Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2019

Biology

Unit 1
Higher Tier

[GBL12]

GBL12

FRIDAY 24 MAY, AFTERNOON

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

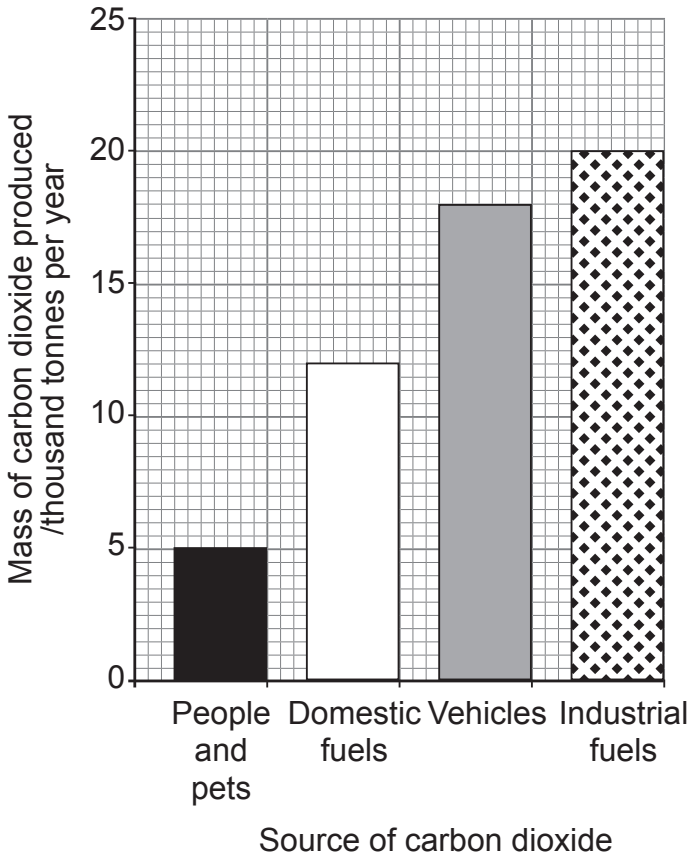
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. **Do not write with a gel pen.**
Answer **all ten** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is **75**.
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 **9**.

1 **(a)** A local council monitored the mass of carbon dioxide produced by different sources over a year.

The graph shows the results.



Source: Principal Examiner

Look at the graph.

(i) Calculate the **total mass** of carbon dioxide from all sources.

Show your working.

_____ thousand tonnes per year [2]

(ii) Calculate the **percentage** of the total carbon dioxide produced by industrial fuels.

Give your answer to **one** decimal place.

Show your working.

_____ % [2]

After monitoring the carbon dioxide produced for a year, the council decided that planting more trees would help reduce the mass of carbon dioxide in the atmosphere.

(b) Explain how planting more trees reduces the mass of carbon dioxide in the atmosphere.

_____

_____

_____

_____

_____

_____

_____ [2]

(c) Describe and explain how planting trees could affect biodiversity.

_____

_____

_____

_____ [2]

[Turn over

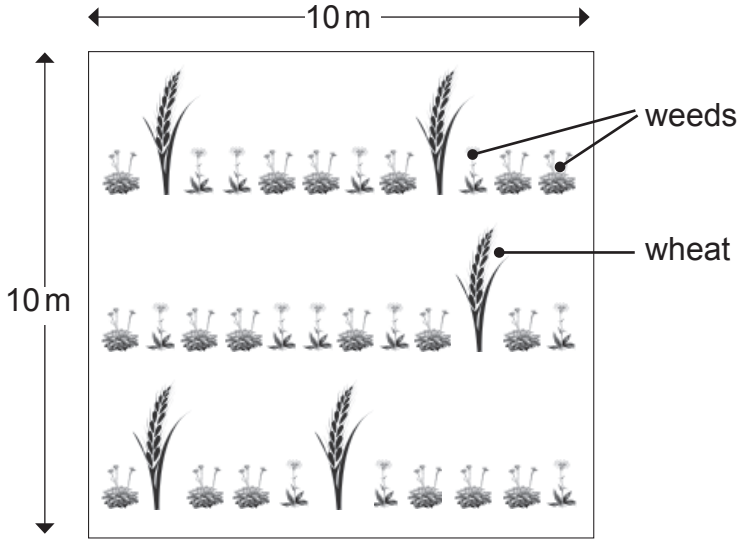
2 Scientists investigated the effect of weeds on the growth of wheat.

They cleared the weeds from five plots of land (**A**–**E**), each measuring 10 m × 10 m.

