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
June 2012

Science A
Unit Biology B1

BL1HP

H

Biology
Unit Biology B1

Tuesday 12 June 2012 9.00 am to 10.00 am

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 3 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 Scientists at a drug company developed a new pain-killing drug, drug **X**.

1 (a) Painkillers do **not** cure infectious diseases.

Why?

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(1 mark)

1 (b) The scientists compared drug **X** with two other pain-killing drugs, drug **A** and drug **B**. In their investigation the scientists:

- chose 600 volunteers. The volunteers were all in pain
- gave 200 of the volunteers a standard dose of drug **A**
- gave 200 of the volunteers a standard dose of drug **B**
- gave 200 of the volunteers a standard dose of drug **X**.

Over the next seven hours the volunteers recorded how much pain they felt.

To get valid results the three groups of volunteers should be matched for as many factors as possible.

Suggest **two** of the factors that should be matched.

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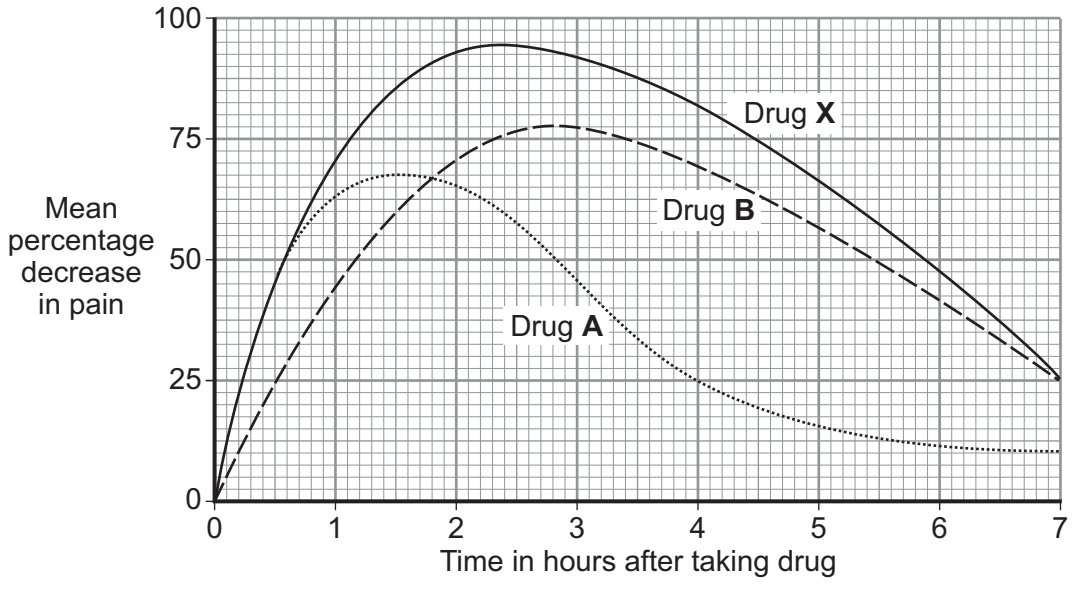
(2 marks)

1 (c) The graph shows the results of the investigation.



1 (c) (i) How much pain did the volunteers still feel, four hours after taking drug **A**?

..... percent
(1 mark)

1 (c) (ii) Give **one** advantage of taking drug **A** and **not** drug **B**.

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(1 mark)

1 (c) (iii) Give **two** advantages of taking drug **B** and **not** drug **A**.

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(2 marks)

1 (d) Drug **X** is much more expensive than both drug **A** and drug **B**.

A pharmacist advised a customer that it would be just as good to take drug **A** and drug **B** together instead of drug **X**.

Do you agree with the pharmacist's advice?

Give reasons for your answer.

