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	
9	
TOTAL	

General Certificate of Secondary Education
Higher Tier
June 2015

Science A
Unit Biology B1

Biology
Unit Biology B1

BL1HP

H

Friday 5 June 2015 1.30 pm to 2.30 pm

For this paper you must have:
- a ruler.

You may use a calculator.

A

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(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.

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

1 Many people in the UK take sleeping pills.

1 (a) The drug thalidomide was developed as a sleeping pill in the 1950s.
In the 1960s thalidomide was banned.
Recently thalidomide has been used to treat other diseases.

Name **one** disease thalidomide is used to treat now.

[1 mark]

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1 (b) **Table 1** shows information about the development of a new sleeping pill.

Table 1

Type of test or trial	Preclinical	Clinical phase 1	Clinical phase 2	Clinical phase 3
Tested or trialled on	Cells, tissues or animals	20–100 healthy volunteers	100–500 volunteer patients	1000–5000 volunteer patients
Number of compounds tested	>10 000	5–10	2–3	1 (new sleeping pill)
Time taken for test or trial in years	1–4	2–4	1–3	2–4

1 (b) (i) What is the shortest time taken to develop a new sleeping pill?

[1 mark]

..... years

1 (b) (ii) What is the **range** for the number of volunteers needed to complete all the clinical trials for the new sleeping pill?

[1 mark]

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1 (c) Drugs are trialled to check for side effects on people.

Give **one** other reason why drugs are trialled.

[1 mark]

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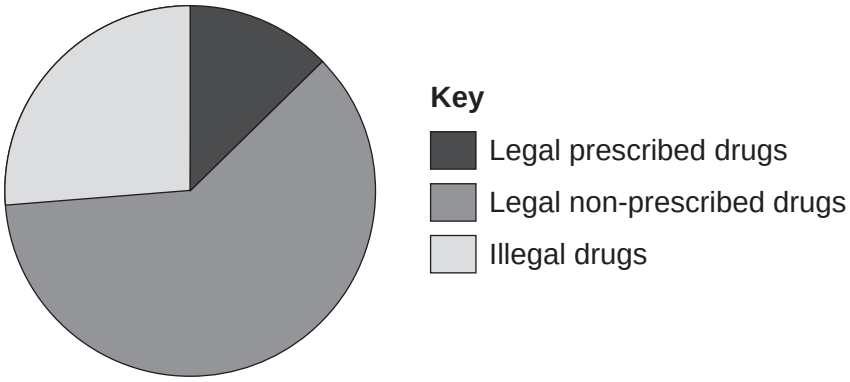
1 (d) **Figure 1** shows the impact on the health of the population caused by drugs from different sources.

Figure 1



1 (d) (i) Legal non-prescribed drugs have a greater impact on the health of the population than illegal drugs.

Suggest **two** reasons why.

[2 marks]

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1 (d) (ii) Drugs change chemical processes in a person's body.

Why is it difficult for a person to stop taking certain drugs?

[1 mark]

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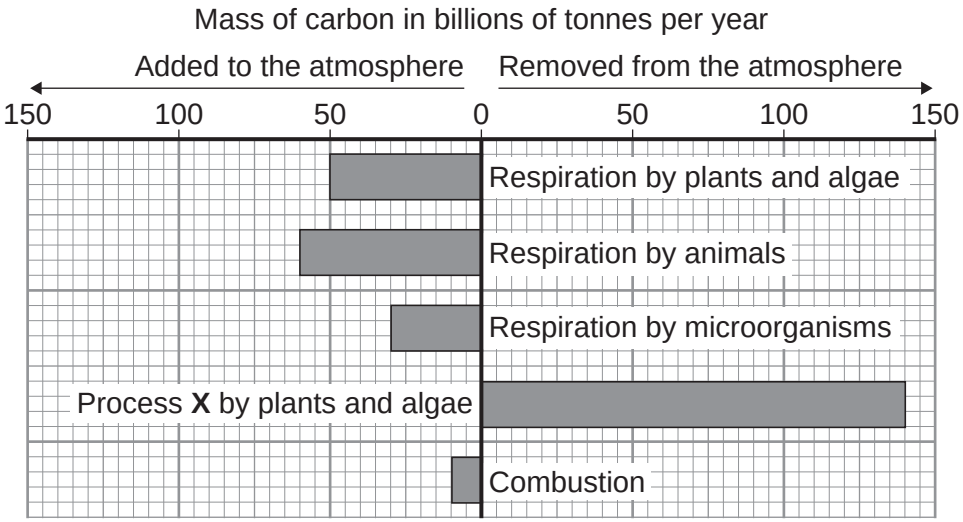
7

2 This question is about carbon.

Figure 2 shows the mass of carbon added to and removed from the atmosphere each year.