They planted wheat in each plot and, while the wheat was growing, kept each plot clear of weeds for different lengths of time.

After 20 weeks the scientists harvested and weighed the weeds and the wheat in each plot.

The diagram shows plot **A** after 20 weeks of growth.



© Getty Images

The scientists then calculated the mass of plants per square metre for each plot.

The table shows their results.

Plot	Time plot is kept clear of weeds/weeks	Mass of plants/kg per m^2	
		Wheat	Weeds
A	0	0.05	0.30
B	5	0.15	0.20
C	10	0.12	0.10
D	15	0.25	0.05
E	20		0

After keeping plot **E** clear of weeds for 20 weeks the scientists harvested a total of 29 kg of wheat.

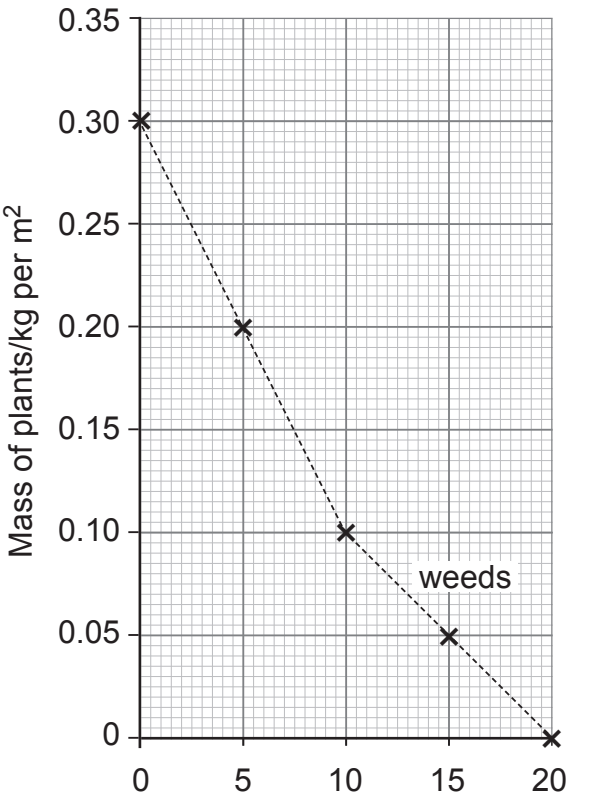
(a) Complete the table opposite by calculating **the mass of wheat per square metre** in plot **E** after 20 weeks.

Give your answer to **two** decimal places

Show your working.

Mass of wheat _____ kg per m^2 [2]

The graph shows the results for the mass of weeds per square metre over time.



(b) **Complete the graph** by:

- accurately plotting the results for the mass of the **wheat**
- drawing straight lines between the plotted points. [3]

[Turn over

(c) Describe the **overall** relationship between the mass of wheat and the mass of weeds.

_____

_____

_____ [1]

The scientists suggested the change in mass of the wheat crop was due to competition with the weeds for abiotic factors.

(d) Suggest **two** of these abiotic factors.

1. _____

2. _____ [2]

The scientists noticed that in one of the plots the leaves of the wheat were covered with leaf-eating insects.

(e) Suggest which plot contained the leaf-eating insects.

Use evidence from the graph to help explain your answer.

Plot _____ [1]

Explanation _____

_____

_____ [1]

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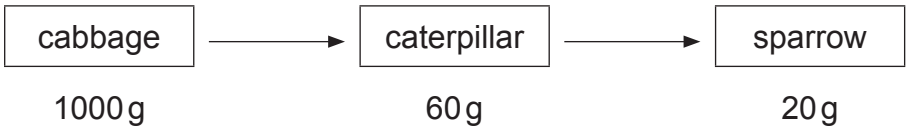
(Questions continue overleaf)

3 The diagram shows a food chain and the biomass of organisms at each trophic level.



(a) Draw a pyramid of biomass for this food chain by:

- plotting data, using 1 small square to represent 10 g.
- labelling the bars using the key.

[3]

The relationships in a food chain can also be shown by a pyramid of numbers.

(b) Give **one** advantage and **one** disadvantage of a pyramid of biomass rather than a pyramid of numbers.

Advantage _____

_____

_____ [1]

Disadvantage _____

_____

_____ [1]

4 **(a)** Name the part of the eye that bends light as it first enters the eye.

_____ [1]

(b) Describe and explain how the shape of the lens is changed when focusing on a near object.

_____

_____

_____

_____

_____ [3]

(c) The diagram shows how light entering the eye becomes an image in the brain.

(i) Name the part of the eye that is the receptor.

_____ [1]

(ii) Describe how the information from the receptor reaches the brain.

