



Rewarding Learning

General Certificate of Secondary Education
2018–2019

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit B1

Higher Tier



[GDW12]

GDW12

TUESDAY 14 MAY 2019, AFTERNOON

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 **4(a)**.

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24GDW1201

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24GDW1202

1 Four adaptations of a leaf and parts of a leaf are given below.

Draw a line to link each adaptation to the part of the leaf which has that adaptation.

Adaptation

Part of the leaf

Layer with **no cells** that is transparent
to allow light through

Palisade mesophyll

Area that allows diffusion of gases
throughout the leaf

Spongy mesophyll

Layer with tightly packed cells
containing the most chloroplasts for
maximum photosynthesis

Intercellular air space

Layer with cells that carry out some
photosynthesis and have a large
surface for gas exchange

Waxy cuticle

[3]

[Turn over



- 2 The photograph shows light-bellied brent geese in Strangford Lough in Northern Ireland.



© TwistedClassics / Getty Images

Read the passage below about these geese and answer the questions that follow.

Light-bellied brent geese migrate from their summer breeding ground in the Arctic to Strangford Lough each year to spend the winter.

In the Arctic, light-bellied brent geese feed on grasses. These grasses are also found in abundance in Strangford Lough.

In the Arctic snowy owls and Arctic foxes feed on the geese.
Arctic foxes also feed on small animals called lemmings.
Lemmings feed on the same grasses as these brent geese.

- (a) Complete the food web below by writing the names of the organisms in the empty boxes.

light-bellied brent geese

[4]



(b) Give **two** biotic factors that affect the population of the light-bellied brent geese in the Arctic.

1. _____

2. _____ [2]

The number of lemmings decreased in one year in the Arctic.

(c) Describe and explain how this would affect the light-bellied brent geese population.

_____ [2]

The population of light-bellied brent geese in Strangford Lough each winter makes up 75% of the world population of these geese.

In 2016 the number of light-bellied brent geese counted in Strangford Lough was 22 500.

(d) Calculate the world population of light-bellied brent geese in 2016.

