescale.

The students could use the following equipment:

- beakers
- balance
- measuring cylinders or burettes
- powdered calcium carbonate
- liquid limescale removers **A**, **B**, **C**.

Describe an experiment that the group of students could do to find which limescale remover, **A**, **B** or **C**, would dissolve the most limescale.

[4 marks]

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7 (a) (iii) Students are given the cost of 1 cm³ of each limescale remover.

Suggest how the students could use their results to decide which limescale remover is the best value for money.

[2 marks]

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END OF QUESTIONS



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Question 1: Figure 1A: © Thinkstock

Question 1: Figure 1B,C,D: © Getty Images

Question 7: Figure 6: © Thinkstock

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