_____

_____

_____

_____ [2]

5 **(a)** Respiration is an example of a reaction which releases energy.

(i) Give the term used to describe reactions that release energy.

_____ [1]

The energy released by respiration can be used for heat, reproduction and active transport.

(ii) Give **one other** way organisms use the energy released by respiration.

_____ [1]

(b) Complete the table by giving the products of aerobic and anaerobic respiration in muscle and anaerobic respiration in yeast.

Use a ✓ to show if a product is present.

Use an ✘ to show if the product is not present.

Do not leave any boxes empty.

Type of respiration	**Products of respiration**			
	Carbon dioxide	Water	Lactic acid	Alcohol
Aerobic respiration in muscle		✓	✘	
Anaerobic respiration in muscle		✘		✘
Anaerobic respiration in yeast	✓	✘		

[3]

[Turn over

6 **(a)** Plants absorb magnesium ions through their roots.

(i) Name the specialised cells in the roots which absorb magnesium ions.

_____ [1]

(ii) Describe how these cells are adapted for their function.

_____

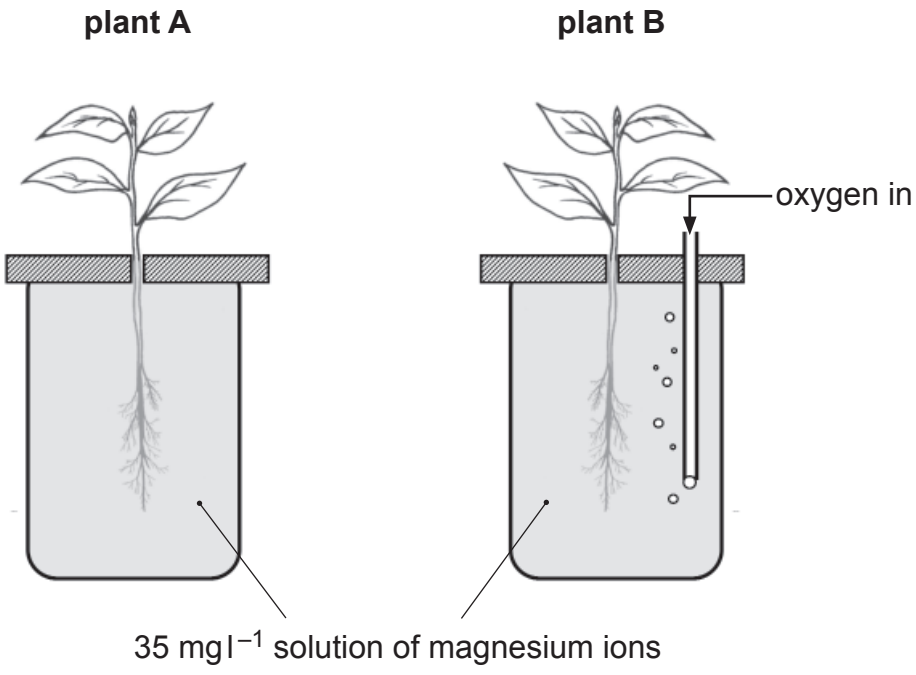
_____ [1]

(iii) Give the function of magnesium ions in plants.

_____

_____ [1]

(b) A scientist set up an experiment to investigate the absorption of magnesium ions in the roots of two plants.



Source: Chief Examiner

The concentration of magnesium ions in the solution was 35 mg l^{-1}.

The scientist measured the concentration of magnesium ions in the roots of each plant every hour for five hours.

The table shows his results.

Time/hours	Concentration of magnesium ions in the roots/mg l^{-1}	
	plant **A**	plant **B**
0	4	3
1	31	30
2	33	61
3	35	83
4	35	104
5	35	128

(i) Compare the results for plant **A** and plant **B** after five hours.

Use data to support your answer.

_____

_____

_____

_____ [2]

(ii) Suggest an explanation for the differences.