Show your working

_____ [2]

[Turn over

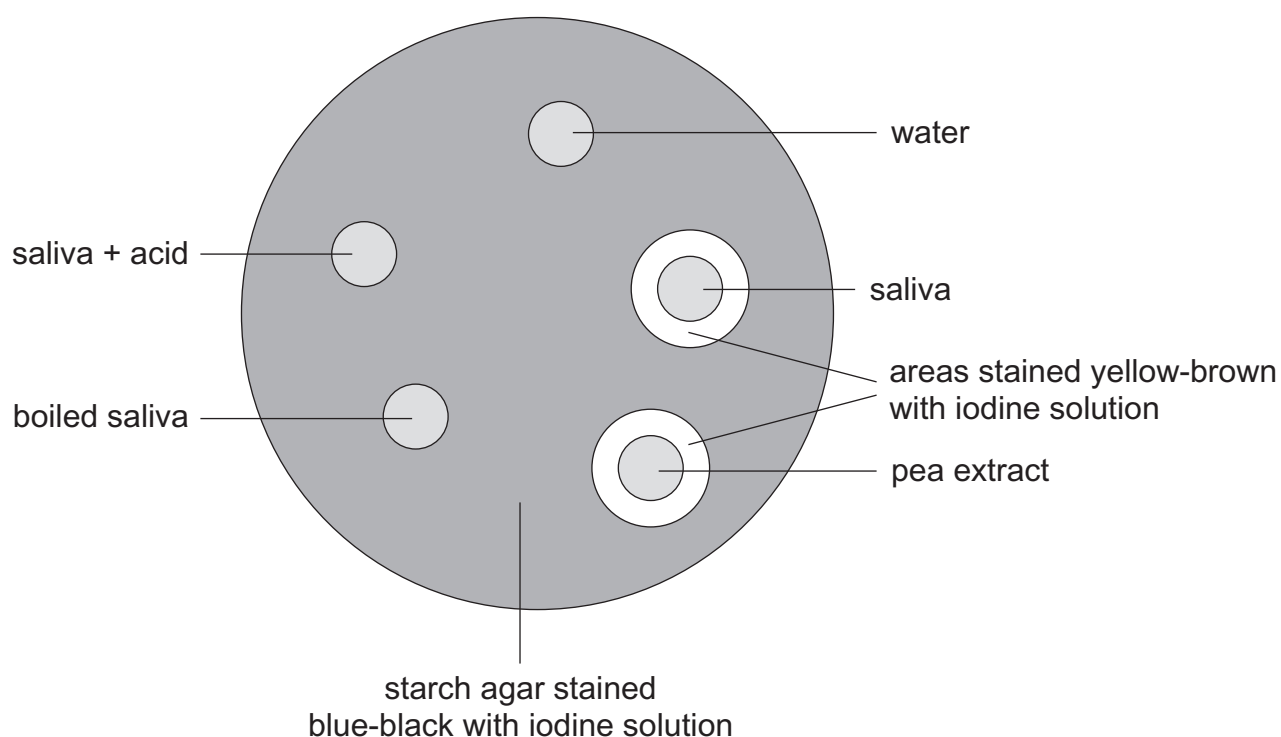


- 3 Students investigated the action of an enzyme that is found in saliva and parts of the digestive system.

They placed different solutions into holes in starch agar in a Petri dish. Starch agar is a jelly-like substance containing starch.

The students left the solutions in the holes for several hours. They then stained the starch agar blue-black with iodine solution.

The diagram below shows the results at the end of their experiment.



© CCEA

The starch agar surrounding the hole containing **saliva** was yellow-brown at the end of the experiment.

(a) Explain why.

[2]



The starch agar surrounding the hole containing **saliva and acid** was blue-black at the end of the experiment.

(b) Explain why.

[2]

The starch agar surrounding the hole containing **boiled saliva** was blue-black at the end of the experiment.

(c) Use your knowledge of enzyme theory to explain why.

[3]

[Turn over



(d) The starch agar surrounding the hole containing pea extract was yellow-brown at the end of the experiment.

(i) Suggest what was present in the pea extract to cause this.

_____ [1]

Peas contain starch.

A reaction takes place in peas within a few hours after they are picked.

This reaction causes the peas to taste sweeter.

(ii) Use the results from the pea extract to explain why.

_____ [2]



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(b) Describe the action of the hormone that is involved in maintaining water balance in the body.

[2]

[Turn over

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- 5 A plant shoot was grown in light shining from above on Day 1.
The diagram below shows two different regions of the plant shoot, A and B.



The direction of the light was changed at the end of Day 1.

The table below shows the concentration of auxin in regions A and B at the end of Day 1 and at the end of Day 3.

Region	Concentration of auxin/ arbitrary units	
	At the end of Day 1	At the end of Day 3
A	5	5
B	5	25

- (a) Where is auxin produced in the shoot?

[1]

- (b) (i) Draw an arrow on the diagram to show the direction light is shining from onto this shoot on Day 3.

[1]

- (ii) Explain your answer to part (i).

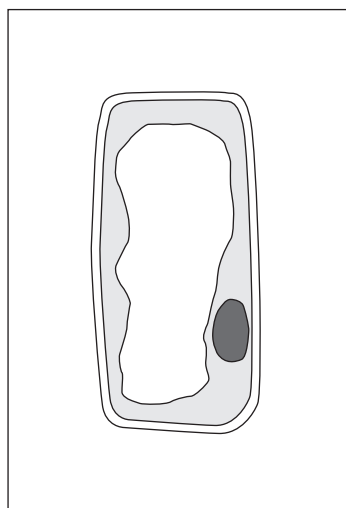
[1]



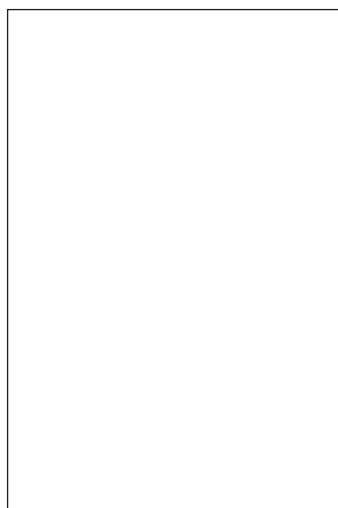
- (c) The diagram below shows one plant cell from the shoot before it is affected by auxin.

Draw another diagram of this cell in the empty box to show how it would appear after it is affected by auxin.

Plant cell before it is
affected by auxin



Plant cell after it is
affected by auxin



© Barking Dog Art. Used with Permission

[2]

- (d) (i) Describe the appearance of the **plant shoot** at the end of Day 3.

[1]

- (ii) Explain why this has happened in the **plant shoot** by the end of Day 3.

