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Rewarding Learning

**General Certificate of Secondary Education
2017**

Biology

Unit 1

Higher Tier

MV18

[GBY12]

FRIDAY 9 JUNE, MORNING

Time

1 hour 30 minutes, plus your additional time allowance.

Instructions to Candidates

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Complete in black ink only.
Answer **all twelve** questions.

Information for Candidates

The total mark for this paper is 100.
Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions **4** and **11(a)**.

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1 The table gives information about food molecules.

Complete the table. [4 marks]

Food molecules	Smaller molecules they are made from	Main function in the body
Carbohydrates		
Fats		Energy store
Proteins		Growth and repair

2 The diagram shows part of a food web found in a woodland.

hawk   fox   weasel

red squirrel   field mouse   rabbit
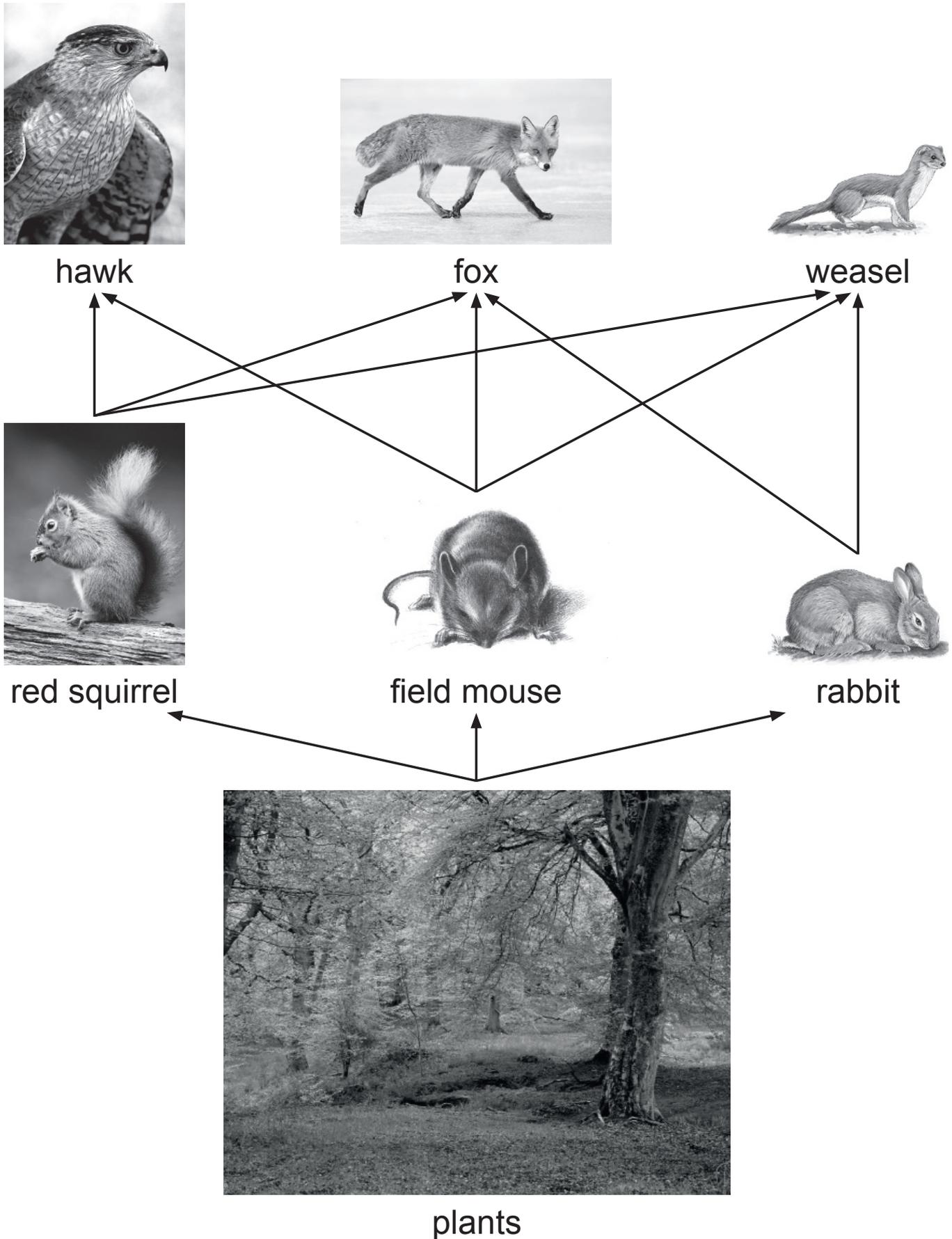
plants

(a) Describe the role of plants in this food web.   [3 marks]

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In this woodland, disease killed many red squirrels.

(b) Explain how this would affect the number of field mice.
[2 marks]

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3 The photograph shows how a plant responds to light from one direction.