_____

_____

_____

_____

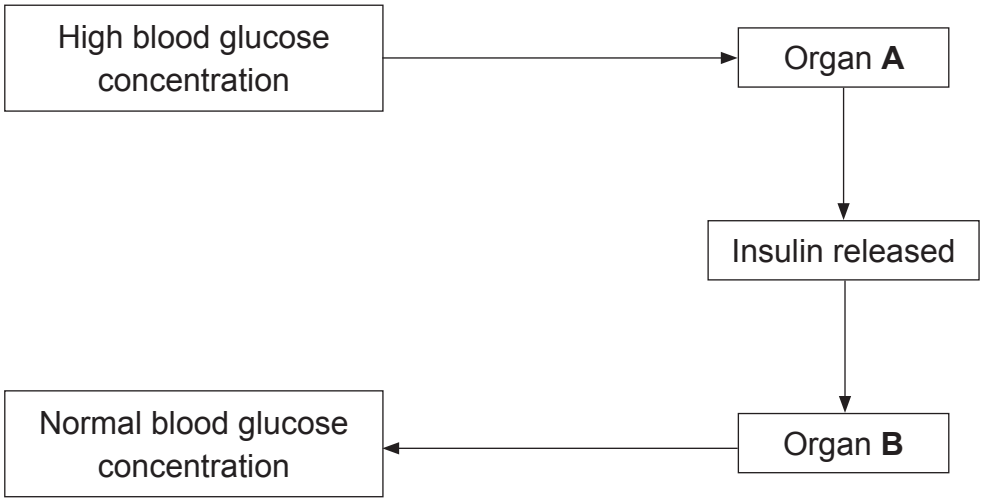
_____

_____

_____ [4]

[Turn over

7 **(a)** The diagram shows the role of insulin in controlling blood glucose concentration.



Source: Principal Examiner

(i) Name organs **A** and **B**.

A _____ [1]

B _____ [1]

(ii) Describe how insulin returns the blood glucose concentration to normal.

[4]

The process of returning the blood glucose concentration to normal involves negative feedback.

(b) Describe what is meant by negative feedback.

[2]

8 The photograph shows a farmer spreading slurry on a field.

© Tofotografie / iStock / Getty Images

Slurry is a mixture of faeces and urine from farm animals.

(a) Suggest how slurry improves the growth of the crop in the field.

_____ [1]

The table shows the monthly rainfall in Northern Ireland between October 2015 and September 2016.

Month	Rainfall/mm
October 2015	69.4
November 2015	190.5
December 2015	220.2
January 2016	175.7
February 2016	110.8
March 2016	72.2
April 2016	78.4
May 2016	58.5
June 2016	89.0
July 2016	98.0
August 2016	68.0
September 2016	96.8

Source: www.metoffice.gov.uk

The average monthly rainfall from the start of February 2016 to the end of September 2016 is 83.96 mm.

(b) Suggest why, in order to reduce the risk of eutrophication, slurry spreading is not allowed between the start of October and the end of January.

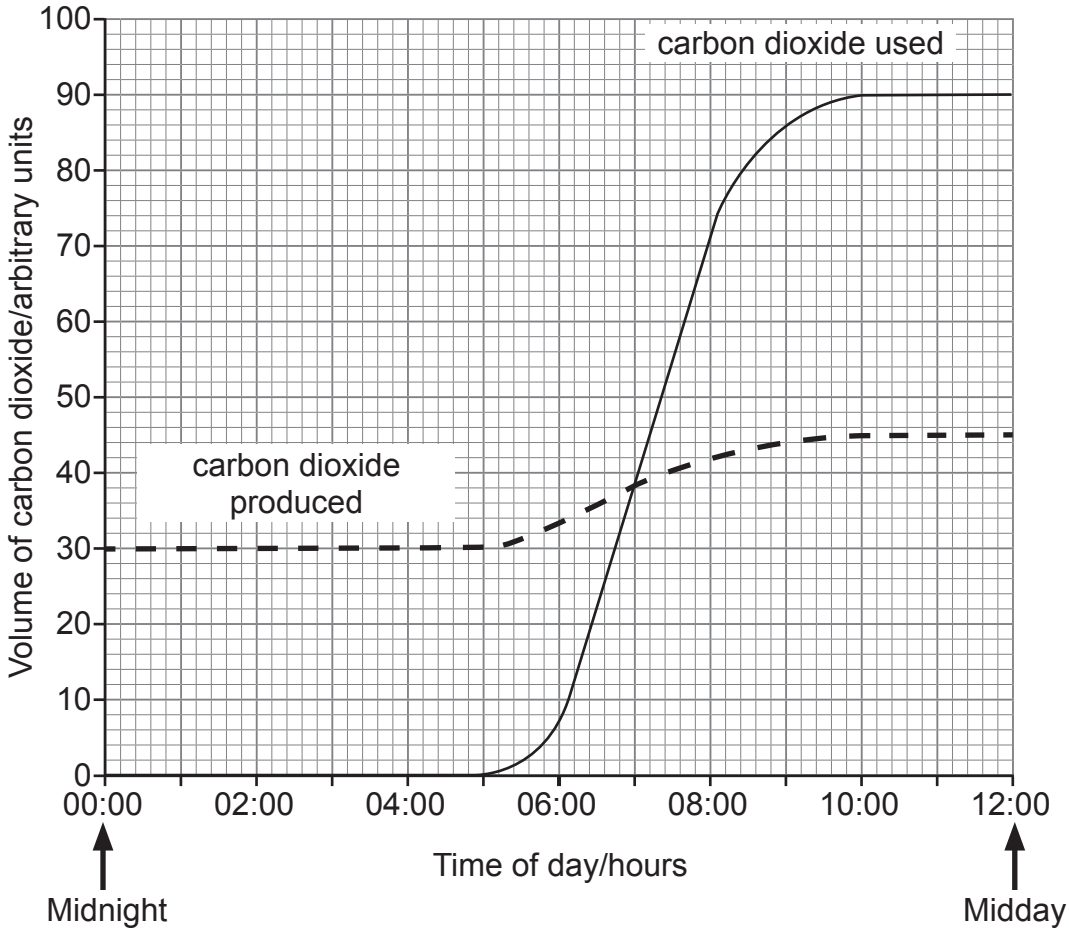
[2]