[1]

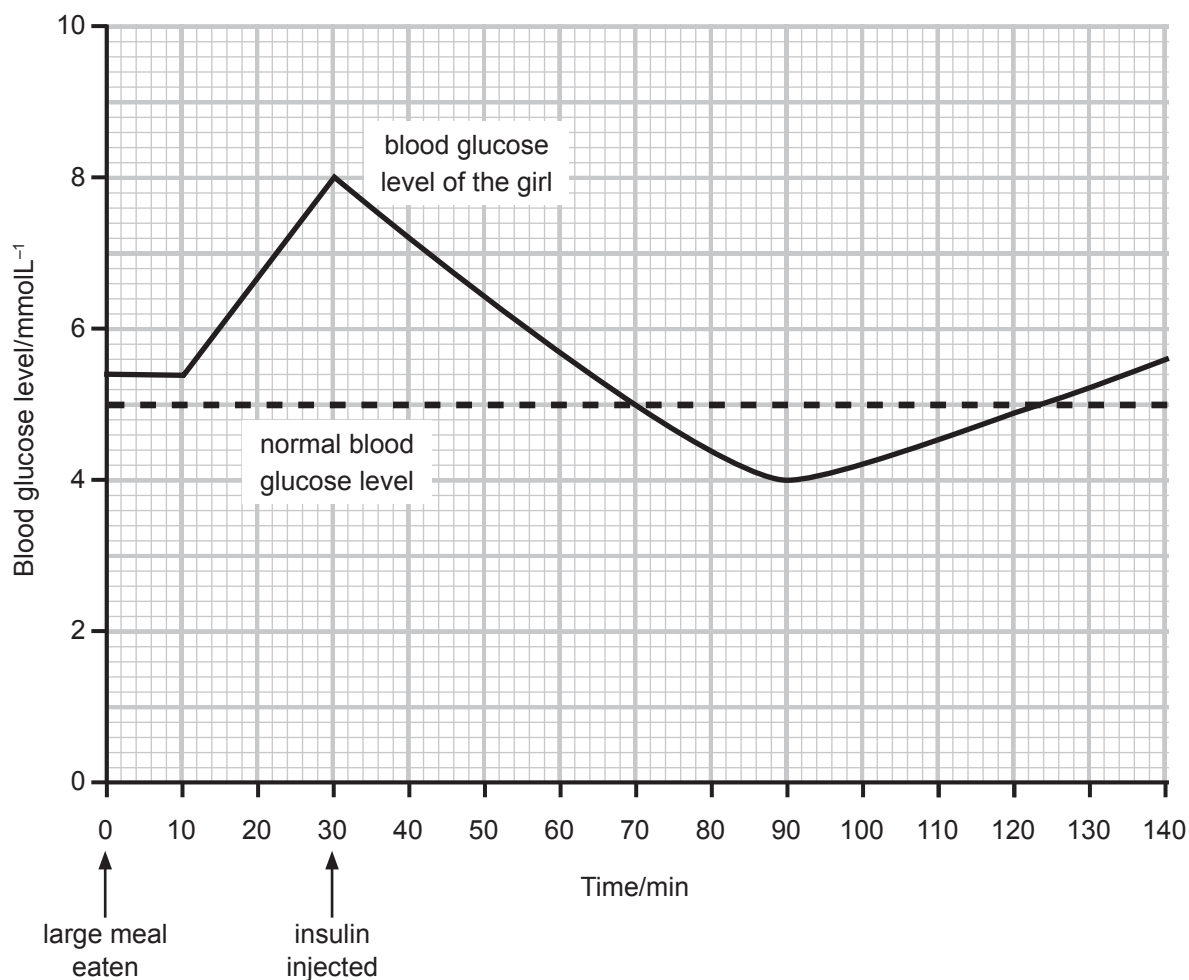
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6 Insulin is a hormone that lowers the blood glucose level.

A girl with Type 1 diabetes ate a large meal.
She injected herself with insulin 30 minutes later.

The graph below shows her blood glucose level.



© Data from: <https://www.diabetes.org.uk/guide-to-diabetes/managing-your-diabetes/testing>

(a) Name the target organ for insulin.

[1]



- (b) Other than injecting insulin, give **one** way people with Type 1 diabetes can lower their blood glucose level.

_____ [1]

Use the graph opposite to answer the following questions.

- (c) How much had the girl's blood glucose level increased 30 minutes after eating her large meal?

Show your working

_____ mmolL⁻¹ [2]

- (d) The girl did not eat anything after her large meal.
Another hormone called glucagon acts in the **opposite way** to insulin.
It raises the blood glucose level if it falls too low.

- (i) What evidence from the graph suggests that the girl produced glucagon?