Look at the photograph.

(a) Name the plant's response to light.   [1 mark]

_____

(b) The hormone auxin causes the plant to bend.

Explain how.   [2 marks]

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(c) Suggest why this response may benefit the plant.
[2 marks]

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4 A class of students set up an investigation into the effect of amylase and lipase enzymes on starch solution.

They set up two test tubes each containing $5\,cm^3$ of starch solution.

They added $2\,cm^3$ of amylase solution to tube **A**.

They added $2\,cm^3$ of lipase solution to tube **B**.

The students then placed tubes **A** and **B** in a water bath at 35°C for 30 minutes.

After 30 minutes the students added 5 drops of iodine to each tube.

The colour of the solution in each tube was recorded.

The table shows their results.

Tube	Enzyme present	Colour of starch solution after 30 minutes
A	amylase	yellow/brown
B	lipase	blue/black

Explain the results for amylase and lipase.

Use your knowledge of enzyme structure and action to support your answer.   [6 marks]

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

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5 The table shows the mass of some gases released into the atmosphere between 2009 and 2013 in the UK.

Gas	Mass of gas released/thousand tonnes				
	2009	**2010**	**2011**	**2012**	**2013**
Sulfur dioxide	1042	1040	1015	972	894
Nitrogen oxides	563	581	527	563	479

(a) Give **one similarity** and **one difference** in the trend in mass of sulfur dioxide and nitrogen oxides between 2009 and 2013.   [2 marks]

Similarity _____

_____

Difference _____

_____

_____

(b) Factories and power stations release large masses of sulfur dioxide into the atmosphere.

Describe how this sulfur dioxide is produced.
[2 marks]

_____

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(c) Describe how sulfur dioxide in the atmosphere can lead to acid rain. [2 marks]

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(d) Describe and explain how acid rain affects the biodiversity of a forest ecosystem. [2 marks]

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6 Classification is used to identify different species of organisms.

(a) What is a species?   [2 marks]

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_____

(b) The key (opposite on page 13) can be used to classify organisms into five kingdoms.
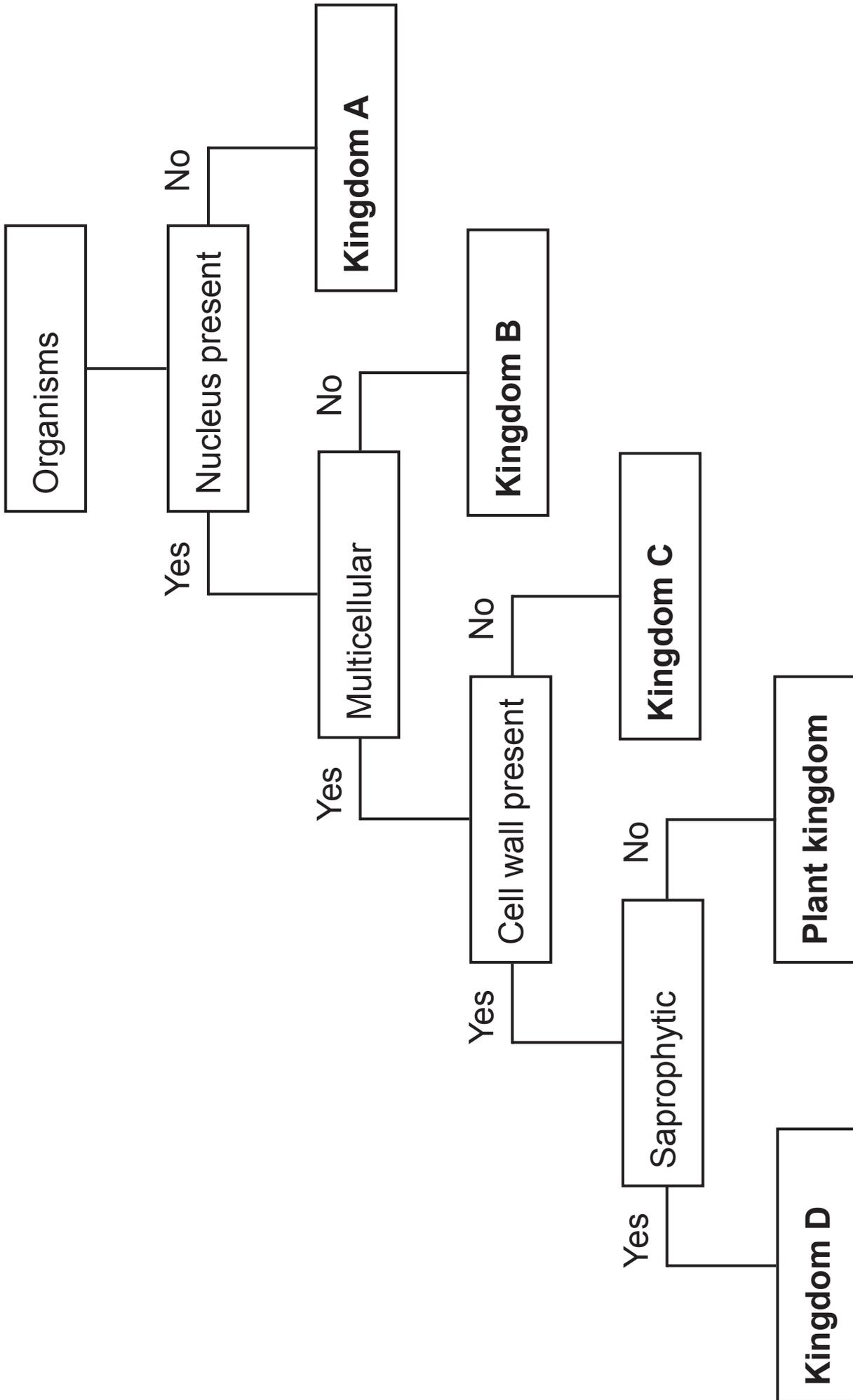
Use the key to identify the kingdoms **A**, **B**, **C** and **D**. [4 marks]

