



General Certificate of Secondary Education
2023–2024

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit B1

Higher Tier



[GDW12]

GDW12

FRIDAY 17 MAY 2024, MORNING

TIME

1 hour.

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.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Question 2.

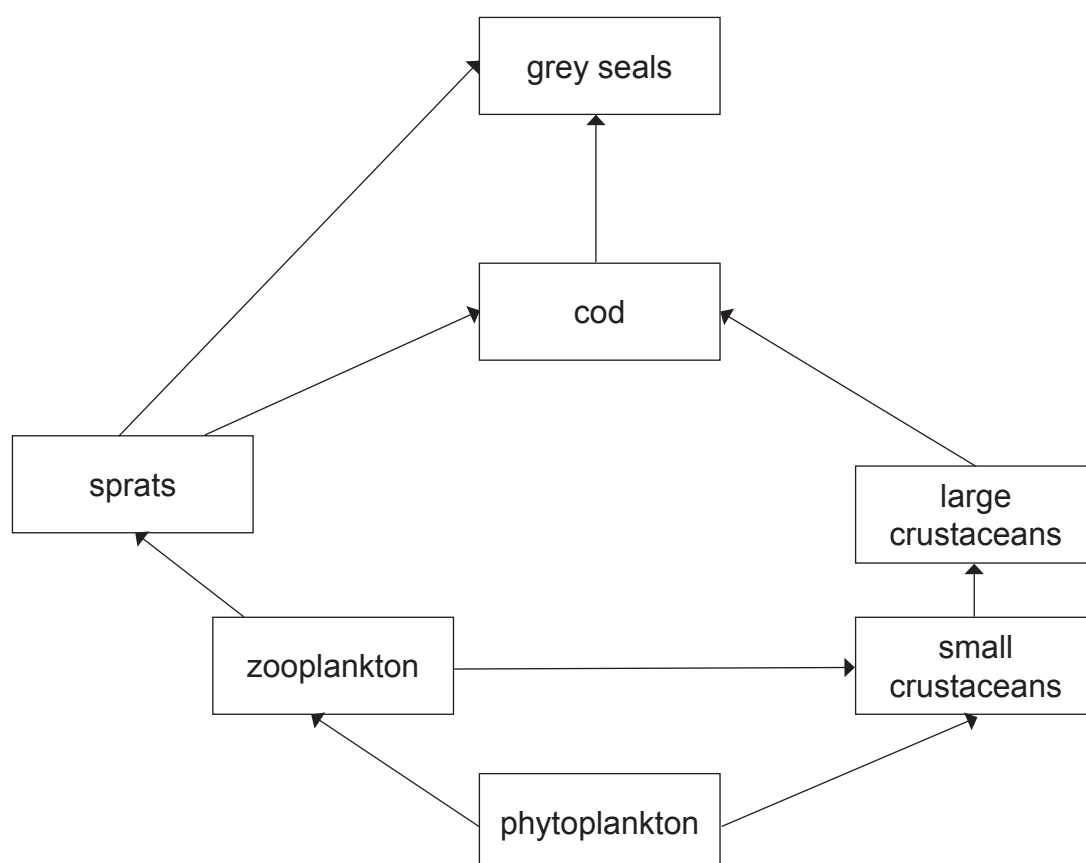


- 1 Grey seals are a protected species that live in the seas around Ireland. Measures have been put in place to conserve the population of grey seals.

The photograph shows a grey seal.



- (a) The diagram shows a food web for grey seals. Cod is a type of fish that is eaten by people.



- (i) Complete the table by writing a tick (✓) in the empty boxes to show the correct position(s) for some types of organism in this food web.

Two of these types of organism feed at **two** positions in this food web.

Type of organism	Producer	Primary consumer	Secondary consumer	Tertiary consumer	Quaternary consumer
small crustaceans					
cod					
phytoplankton					
sprats					

[4]

- (ii) Name a type of organism in the food web that has only one food source.

[1]

The population of **small crustaceans** decreased suddenly.

- (iii) Explain why this could cause either:

- an increase in the phytoplankton population or
- a decrease in the phytoplankton population.

an increase in the phytoplankton population _____

a decrease in the phytoplankton population _____

[3]

[Turn over



(iv) Name the type of organism that competes with the cod for food.

[1]

(b) The number of grey seals in the seas around Ireland has been monitored for a number of years.

In 2003, 1309 grey seals were counted.

