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
Foundation Tier
June 2015

Science A
Unit Biology B1

BL1FP

F

Biology
Unit Biology B1

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 9(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 Humans use the nervous system to react to changes in the environment.

1 (a) (i) Which word means a change in the environment?

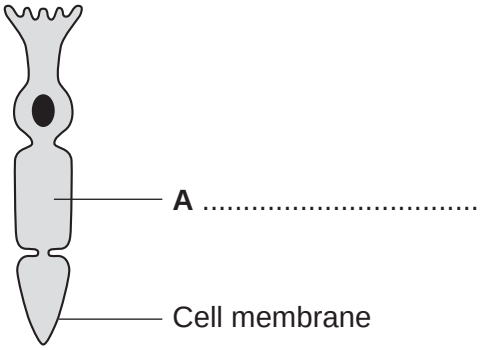
Draw a ring around the correct answer.

[1 mark]

neurone **reflex** **stimulus**

1 (a) (ii) **Figure 1** shows a light receptor cell.

Figure 1



Use the correct answer from the box to label part **A** on **Figure 1**.

[1 mark]

chloroplast	**cytoplasm**	**vacuole**

1 (b) **Figure 2** shows a boy riding a bicycle on a sunny day.

Figure 2

1 (b) (i) Receptors in the boy's body detect changes in the environment.

Complete **Table 1** to show which organ of the body contains the receptors for each change in the environment.

[3 marks]

Table 1

Change in the environment	**Organ that contains the receptors**
Sound of traffic from behind him	
Flashing blue lights of a police car	
Cooler air temperature in the shadows	

1 (b) (ii) The boy's response to danger is to pull on the bicycle brakes.

Which type of effector causes this response?

Tick (✓) **one** box.

[1 mark]