(c) Describe how eutrophication can lead to the death of vertebrates and invertebrates in rivers and lakes.

[4]

[Turn over

9 The graph shows the results of an investigation into the volume of carbon dioxide used by photosynthesis and the volume of carbon dioxide produced by respiration in a plant between midnight (00:00 hours) and midday (12:00 hours).



Source: Chief Examiner

Explain how photosynthesis and respiration bring about the changes in the volume of carbon dioxide shown:

- between midnight 00:00 hours and 05:00 hours,
- at 07:00 hours,
- after 07:00 hours.

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

[6]

[Turn over

10 A student carried out an enzyme experiment.

(a) What is an enzyme?

_____

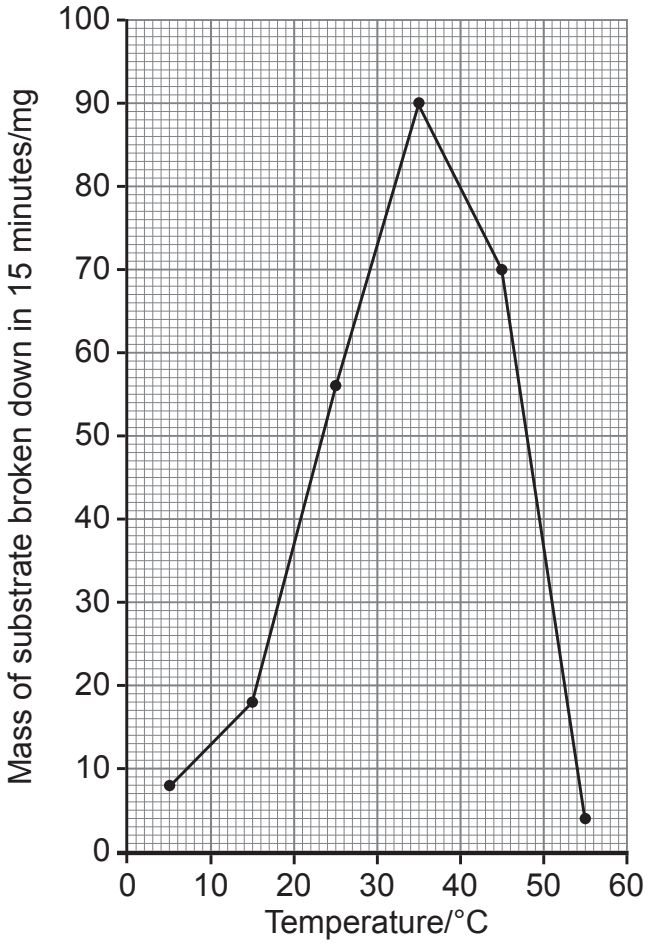
_____

_____

_____ [2]

The student measured the mass of substrate broken down in 15 minutes by an enzyme solution over a range of temperatures.

The graph shows her results.



Source: Principal Examiner

(b) Describe and explain the shape of the graph between 5°C and 25°C.

_____

_____

_____

_____

_____ [3]

(c) Calculate the **rate** of reaction at 35°C.

Show your working.

_____ mg min^{-1} [2]

(d) The experiment was repeated at 35°C, with a very small volume of inhibitor added to the enzyme and substrate solution.

The rate of reaction was decreased to 2 mg min^{-1}.

(i) Explain how the inhibitor decreased the rate of reaction.

_____

_____ [1]

(ii) Suggest why the rate of reaction did not fall to zero when the inhibitor was added.

_____

_____

_____

_____ [2]

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For Examiner's use only	
Question Number	Marks
1	
2	
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10	
Total Marks	

Examiner Number