Kingdom **A** _____

Kingdom **B** _____

Kingdom **C** _____

Kingdom **D** _____

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Organisms
    |
Nucleus present ── No ──> Kingdom A
    |
   Yes
    |
Multicellular ── No ──> Kingdom B
    |
   Yes
    |
Cell wall present ── No ──> Kingdom C
    |
   Yes
    |
Saprophytic ── No ──> Plant kingdom
    |
   Yes
    |
Kingdom D
```

(c) Give **two other** uses for classification.
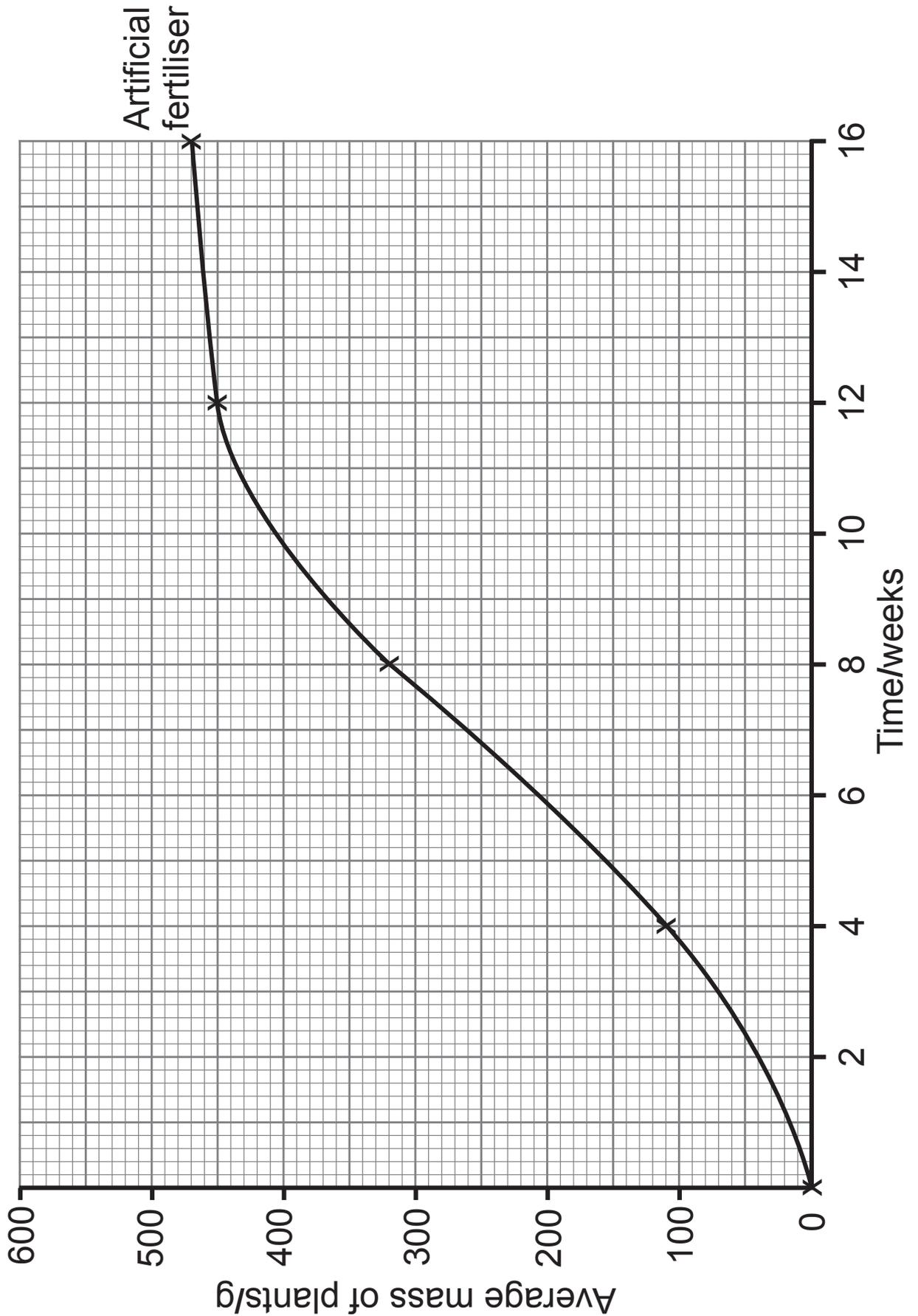[1 mark for each]

1. _____

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2. _____

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7 **(a)** An experiment was set up to investigate the growth of two crops of a plant of the same species under different conditions.

Artificial fertiliser was applied to one and manure to the other.

The table shows the results.

Time/weeks	Average mass of plants/g	
	Artificial fertiliser	Manure
0	0	0
4	110	50
8	320	160
12	450	340
16	470	450

(i) Complete the graph by plotting the results for manure. [3 marks]

The plants must reach an average mass of 400 g before they can be harvested.

(ii) How long does it take the plants to reach this mass? [1 mark for each]

Artificial fertiliser _____ weeks

Manure _____ weeks

(iii) Explain why the plants grow slower when manure is applied.   [2 marks]