A gland ☐

A muscle ☐

A synapse ☐

6

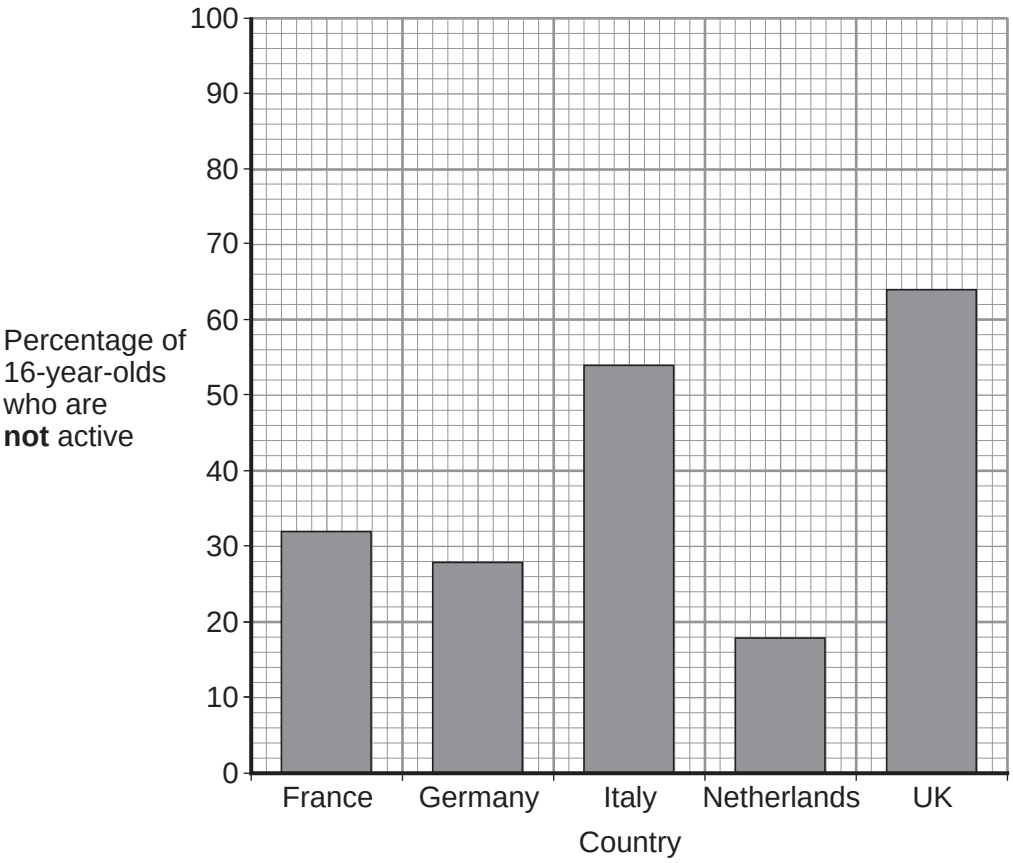
Turn over for the next question

2 Scientists investigated the effect of different factors on health.

2 (a) People who are **not** active may have health problems.

Figure 3 shows the percentage of 16-year-olds in some countries who are **not** active.

Figure 3



2 (a) (i) What percentage of 16-year-olds in the UK are **not** active?

[1 mark]

..... %

2 (a) (ii) What percentage of 16-year-olds in the UK are **active**?

[1 mark]

..... %

2 (a) (iii) A newspaper headline states:

People in the UK are the laziest in the world.

Information in **Figure 3** does **not** support the newspaper headline.

Suggest **one** reason why the newspaper headline may be wrong.

[1 mark]

.....

.....

2 (b) Doctors gave a percentage rating to the health of 16-year-olds.
100% is perfect health.

Table 2 shows the amount of exercise 16-year-olds do and their health rating.

Table 2

Amount of exercise done in minutes every week	**Health rating as %**
Less than 30	72
90	76
180	82
300	92

What conclusion can be made about the effect of exercise on health?

Use information from **Table 2**.

[1 mark]

.....

.....

Question 2 continues on the next page

2 (c) Inherited factors can also affect health.

Give **one** health problem that may be affected by the genes someone inherits.

Draw a ring around the correct answer.

[1 mark]

being malnourished	**having a high cholesterol level**	**having a deficiency disease**

2 (d) White blood cells are part of the immune system.

Use the correct answer from the box to complete each sentence.

antibiotics	**antibodies**	**pathogens**	**vaccines**

2 (d) (i) When we are ill, white blood cells produce ..... to kill microorganisms.

[1 mark]

2 (d) (ii) Many strains of bacteria, including MRSA, have developed resistance to drugs called ..... .

[1 mark]