In 2017, 3698 grey seals were counted.

(i) Calculate the percentage (%) increase in the number of grey seals between 2003 and 2017.

Show your working.

Give your answer to the nearest whole number.

_____ % [4]

(ii) Suggest why some fishermen are against conservation measures that protect the grey seals.

[2]



2 Root hair cells are specialised cells found in the roots of plants. They have adaptations to help them in their role.

- Name **one** structure, absent from root hair cells, that is present in palisade mesophyll cells in a leaf.
- Give the role of root hair cells.
- Describe and explain how root hair cells are adapted for their role.

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

Structure absent from root hair cells _____

Role of root hair cells _____

Description and explanation of how root hair cells are adapted for their role

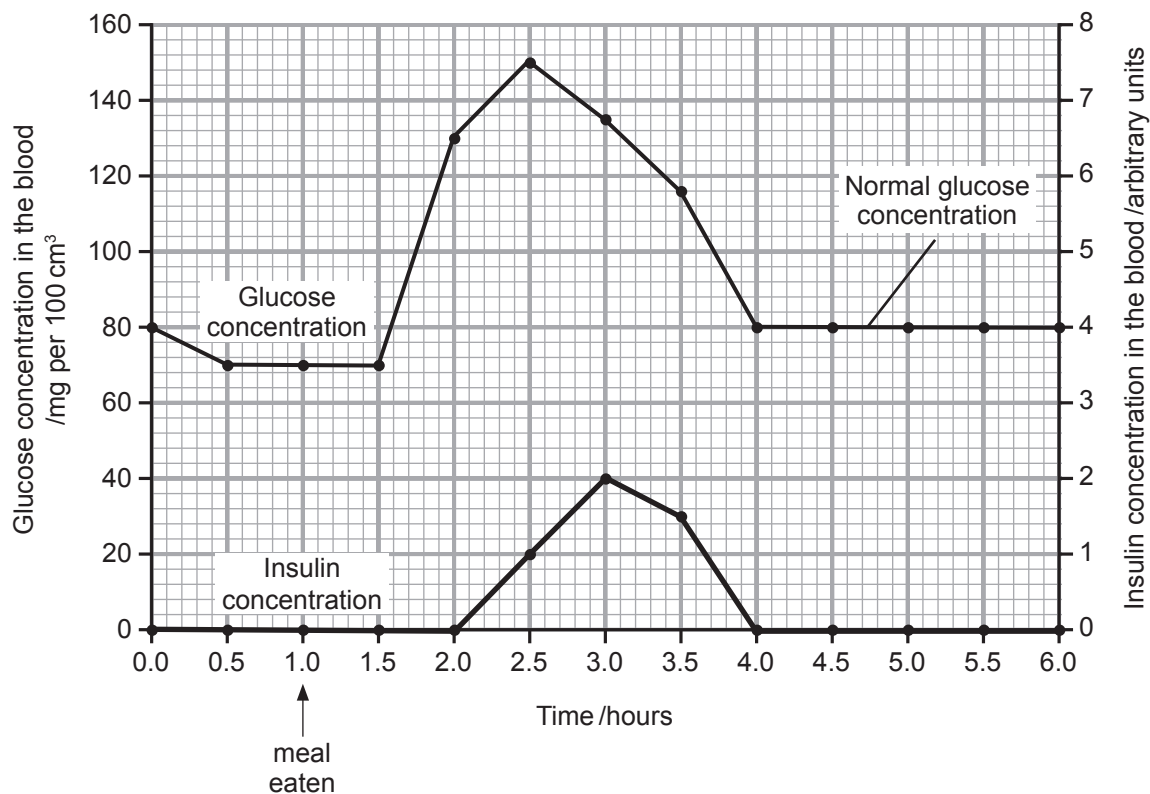
[6]

[Turn over



- 3 The graphs show the glucose and insulin concentrations in the blood of a healthy woman before and after she ate a meal.

The y axis on the **left-hand** side shows the **glucose** concentration in the blood.
The y axis on the **right-hand** side shows the **insulin** concentration in the blood.



- (a) Use the graph to give the lowest glucose concentration in this woman's blood.

_____ mg per 100 cm³ [1]



- (b) Suggest why there is a time delay between the woman eating the meal and the glucose concentration in her blood increasing.

[2]

- (c) (i) Insulin was first released at 2 hours.
After insulin was first released, how long did it take for the glucose concentration in the woman's blood to return to normal?