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_____

_____

(b) Suggest why adding manure is beneficial to the soil. [1 mark]

_____

_____

_____

(c) Give **two** advantages to the grower of using artificial fertiliser.   [2 marks]

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(d) The overuse of fertilisers may result in mineral enrichment of lakes.

   (i) Describe how the minerals in the fertilisers reach the lakes.   [1 mark]

   _____

   _____

   (ii) Describe and explain the effect of mineral enrichment on the living organisms in the lakes.
   [4 marks]

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8 When the blood glucose concentration rises the pancreas helps return it to its normal concentration.

(a) Describe the role of the **pancreas** in lowering the blood glucose concentration.   [2 marks]

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(b) Describe how the liver helps lower the blood glucose concentration.   [3 marks]

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(c) Name the hormone which helps correct the blood glucose concentration when it falls too low.   [1 mark]

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9 Doctors use Body Mass Index (BMI) to check if a person has a healthy weight.

(a) Complete the equation for the calculation of BMI by writing in the box.   [2 marks]

$$\textbf{BMI} = \frac{\text{Mass/g}}{\boxed{}}$$

(b) The graph (opposite on page 21) shows the range of BMI values for boys aged 2 years to 20 years in a population.

The 50th percentile shows the average BMI for the population.

Boys with a BMI on or above the 95th percentile are described as obese.

(i) What is the average BMI of a 10-year-old boy? [1 mark]

_____

(ii) Describe the trend in the BMI for boys between 2 and 20 years.   [2 marks]

_____

_____

_____

21

[Turn over

(iii) From what age would a boy with a **BMI** of 20 or above be described as obese?   [1 mark]

_____

(iv) Describe how an energy imbalance can lead to obesity.   [1 mark]

_____

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(v) Explain why obesity is a problem to both the individual and to society.   [2 marks]

Individual _____

_____

Society _____

_____

**10** The image shows a junction between two neurones
A and **B**.
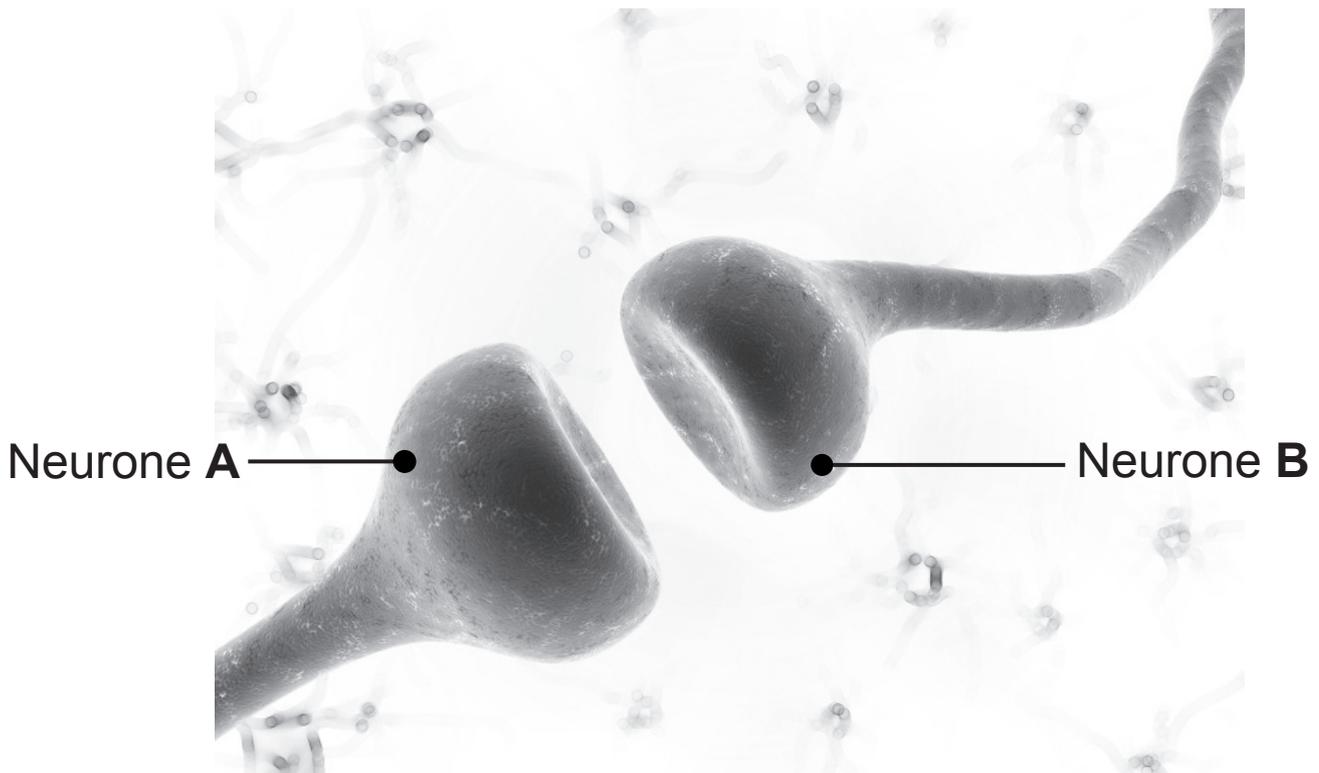
Neurone **A** ——————●   ●—————— Neurone **B**

(a) (i) Name this junction.   [1 mark]

_____

(ii) Describe how a nerve impulse travels from neurone
A to neurone **B**.   [4 marks]

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(b) The diagram shows a normal neurone and a damaged neurone from a person suffering from multiple sclerosis.

Normal neurone   **Damaged neurone**