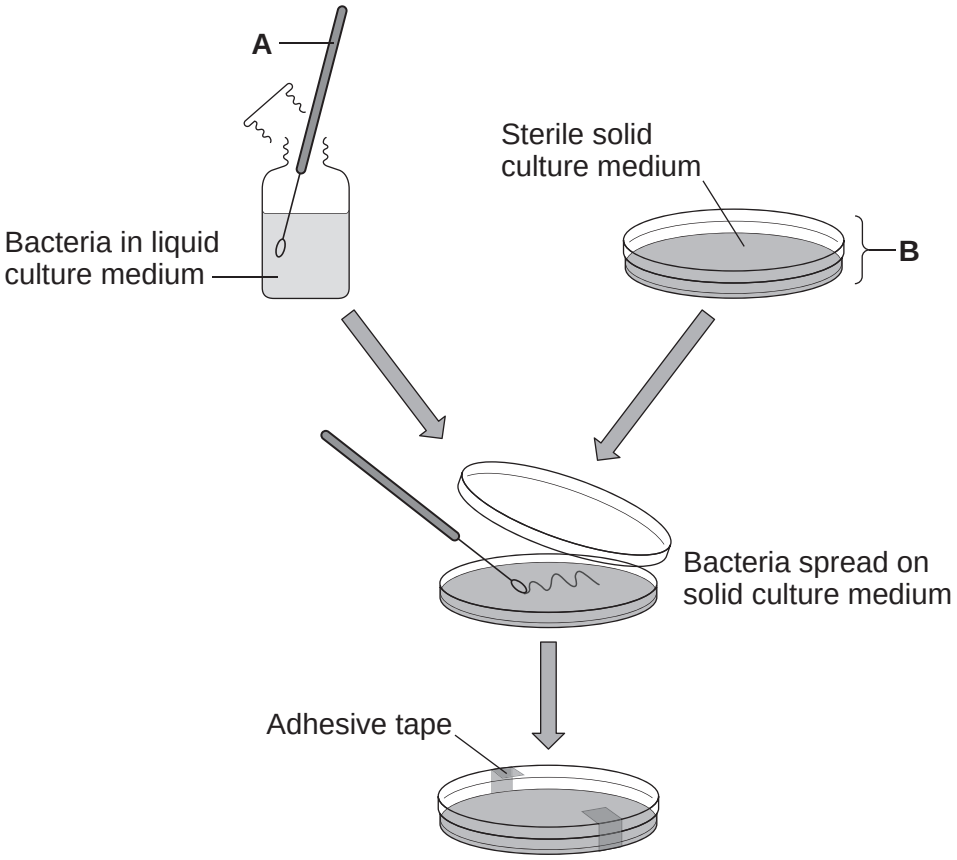
7

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

3 **Figure 4** shows a method used to grow pure cultures of a bacterium.

Figure 4



3 (a) Name apparatus **A** and apparatus **B**.

[2 marks]

Apparatus **A** .....

Apparatus **B** .....

3 (b) (i) Why should apparatus **A** and apparatus **B** be sterilised before they are used?

[1 mark]

.....

.....

3 (b) (ii) How should apparatus **A** be sterilised?

Tick (✓) **one** box.

[1 mark]

Using enzymes ☐

Using a flame ☐

In an incubator ☐

3 (b) (iii) Adhesive tape is used to secure the lid on apparatus **B**.

Give **one** reason why the lid of apparatus **B** should be securely taped in place.

[1 mark]

.....

.....

3 (c) What is the maximum temperature that should be used **in schools** to grow the bacteria in apparatus **B**?

Draw a ring around the correct answer.

[1 mark]

10 °C **25 °C** **50 °C**

6

Turn over for the next question

4 Modern scientists use cloning techniques.

4 (a) Which **one** of the following is a method of producing cloned plants?

Tick (✓) **one** box.

[1 mark]

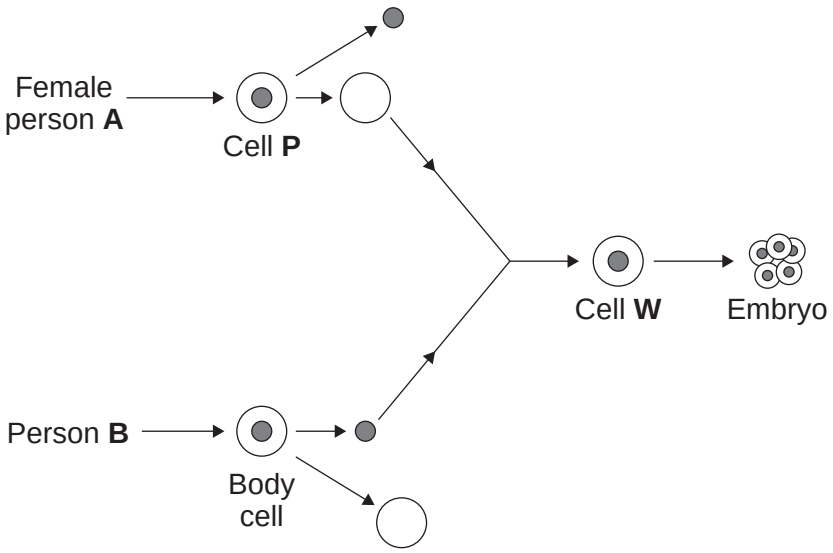
Joining male and female sex cells ☐

Taking cuttings from plants ☐

Transferring genes from one plant to another plant ☐

4 (b) **Figure 5** shows a method that could be used in the future to produce a human.