_____ hours [1]

- (ii) Give **two** ways that insulin lowers the glucose concentration in the blood.

1. _____

2. _____

[2]

[Turn over



(d) Diabetes is a condition in which the blood glucose control mechanism fails.

(i) Which of the following could help reduce the chances of a person developing Type 2 diabetes?

Circle the **two** correct answers in the list.

doing less exercise	doing the same amount of exercise	doing more exercise
consuming less sugar	consuming the same amount of sugar	consuming more sugar

[2]

(ii) Diabetes can have long-term effects on the body.

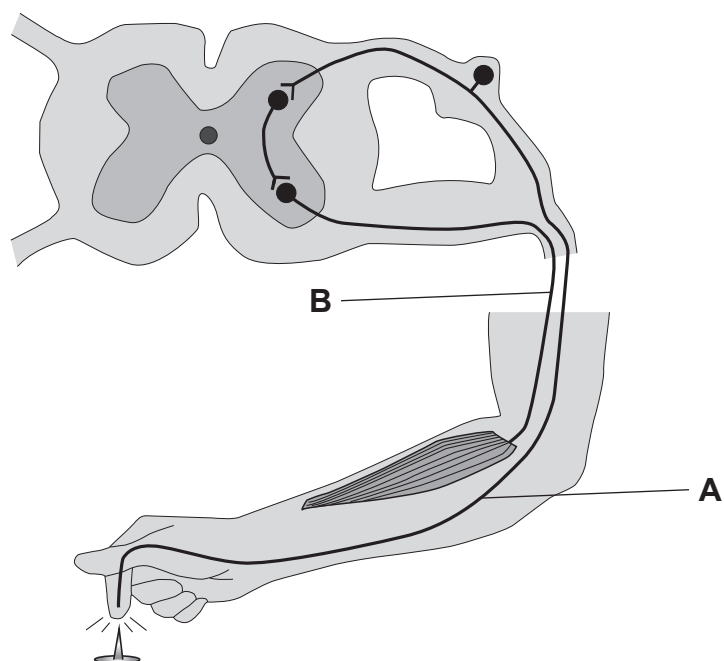
Circle the long-term effect of diabetes in the list.

hair damage	kidney failure	muscle weakness
-------------	----------------	-----------------

[1]



4 The diagram shows a reflex arc.



(a) Name neurones **A** and **B**.

A _____

B _____

[2]

(b) What is meant by a synapse?

_____ [1]

(c) The brain is **not** involved in a reflex arc.

Give **one** advantage of the brain not being involved in a reflex arc.

_____ [1]

[Turn over



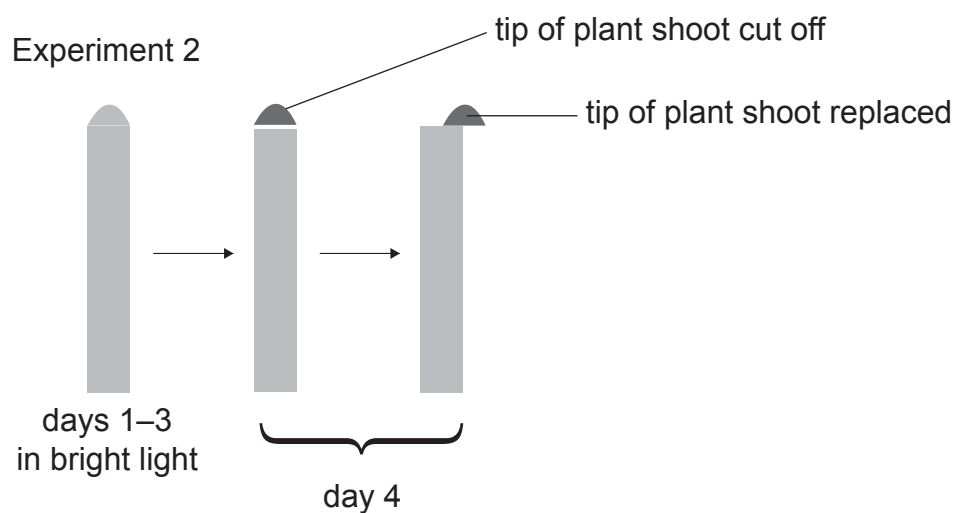
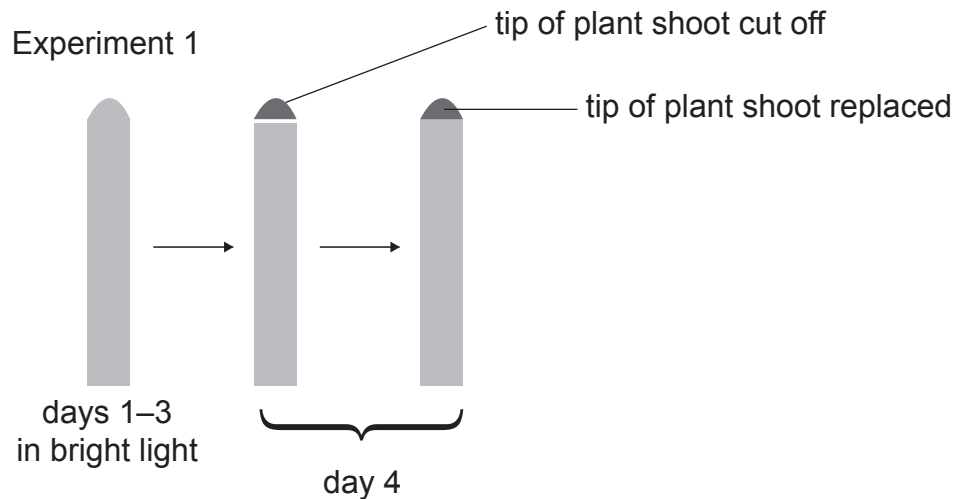
- 5 A student carried out two experiments with two identical plant shoots.