Figure 2



2 (a) Name process **X**.

[1 mark]

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2 (b) (i) Calculate the mass of carbon added to the atmosphere by respiration per year.

[1 mark]

Answer = ... billion tonnes

2 (b) (ii) Some scientists are concerned that the mass of carbon in the atmosphere is changing.

How does the data in **Figure 2** support this idea?

[1 mark]

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3

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

3 Gardeners sometimes use weed killers to control the growth of plants.

3 (a) A gardener wanted to get rid of daisy plants growing in a lawn.

The gardener investigated the use of a weed killer.

The gardener:

- recorded the number of daisy plants growing in different 10 m^2 areas of the lawn
- made solutions of the weed killer (each solution had a different concentration)
- put 5 dm^3 of each solution on different 10 m^2 areas of the lawn
- recorded the number of daisy plants growing in each area after 2 weeks.

Table 2 shows the results.

Table 2

Concentration of weed killer in arbitrary units	**Number of daisy plants per 10 m^2**	
	Before using weed killer	**2 weeks after using weed killer**
0 (water)	8	8
20	6	8
40	9	6
60	5	2
80	4	0
100	8	0

3 (a) (i) To make the investigation fair, the gardener controlled some variables.

Give **one** variable the gardener controlled in the investigation.

[1 mark]

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3 (a) (ii) The gardener decided that the result for a concentration of 20 arbitrary units of weed killer was anomalous.

Suggest why the gardener decided this result was anomalous.

[1 mark]

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3 (a) (iii) Why did the gardener put 0 arbitrary units of weed killer on one area of the lawn?

[1 mark]

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3 (a) (iv) The gardener concluded that the best concentration of weed killer to use all over a lawn is 100 arbitrary units.

Suggest why the gardener cannot be sure about this conclusion.

[1 mark]

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Question 3 continues on the next page

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

Plants respond to different environmental factors.

Describe how different environmental factors affect:

- the direction of growth of roots
- the direction of growth of shoots.

In your answer you should refer to the role of plant hormones.

Do **not** refer to the artificial use of plant hormones by gardeners or scientists.

[6 marks]

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Extra space .....

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10

4 Antibiotics can be used to protect our bodies from pathogens.

4 (a) What is a pathogen?

[1 mark]

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4 (b) Bacteria may become resistant to antibiotics.

How can doctors reduce the number of bacteria that become resistant to antibiotics?

[2 marks]

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4 (c) Scientists grow microorganisms in industrial conditions at a higher temperature than is used in school laboratories.

4 (c) (i) Which temperature would be most suitable for growing bacteria in industrial conditions?

Draw a ring around the correct answer.

[1 mark]

25 °C **40 °C** **100 °C**

4 (c) (ii) What is the advantage of using the temperature you gave in part **(c)(i)**?

[1 mark]

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5

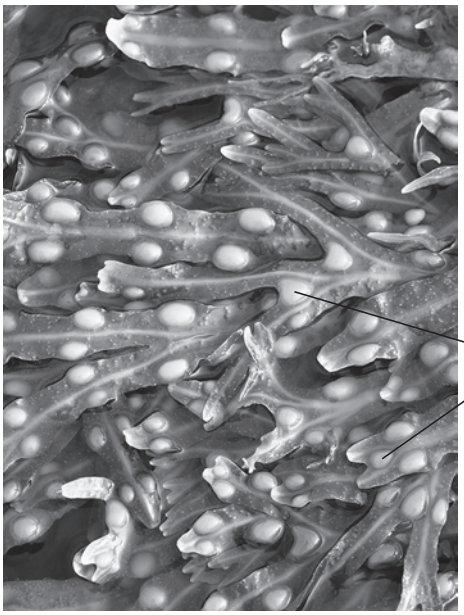
5 Organisms compete with each other.

5 (a) **Figure 3** shows two types of seaweed which live in similar seashore habitats.

Figure 3

Saw wrack

Bladder wrack



Most of the time the two seaweeds are covered with water.

Bladder wrack has bladders filled with air.

Bladder wrack grows more quickly than saw wrack.
Suggest an explanation why.

[3 marks]

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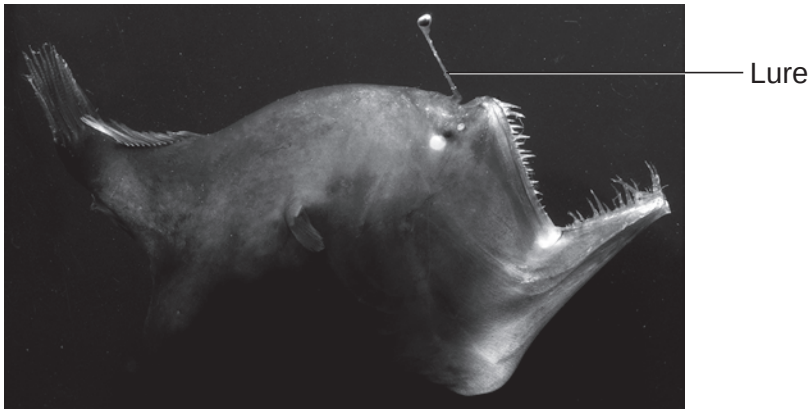
5 (b) **Figure 4** shows an angler fish.