Figure 5



4 (b) (i) What is the name of the method shown in **Figure 5**?

Tick (✓) **one** box.

[1 mark]

Adult cell cloning ☐

Embryo transplant ☐

Tissue culture ☐

4 (b) (ii) What type of cell is cell **P**?

Draw a ring around the correct answer.

[1 mark]

an egg cell **a skin cell** **a sperm cell**

4 (b) (iii) Use the correct answer from the box to complete the sentence.

[1 mark]

cell membrane	**cytoplasm**	**nucleus**

The ..... of cell **P** is removed and is discarded.

4 (b) (iv) Use the correct answer from the box to complete the sentence.

[1 mark]

an electric shock	**enzymes**	**hormones**

To make cell **W** divide to form an embryo, the cell must be treated with

..... .

4 (b) (v) The embryo must be placed in an adult female to develop into a child.

Where, in the adult female, should the embryo be placed?

[1 mark]

.....

4 (c) Some children have kidney disease. Kidney disease cannot be cured.
In the future, scientists could make a healthy clone of a child with kidney disease.
One kidney could then be transplanted from the cloned child into the child with kidney disease. The cloned child would still live with only one remaining kidney.

Suggest **two** reasons why people might disagree with cloning a child to get a kidney for transplanting.

[2 marks]

1 .....

.....

2 .....

.....

8

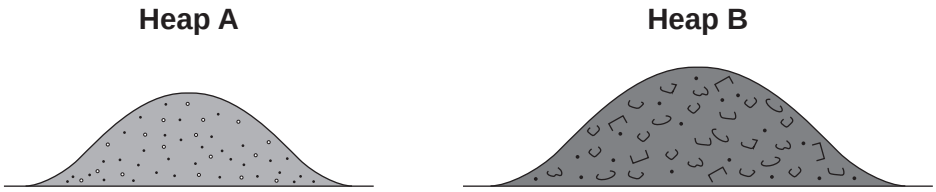
5 A gardener investigates if turning over the waste in a compost heap makes the waste decay more quickly.

The gardener:

- makes two separate heaps of garden waste, heap **A** and heap **B**
- turns over the material in heap **A** every 2 weeks
- does **not** turn over the material in heap **B**
- estimates the amount of decay in the two heaps after 6 months.

Figure 6 shows the two heaps of garden waste at the beginning of the investigation.

Figure 6



5 (a) Suggest **two** factors, other than time, the gardener should control to make the investigation fair.

[2 marks]

1 .....

.....

2 .....

.....

5 (b) Name **one** type of living thing that causes decay.

[1 mark]

.....

5 (c) **Table 3** shows the gardener's results.

Table 3

Compost heap	Estimated amount of decay
A	A lot
B	Very little

5 (c) (i) Why does turning over the material in heap **A** make the material decay more quickly?

[1 mark]

.....

.....

5 (c) (ii) The gardener puts decayed material around his plants to help them grow.

Suggest why the plants in a woodland grow well each year **without** material from compost heaps being added.

[2 marks]

.....

.....

.....

.....

6

Turn over for the next question

6 (a) Which term describes organisms that can tolerate very hot or very cold places?

Draw a ring around the correct answer.

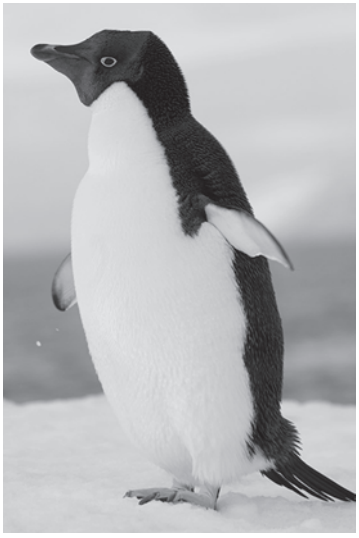
[1 mark]

an environmental species	**an extremophile species**	**an indicator species**

6 (b) **Figure 7** shows photographs of an Adelie penguin and a chinstrap penguin. Adelie penguins and chinstrap penguins live in the Antarctic at temperatures below 0 °C.