She left each plant shoot in bright light for three days and then cut off the tip of each shoot on day four.

She placed each tip back on top of the plant shoot in the positions shown in the diagrams.

The student left the shoots for another two days.

The diagrams show the set-up of the student's experiments.



The tables give statements of possible descriptions and explanations for the growth of the plant shoots at the **end** of the experiments.

Letter	Descriptions
A	shoot grew straight up
B	shoot bent to the right
C	shoot bent to the left

Letter	Explanations
D	more hormone diffused down the left side
E	more hormone diffused down the right side
F	hormone diffused equally down both sides
G	there was no cell elongation
H	there was more cell elongation on the right side
I	there was more cell elongation on the left side
J	there was even cell elongation on both sides

Complete the table below to describe and explain what happened to the plant shoots by the end of each experiment.

Choose the letters of the statements from the tables above.

Write the letters on the blank lines in the table below.

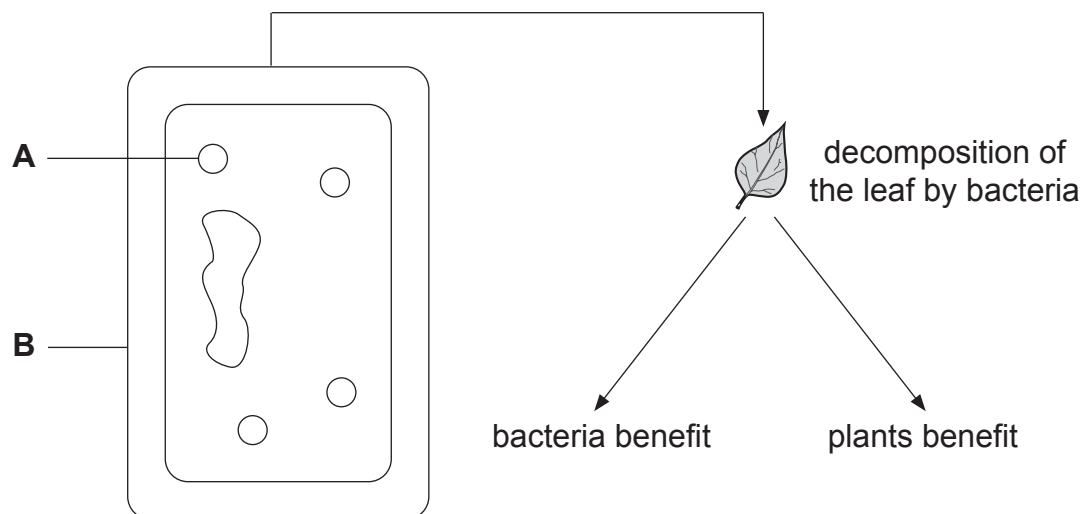
Experiment	Description	Explanations
1	_____	_____ and _____
2	_____	_____ and _____

[6]

[Turn over



- 6 The diagram shows one type of bacterium that carries out decomposition and a leaf that is decomposed by this type of bacterium.