Figure 4



Angler fish live at depths of over 1000 m.

In clear water, sunlight does not usually reach more than 100 m deep.
Many angler fish have a transparent 'lure' containing a high concentration of bioluminescent bacteria.
Bioluminescent bacteria produce light.

Suggest an advantage to the angler fish of having a lure containing bioluminescent bacteria.

[2 marks]

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5

Turn over for the next question

6 In January 2011 more than 600 000 people collected results for the UK national bird survey.

People recorded the number of each species of bird they saw in 1 hour on 1 day in their garden.

Some of the results are shown in **Table 3**.

Table 3

Species	Mean number of birds seen per garden	Percentage of gardens in which the bird was seen
House sparrow	4.1	64.5
Starling	3.9	51.3
Blackbird	3.2	95.2
Goldfinch	1.5	33.5

6 (a) A student looked at **Table 3** and said:

"In the UK, house sparrows are more common than blackbirds."

Suggest **three** reasons why the student's statement may **not** be true.

[3 marks]

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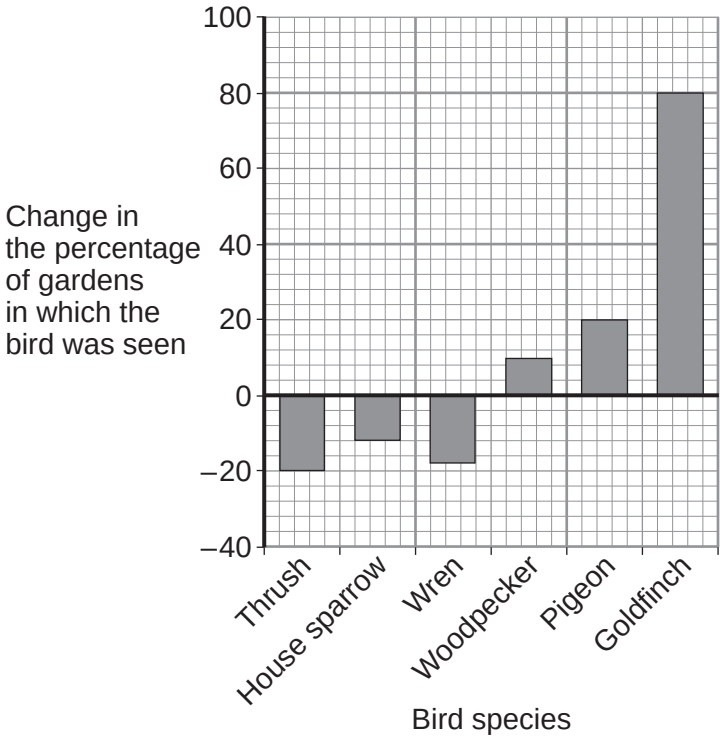
6 (b) A survey in 2012 was done in the same way as the 2011 survey.

Figure 5 shows changes in the percentages of gardens in which some birds were seen from 2011 to 2012.

Figure 5



6 (b) (i) Calculate the percentage of gardens in which goldfinches were seen in 2012.

Use information from **Figure 5** and **Table 3**.

[2 marks]

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Answer = ... %

6 (b) (ii) Suggest **two** reasons why goldfinches were seen in more gardens in 2012 than in 2011.

[2 marks]

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7

7 This question is about the nervous system.

7 (a) Describe the function of receptors in the skin.

[2 marks]

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7 (b) A response is caused when information in the nervous system reaches an effector.

7 (b) (i) There are two different types of effector.

Complete **Table 4** to show:

- the two different types of effector
- the response each type of effector makes.

[4 marks]

Table 4

Type of effector	Response the effector makes
1	....
2	....

7 (b) (ii) Some effectors help to control body temperature.

Give **one** reason why it is important to control body temperature.

[1 mark]

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7

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

8 As embryos develop, some genes in cells are turned off and some genes are turned on. This allows cells to become specialised for particular functions.

Usually, after cells have become specialised, they cannot change again into different types of cells.

8 (a) What is a gene?

[2 marks]

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8 (b) Scientists have developed a way to change specialised cells back into embryo-like cells by a method called iPS.

Read the information in the box.