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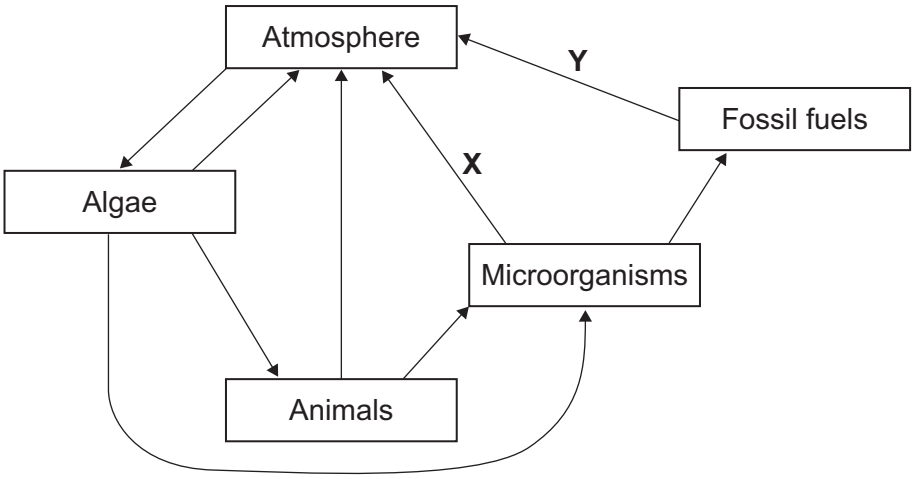
(3 marks)

10

2 The diagram shows part of a carbon cycle in a habitat.



2 (a) Name the processes shown by arrows **X** and **Y**.

X .....

Y .....

(2 marks)

2 (b) Describe the part played by algae in this carbon cycle.

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(3 marks)

2 (c) In tropical rainforests process **X** is much faster than in most other habitats.

Suggest why.

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(2 marks)

7

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

Plants and animals have become adapted in many different ways to reduce the risk of being eaten by predators.

Describe these adaptations.

Give examples of animals and plants adapted in the ways you describe.

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(6 marks)

6

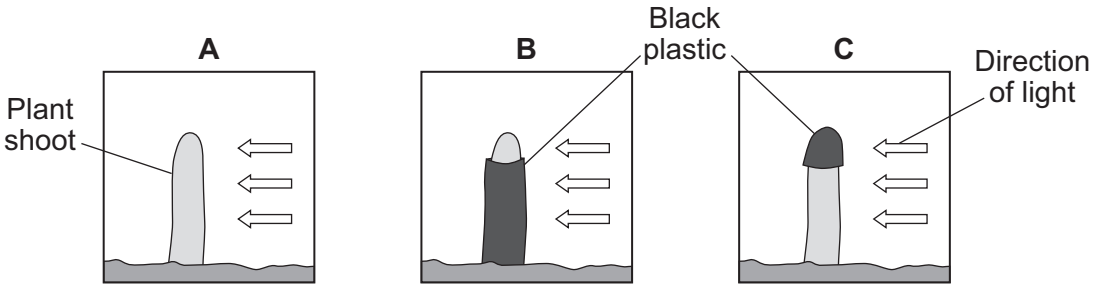
4 Charles Darwin investigated tropisms in plants.

Some students did an investigation similar to Darwin's investigation.

The students:

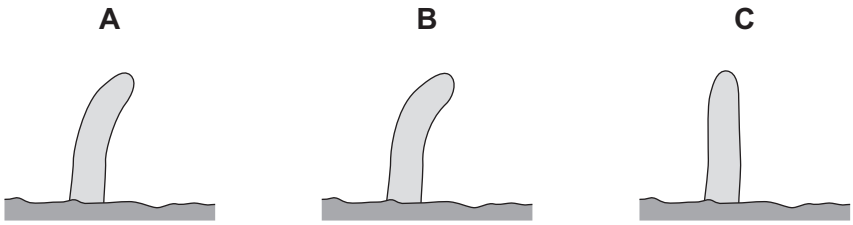
- grew seeds until short shoots had grown
- used black plastic to cover parts of some of the shoots
- put the shoots in light coming from one direction
- put boxes over the shoots to keep out other light.

The diagrams show how the investigation was set up.



Two days later the students took off the black plastic covers and looked at the shoots.

The diagrams show the results.



4 (a) Give **two** variables that the students should control in this investigation.

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(2 marks)

4 (b) Shoot **A** bent towards the light as it grew.

Explain how.

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(4 marks)

4 (c) What conclusions can be drawn from the results about:

4 (c) (i) the detection of the light stimulus

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(1 mark)

4 (c) (ii) where in the shoot the response to the light takes place.

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(1 mark)

8

Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

5 People may be immunised against diseases using vaccines.

5 (a) (i) Which part of the vaccine stimulates the body's defence system?