- (a) Name structures **A** and **B**.

A _____

B _____

[2]

- (b) (i) Describe and explain how these bacteria carry out decomposition of a leaf.

[3]

- (ii) Name the type of nutrition that these decomposing bacteria carry out.

[1]



(c) How do plants benefit from the decomposition of the leaf?

[1]

(d) Other types of bacteria in soil include nitrogen bacteria.

Name the **type** of nitrogen bacteria that convert the products of decomposition of the leaf into nitrates.

[1]

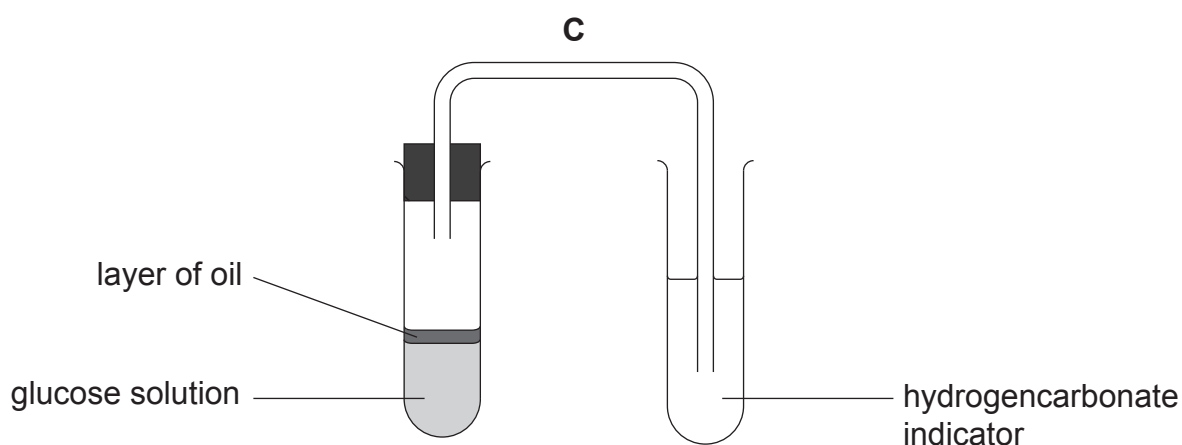
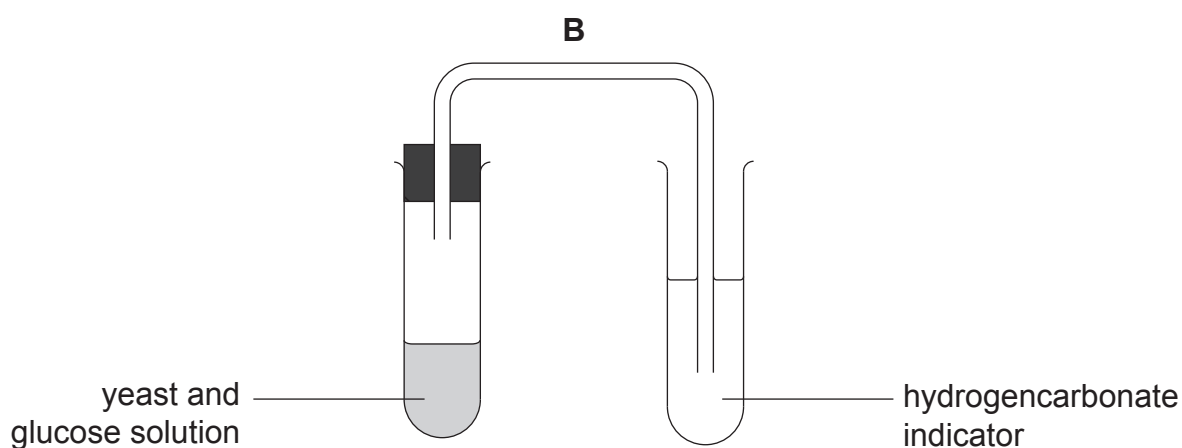
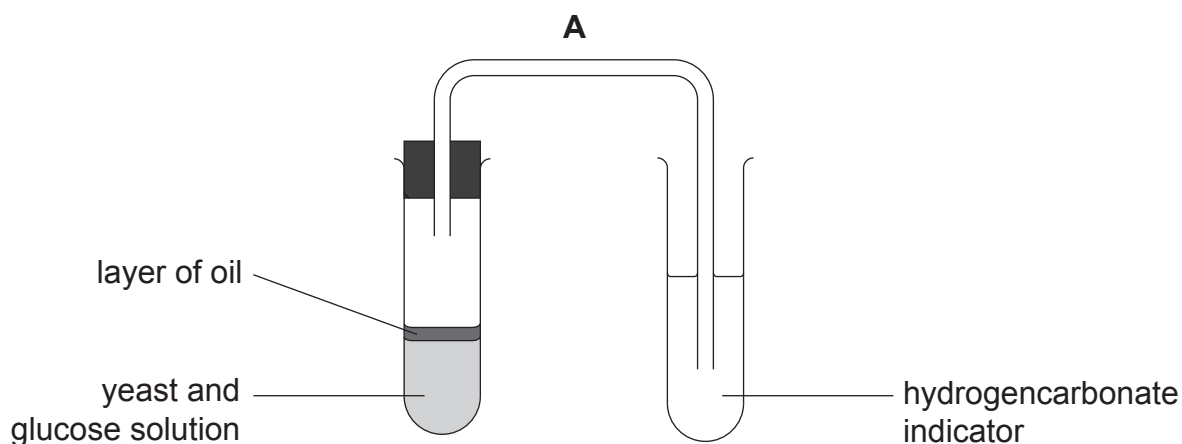
[Turn over