Figure 7

Adelie penguin

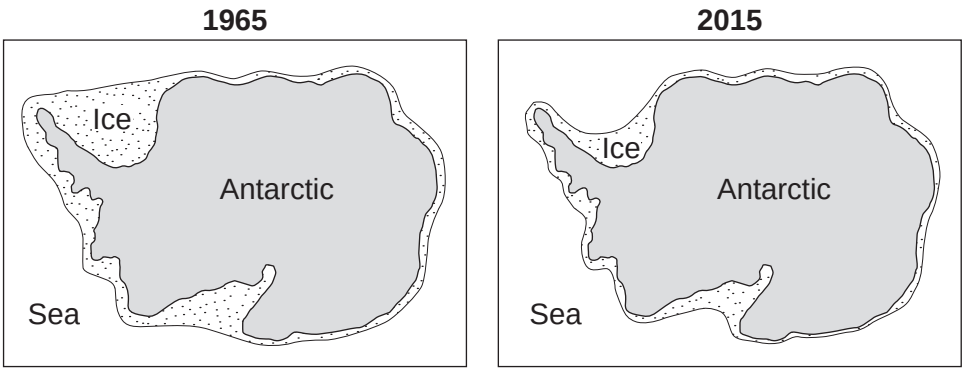


Chinstrap penguin

Adelie penguins spend most of their time on the ice around the Antarctic.
Chinstrap penguins live mainly in the sea around the ice.
Since 1965 the number of Adelie penguins has **decreased** by 6 million.

Figure 8 shows changes to the ice around the Antarctic over the past 50 years.

Figure 8



6 (b) (i) Use information from **Figure 8** to explain why the number of Adelie penguins has decreased since 1965.

[2 marks]

.....

.....

.....

.....

.....

.....

6 (b) (ii) Suggest what has happened to the number of chinstrap penguins since 1965.

Draw a ring around your answer. **increase / decrease**

Give a reason for your answer.

[1 mark]

.....

.....

6 (c) The number of penguins can be used to monitor changes in temperature of the environment.

Temperature readings could also be taken using a thermometer.

What is the advantage of using penguins, instead of a thermometer, to monitor changes in temperature of the environment?

Tick (✓) **one** box.

[1 mark]

Living organisms show long-term changes. ☐

Thermometers cannot measure temperatures below 0 °C. ☐

Thermometers do not give accurate readings. ☐

5

7 In the 1800s, Charles Darwin visited the Galapagos Islands.
On the islands he found many different species of bird called finches.
Darwin thought that all the different finch species had evolved from one species of finch that had reached the islands many years before.