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(2 marks)

5 (a) (ii) A person has been vaccinated against measles. The person comes in contact with the measles pathogen. The person does **not** catch measles.

Explain why.

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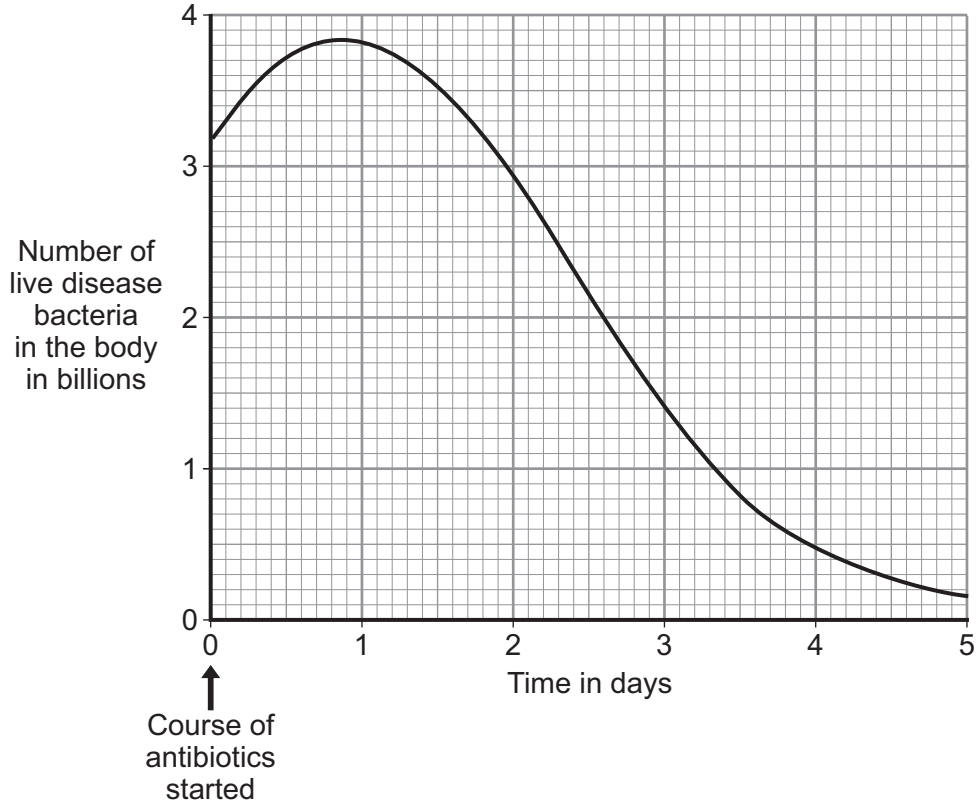
(3 marks)

Question 5 continues on the next page

5 (b) A man catches a disease. The man has **not** been immunised against this disease. A doctor gives the man a course of antibiotics.

The graph shows how the number of live disease bacteria in the body changes when the man is taking the antibiotics.



5 (b) (i) Four days after starting the course of antibiotics the man feels well again.
It is important that the man does **not** stop taking the antibiotics.

Explain why.

Use information from the graph.

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(2 marks)

5 (b) (ii) Occasionally a new, resistant strain of a pathogen appears.

The new strain may spread rapidly.

Explain why.

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(3 marks)

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Turn over for the next question

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6 The picture shows a zebra fish.

Zebra fish are small freshwater fish that usually have black and silver stripes.
Zebra fish can tolerate a wide range of environmental conditions.

6 (a) Scientists have genetically modified zebra fish to act as pollution indicators.
The genetically modified zebra fish have a gene transferred from a jellyfish.
The gene allows the stripes of the zebra fish to change colour.

Describe how the scientists produced the genetically modified zebra fish.

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(3 marks)

6 (b) Some scientists are worried about the production of genetically modified zebra fish.

Suggest reasons why.