- 7 A student carried out three experiments **A**, **B** and **C** to investigate respiration in yeast.

The experiments were all carried out at room temperature.

The diagrams show the set-up of the student's experiments.



(a) Complete the table to show:

- whether each experiment investigates aerobic, anaerobic or no respiration
- the **final** colour of the hydrogencarbonate indicator in each experiment.

Experiment	Respiration	Final colour of hydrogencarbonate indicator
A		
B		
C		

[5]

(b) Name the substance that causes a change in the colour of hydrogencarbonate indicator.

[1]

[Turn over



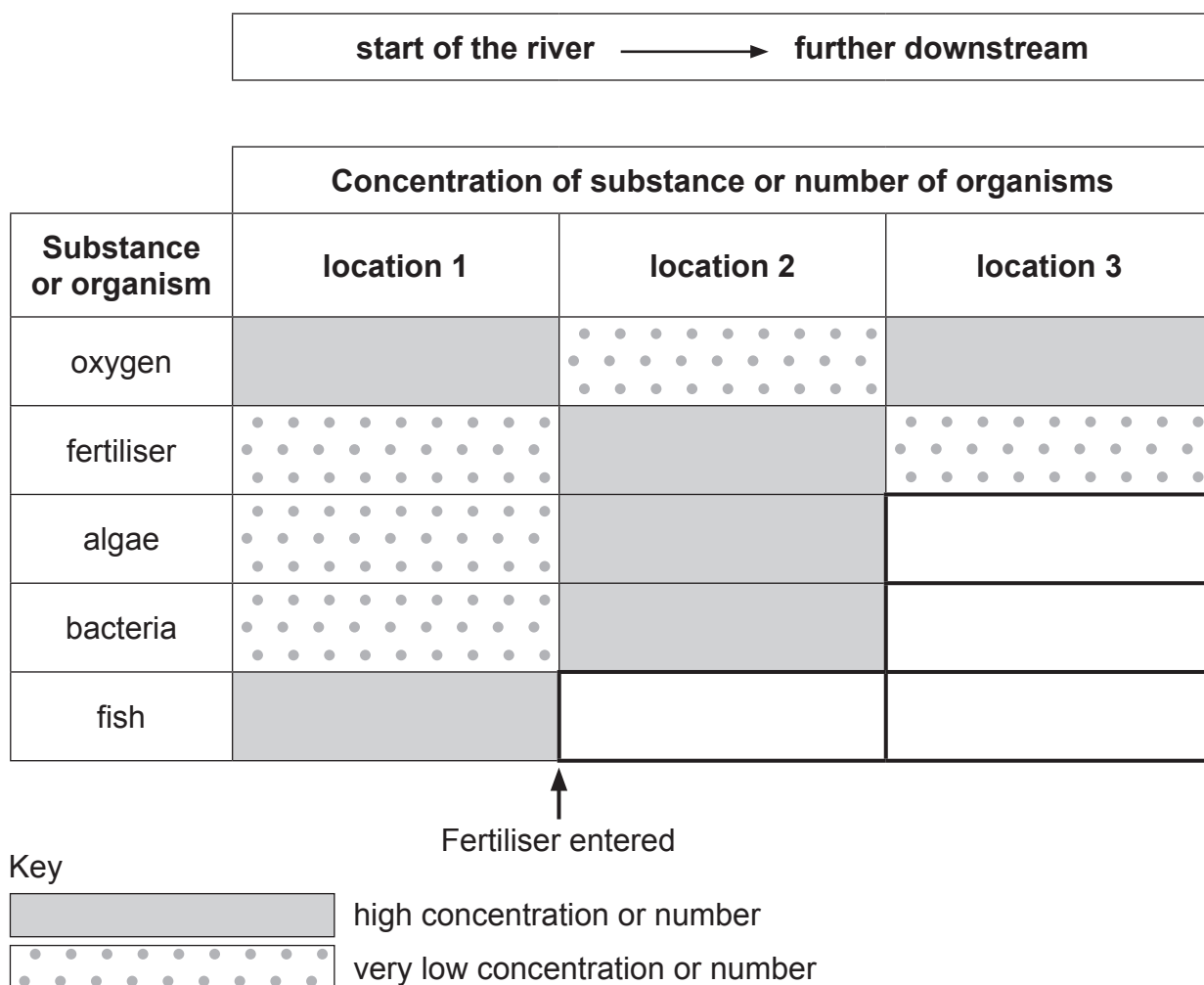
8 Fertiliser is one form of pollution that can cause eutrophication in a river.