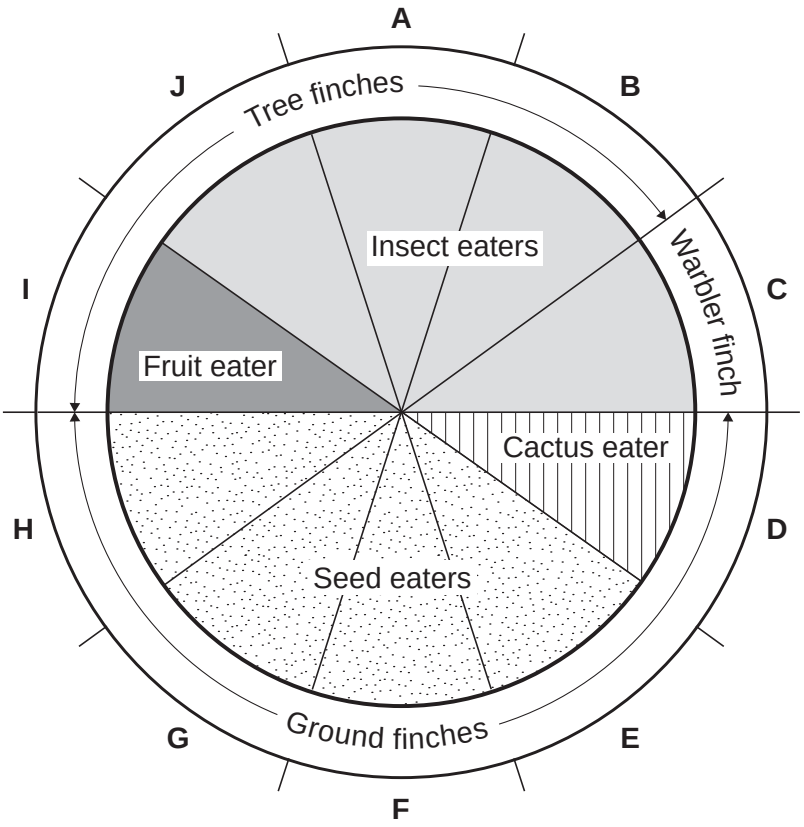
7 (a) Complete the following sentence.

[1 mark]

Darwin suggested the theory of evolution by natural ..... .

7 (b) **Figure 9** shows information about ten species of finch, **A – J**.

Figure 9



7 (b) (i) How many of the species of finch eat insects?

Draw a ring around the correct answer.

[1 mark]

4 **5** **6**

7 (b) (ii) Describe finch species **G**.

Use **only** information from **Figure 9**.

[2 marks]

.....

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.....

7 (c) When Darwin returned to the UK very few people believed his theory of evolution.

A different scientist suggested that the changes that occur in an organism during its lifetime can be inherited by its offspring.

What was the name of this scientist?

Tick (✓) **one** box.

[1 mark]

Lamarck ☐

Mendel ☐

Semmelweis ☐

5

Turn over for the next question

8 Many people in the UK take sleeping pills.

8 (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]

.....

8 (b) **Table 4** shows information about the development of a new sleeping pill.

Table 4

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

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

[1 mark]

..... years

8 (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]

.....

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

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

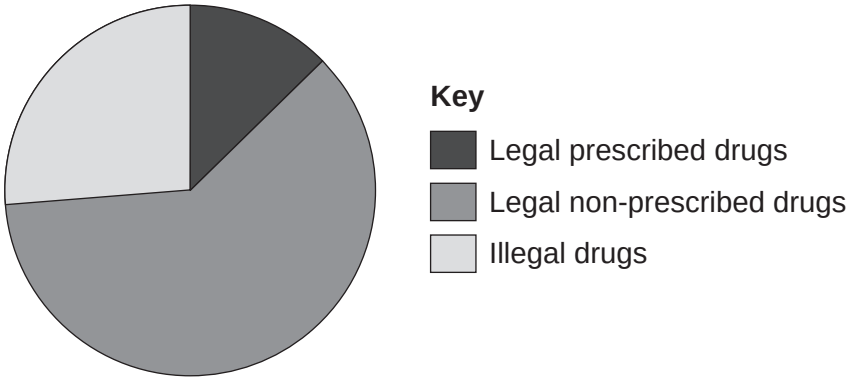
[1 mark]

.....

.....

8 (d) **Figure 10** shows the impact on the health of the population caused by drugs from different sources.

Figure 10



8 (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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8 (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]

.....

.....

7

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

9 (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 5 shows the results.

Table 5

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

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

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

[1 mark]

.....

.....

9 (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]

.....

.....

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

[1 mark]

.....

.....

9 (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]

.....

.....

Question 9 continues on the next page

9 (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

END OF QUESTIONS

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