branching ends

cell body

neurone fibre

insulating sheath
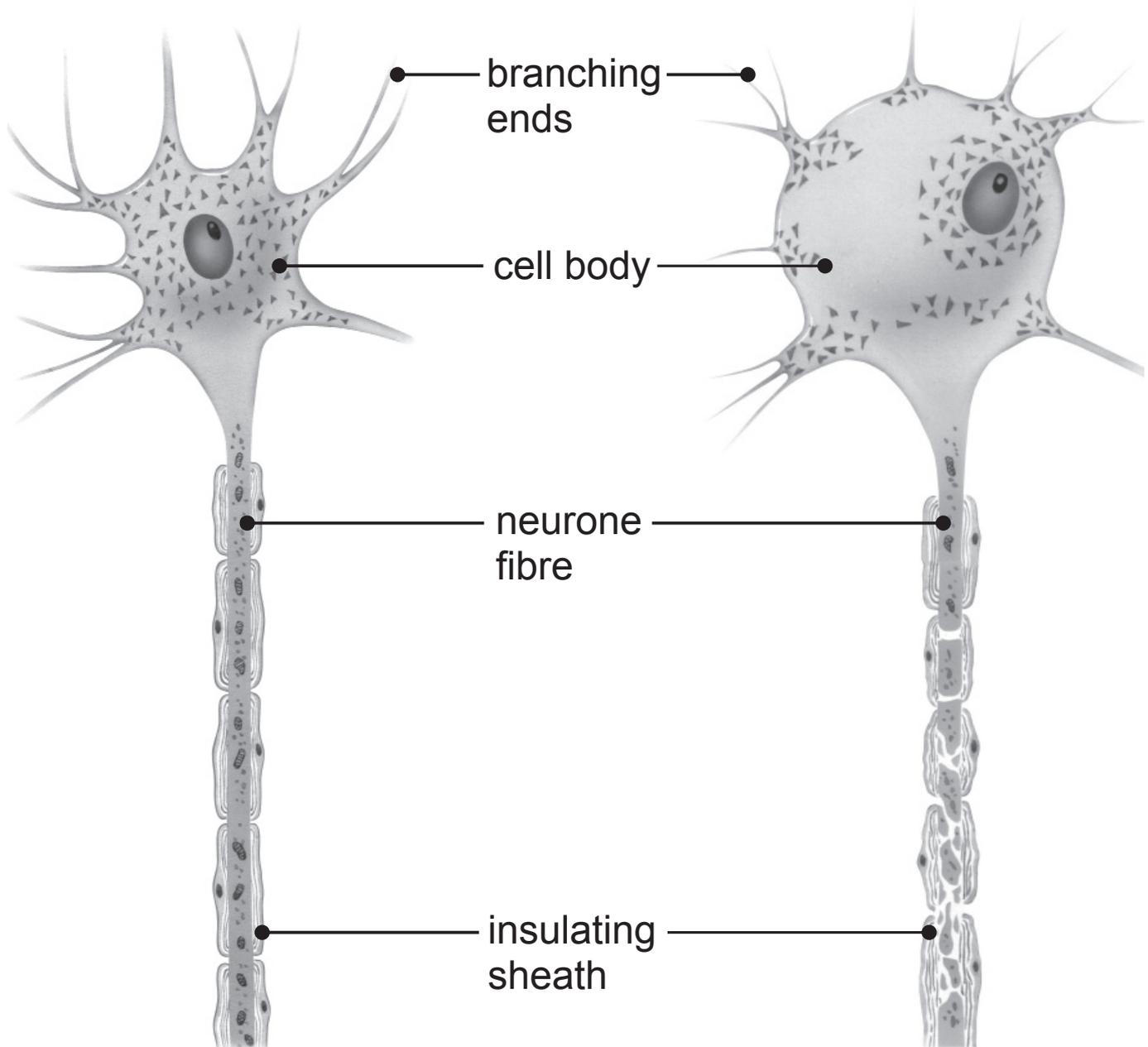
(i) Describe how these neurones are adapted to make connections with other neurones.   [1 mark]

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_____

(ii) Describe **two** ways multiple sclerosis damages the structure of a neurone. [2 marks]
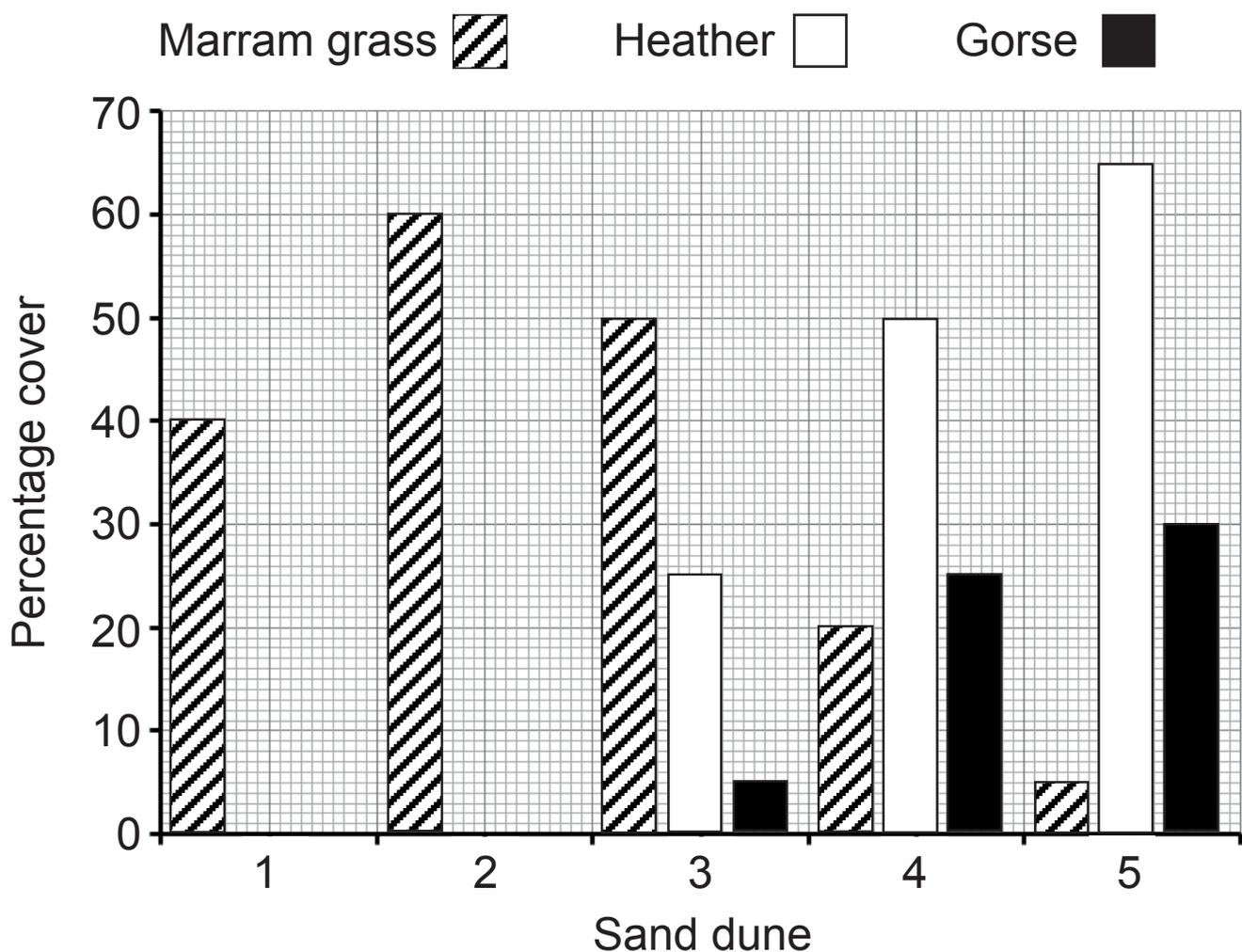
1. _____

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2. _____

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(iii) Suggest **one** effect of multiple sclerosis on the function of the nervous system. [1 mark]

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11 Sand dunes are found at the top of many beaches.
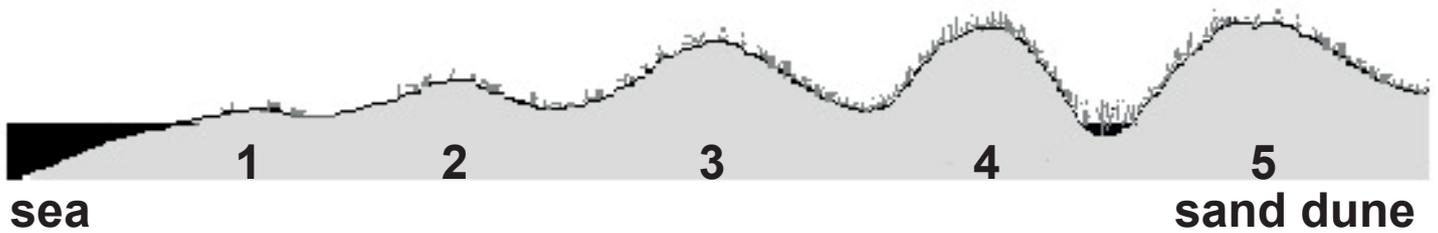
sea   **sand dune**

Students carried out an investigation to measure the percentage cover of three plant species, marram grass, heather and gorse growing on five sand dunes.

The graph shows the results.

(a) Describe the trends in the distribution of the three plant species from sand dune 1 to sand dune 5.

Explain which of the five dunes had the most competition.   [6 marks]

Use evidence from the graphs to support your answer.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

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(b) The students also measured some abiotic factors on each sand dune.