(a) Give **one other** form of pollution that can cause eutrophication.

[1]

The diagram shows the concentration of substances and number of organisms at three locations along a river.

Fertiliser entered the river between location 1 and location 2.



(b) (i) Explain why the algae numbers are high after the fertiliser entered the river.

[2]

(ii) Explain the reason for the very low concentration of oxygen at location 2.

[3]

The river had **recovered** at location 3.

(c) Use the key to complete the diagram to show the numbers of:

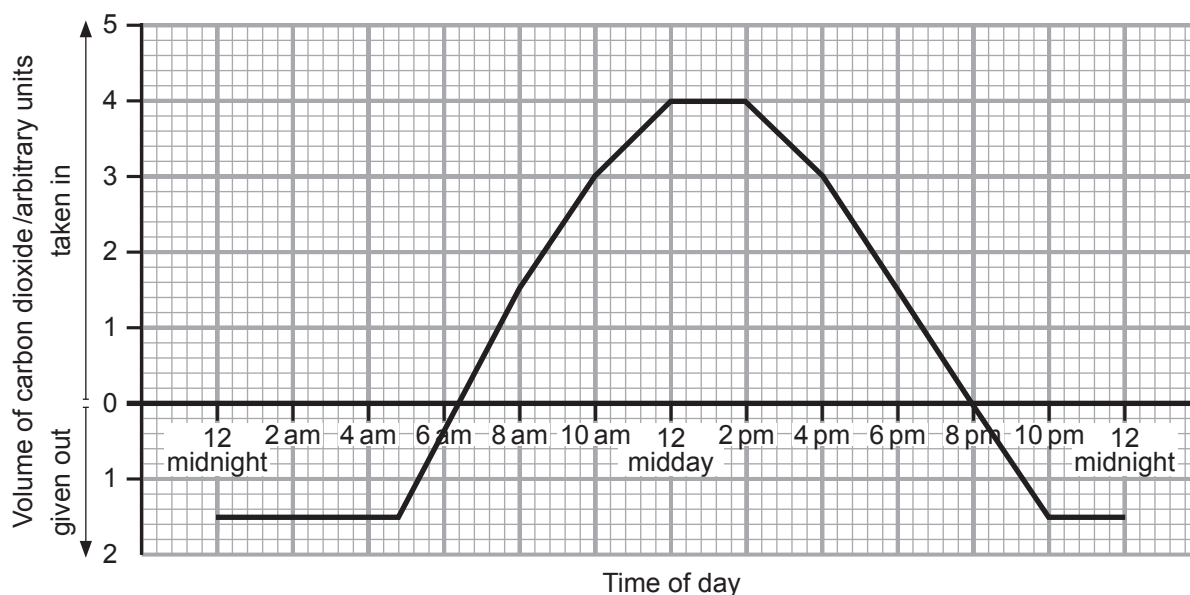
- algae and bacteria at location 3
- fish at locations 2 and 3.