> Cells made using iPS can be changed into different types of cells.
>
> Scientists plan to take skin cells from an endangered species of monkey called a drill and change these cells into iPS cells. These iPS cells can then be changed into egg cells or sperm cells.
>
> After fertilisation, the embryo can be inserted into the womb of a female of a non-endangered species called a mandrill. The mandrill is closely related to the drill.

Describe similarities and differences between the iPS method and adult cell cloning.

[4 marks]

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8 (c) Suggest **one** advantage of trying to preserve endangered species such as the drill.

[1 mark]

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7

Turn over for the next question

9 (a) A healthy diet should be balanced.

What is meant by a balanced diet?

[2 marks]

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9 (b) Cholesterol has important functions in the body.
Some cholesterol is produced by the liver.

Cholesterol is needed in the body to make the hormone oestrogen.

9 (b) (i) Name the organ in the body which produces oestrogen.

[1 mark]

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9 (b) (ii) What effect does oestrogen have on the female reproductive cycle?

[1 mark]

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9 (b) (iii) Oestrogen is a naturally occurring steroid hormone.

Give **one** artificial use of a steroid hormone in the body.

[1 mark]

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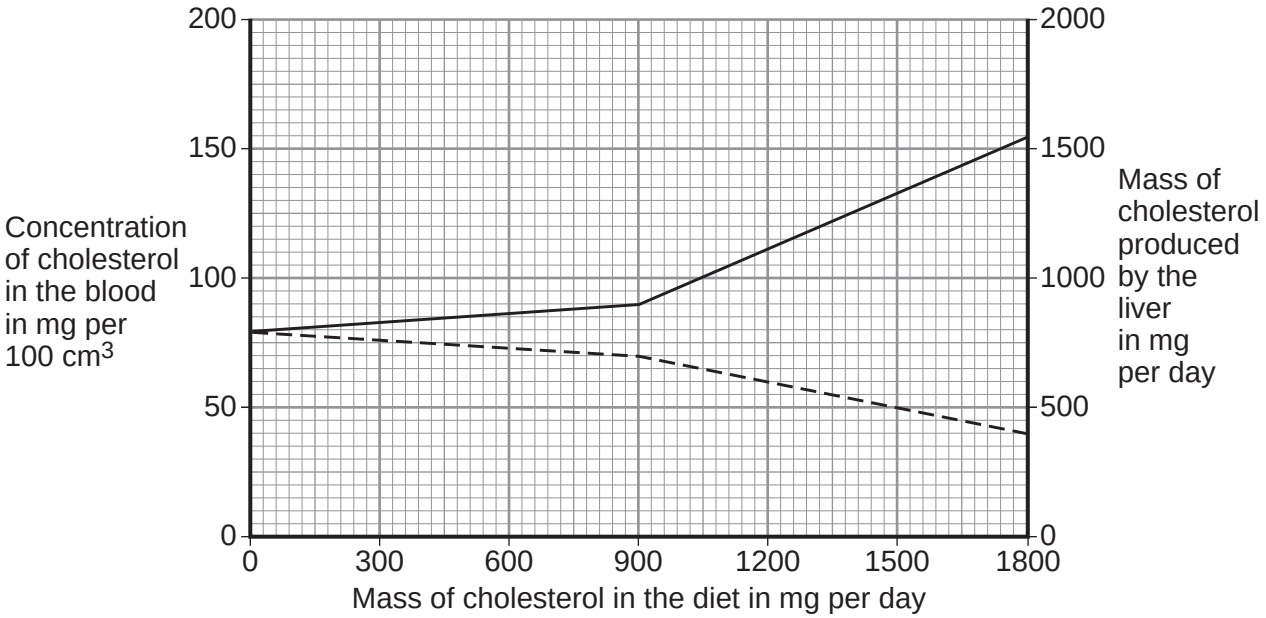
9 (c) **Figure 6** shows the effect of the mass of cholesterol in the diet on:

- the concentration of cholesterol in the blood
- the mass of cholesterol produced by the liver.

Figure 6



Key

——— Blood cholesterol concentration

– – – – Production by the liver

Describe the effect of increasing the mass of cholesterol in the diet on the mass of cholesterol produced by the liver.

To gain full marks you should include data from **Figure 6** in your answer.

[2 marks]

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Question 9 continues on the next page

9 (d) Large amounts of cholesterol in the diet switch off the production of an enzyme called reductase, in the liver.

An increase of the enzyme reductase increases the production of cholesterol by the liver.

9 (d) (i) Which part of a liver cell is responsible for controlling the production of reductase?

[1 mark]

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9 (d) (ii) High blood cholesterol concentrations increase the likelihood of heart and circulatory diseases.

Doctors can prescribe statins to control the concentration of cholesterol in the blood.

Suggest how statins work.

[1 mark]

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9

END OF QUESTIONS

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