The table shows the results.

Sand dune	Abiotic factor/arbitrary units			
	Soil water	Wind speed	Soil humus	Light intensity
1	6	15	4	16
2	7	7	5	22
3	15	18	9	19
4	28	12	22	18
5	42	17	37	25

(i) Use information from the graph on page 26 and the table to suggest which of the abiotic factors affect the growth of heather and gorse.

Place a tick in the appropriate boxes.   [2 marks]

Soil water ☐   Soil humus ☐

Wind speed ☐   Light intensity ☐

(ii) Suggest an explanation for the change in the humus content of the soil on sand dunes 3, 4 and 5.
[2 marks]

Use evidence from the graph and the table to support your answer.

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12 (a) Plants use nitrates for growth.

(i) Describe how plants absorb nitrates.   [3 marks]

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(ii) Describe how plants are adapted to absorb nitrates.
[2 marks]

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(b) A student set up an experiment to investigate the effect of waterlogging on some of the processes in the nitrogen cycle.

He set up two beakers as shown in the diagrams.
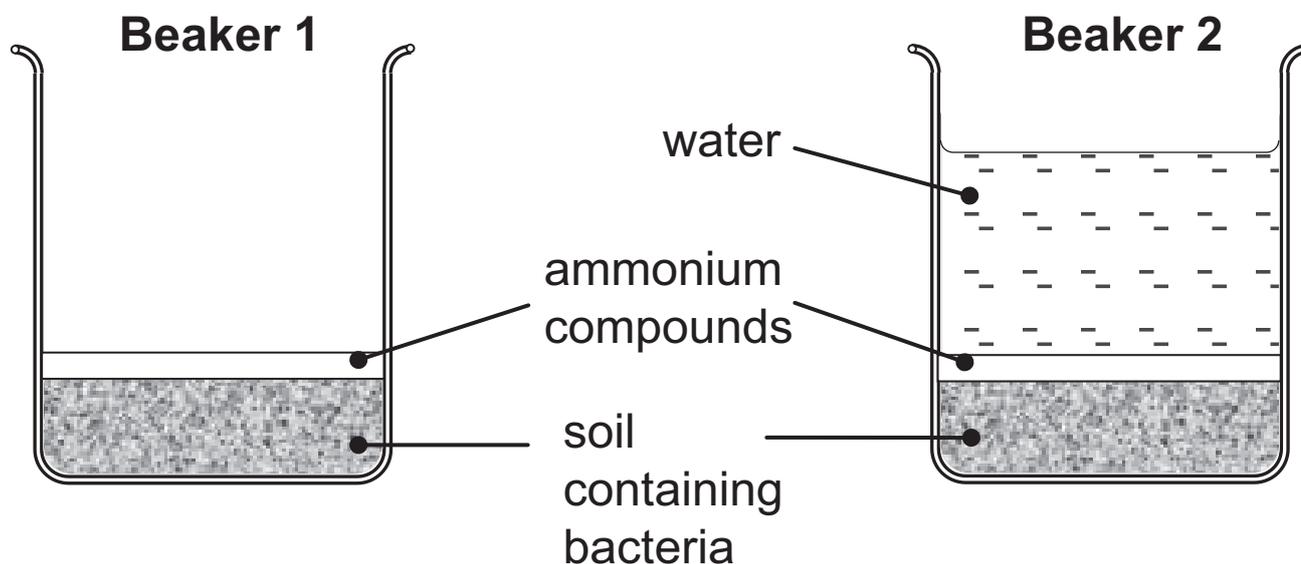
The student measured the concentration of ions in each beaker at the start and after 24 hours.
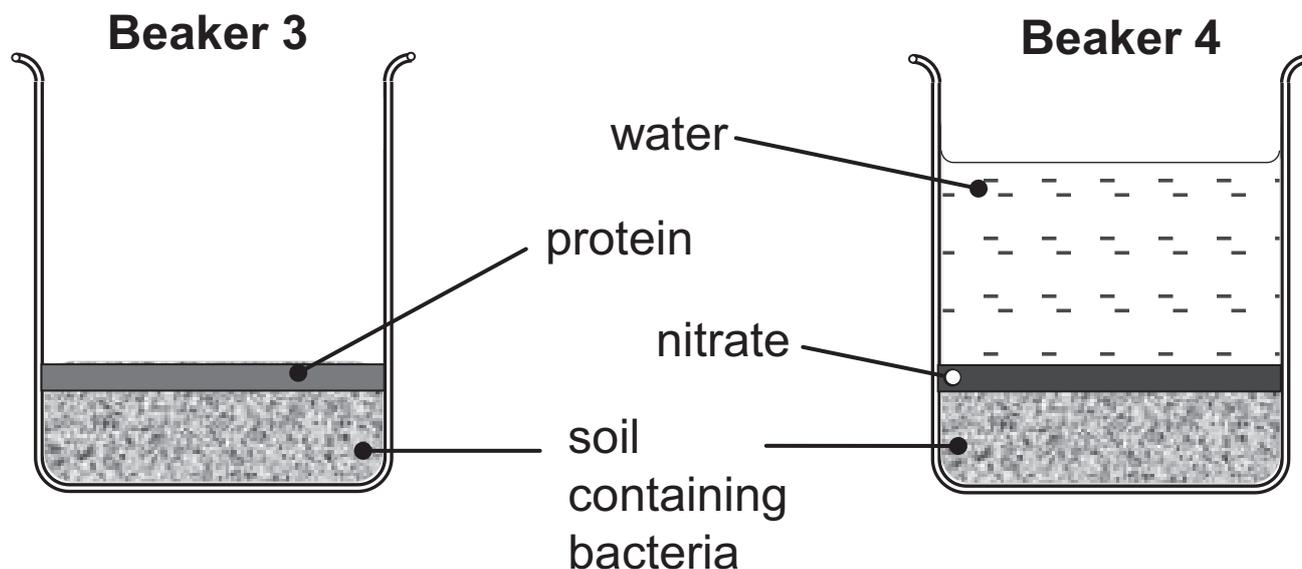
The table shows the results.

| Beaker | Ion | Concentration of ions/ arbitrary units | |
		at start	after 24 hours
1	ammonium	600	550
	nitrates	90	140
2	ammonium	600	595
	nitrates	90	95

In **beaker 1** the ammonium compounds are being converted to nitrates.

(i) Name this process.   [1 mark]

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(ii) Use the results for **beakers 1 and 2** to describe and explain the effect of waterlogging on this process.
[3 marks]

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The student set up two more beakers as shown in the diagrams.

Beaker 3

Beaker 4

water

protein

nitrate

soil
containing
bacteria

The student measured the concentration of ions in each of these beakers at the start and after 24 hours.

The table shows the results.

Beaker	Ion	Concentration of ions/ arbitrary units	
		at start	after 24 hours
3	ammonium	30	120
	nitrates	90	90
4	ammonium	30	30
	nitrates	200	120

34

(iii) Explain the results for **beakers 3 and 4**, and name the process occurring in each beaker.
[3 marks for each]

Use **data** from the table to support your answer.

Beaker 3 _____

_____

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_____

_____

Beaker 4 _____

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THIS IS THE END OF THE QUESTION PAPER

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