[2]

[Turn over



- 9 Photosynthesis and respiration are processes that occur in plants. The graph below shows the volume of carbon dioxide taken in and given out by a plant in one day during **summer**.



Use the statements in lists 1, 2 and 3 to answer part (a).

List 1

Statements about photosynthesis and respiration	
1	Only photosynthesis occurs
2	Only respiration occurs
3	The rate of photosynthesis is greater than the rate of respiration
4	The rate of respiration is greater than the rate of photosynthesis
5	The rate of photosynthesis is the same as the rate of respiration

List 2

Statements about carbon dioxide	
6	More carbon dioxide is given out than taken in
7	More carbon dioxide is taken in than given out
8	The same volume of carbon dioxide is given out as taken in

List 3

Statements about time of day	
9	It is dawn
10	It is dusk (sun is setting)
11	It is night time



- (a) Use the graph on the opposite page to complete the table to explain what is happening at **4 am** and **9 pm** in one day during summer.

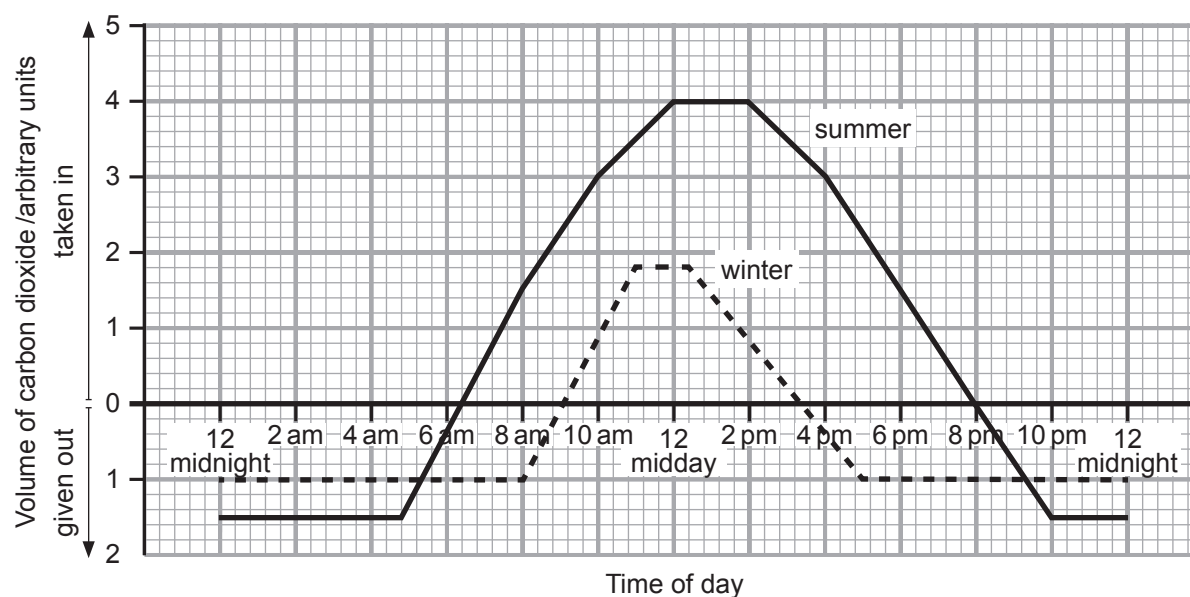
Choose the number of **one** statement from **List 1**, the number of **one** statement from **List 2** and the number of **one** statement from **List 3** for each time.

Each number may be used once, more than once or not at all.

Time	Number of statement from		
	List 1	List 2	List 3
4 am			
9 pm			

[6]

The graph below shows the volume of carbon dioxide taken in and given out by the **same** plant in one day during summer **and** one day during winter.



[Turn over



- (b) Use the graph on the previous page to explain why there is less carbon dioxide taken in by the plant during one day in **winter** compared to one day in summer.

[2]

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Sources:

Question 1: ©Getty Images

Question 1(b): *The Skipper* 13th Feb 2020 Article *the Fishermen and the Seals* (by Niall Duffy) Article 17 Reports
National Parks and Wildlife Services Ireland p 598–604

Question 3: Principal Examiner

Question 4: Principal Examiner

Question 5: Principal Examiner

Question 6: Principal Examiner

Question 7: Principal Examiner

Question 8: Principal Examiner

Question 9: Principal Examiner

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Examiner Number

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