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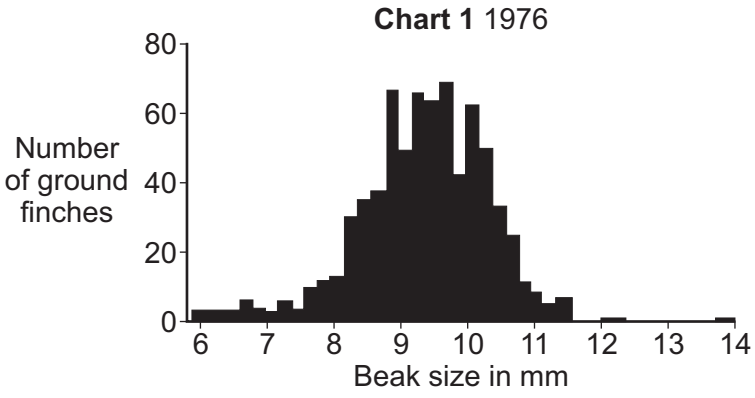
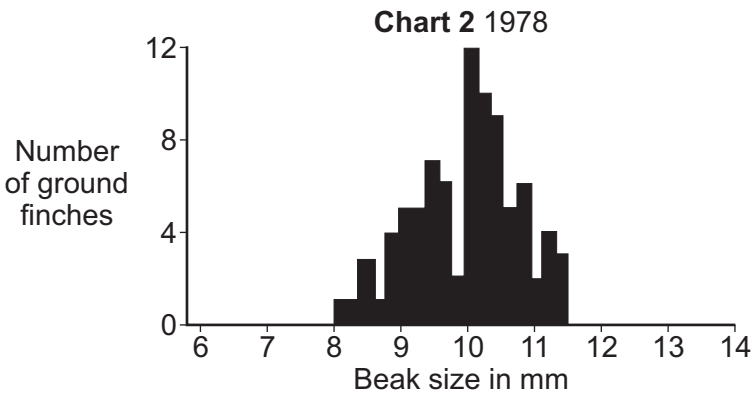
(2 marks)

5

7 The Galapagos Islands are in the Pacific Ocean, 1400 km from South America.
A type of bird called a ground finch lives on the islands.
The picture shows a ground finch.

The size of the seeds the ground finch can eat depends upon the size of the beak.
To eat large seeds, a large beak is needed.
The bar charts show the sizes of the beaks of ground finches on **one** island, in 1976 and in 1978.





7 (a) The population of the ground finches and their beak sizes changed between 1976 and 1978.

Describe these changes.

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(3 marks)

7 (b) In 1977 there was very little rain on the island. The lack of rain affected the seeds that the finches ate.
The table shows how the seeds were affected.

Year	Mean number of seeds per m^2	Mean mass of each seed in mg
1976	8.5	3.5
1978	2.8	4.2

Suggest an explanation for the changes in beak sizes between 1976 and 1978.

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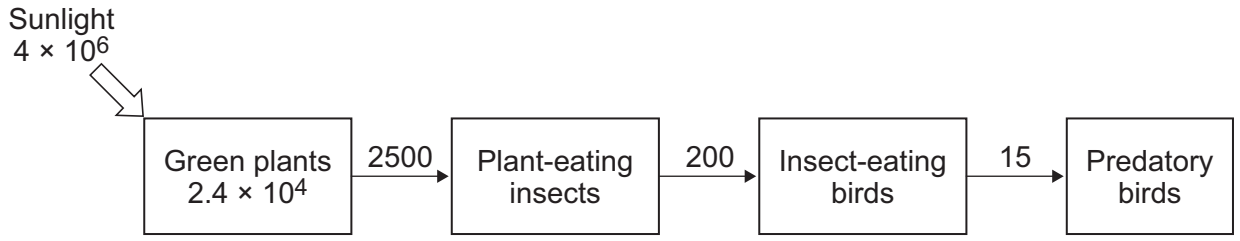
(4 marks)

7

8 The diagram shows the annual flow of energy through a habitat.

The figures are in $kJ\,m^{-2}$.



8 (a) (i) Calculate the percentage of the energy in sunlight that was transferred into energy in the green plants.

Show clearly how you work out your answer.

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Answer = ... %

(2 marks)

8 (a) (ii) Suggest reasons why the percentage energy transfer you calculated in part **(a)(i)** was so low.

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(2 marks)

8 (b) Compare the amount of energy transferred to the insect-eating birds with the amount transferred to the predatory birds.

Suggest explanations for the difference in the amount of energy transferred to the two types of bird.

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(3 marks)

7

END OF QUESTIONS

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