_____ [2]

- (ii) Suggest **two** ways glucagon acts to raise the blood glucose level.

1. _____

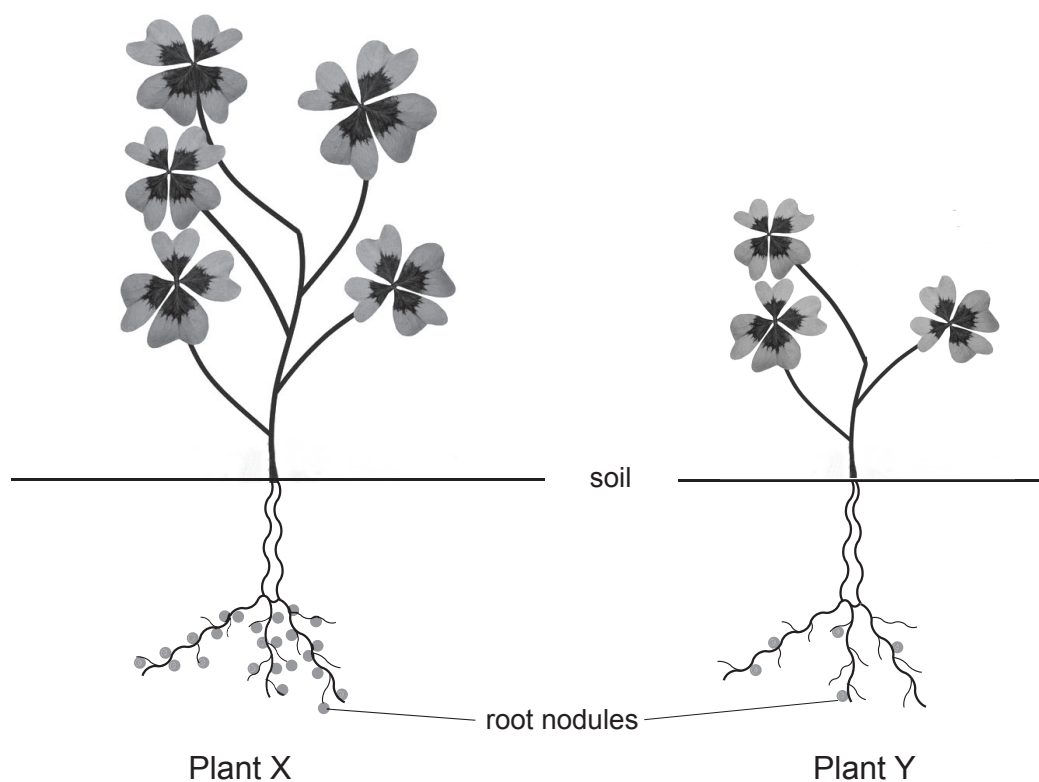
2. _____
_____ [2]

[Turn over]



- 7 (a) Clover plants have root nodules that contain nitrogen-fixing bacteria.

The diagram below shows two clover plants.



© Getty Images

- (i) Use your knowledge of the **nitrogen cycle** to explain why clover plant X shows more growth than clover plant Y.

[3]



The nitrogen-fixing bacteria in the root nodules obtain a substance from the clover plant which they need for respiration.

(ii) Name this substance.

[1]

(b) Crops grow better in fields when there are less weeds present.

(i) Suggest why.

_____ [1]

Clover plants can be grown by farmers in fields and then ploughed and broken up into the soil.

This will help the future growth of crops in the field.

One type of bacteria decomposes these clover plants and produces ammonia by extra-cellular digestion.

(ii) Name this type of decomposer.

[1]

(iii) One type of **nitrogen** bacteria in the soil then acts on the ammonia. Name and describe the role of these nitrogen bacteria.

_____ [2]

[Turn over



- 8 Nitrates from fertiliser entered a lake that was high in biodiversity with fish and other animals.

Students sampled the lake:

- just before the fertiliser entered the lake (time = 0);
- one month after the fertiliser entered the lake;
- two months after the fertiliser entered the lake.

The table below shows the students' results.

Time/ months	Nitrate concentration	Numbers of algae
0	low	low
1	high	high
2	low	low

Use the table to help answer the questions that follow.

- (a) Describe and explain the change in the numbers of algae in the lake between month 0 and month 1.

[2]



- (b) Describe and explain how the numbers of **bacteria** in the lake changed over the two month period.

Description _____

Explanation _____

_____ [3]

- (c) Describe and explain the effect of the fertiliser entering the lake on the animal biodiversity of the lake.

_____ [3]

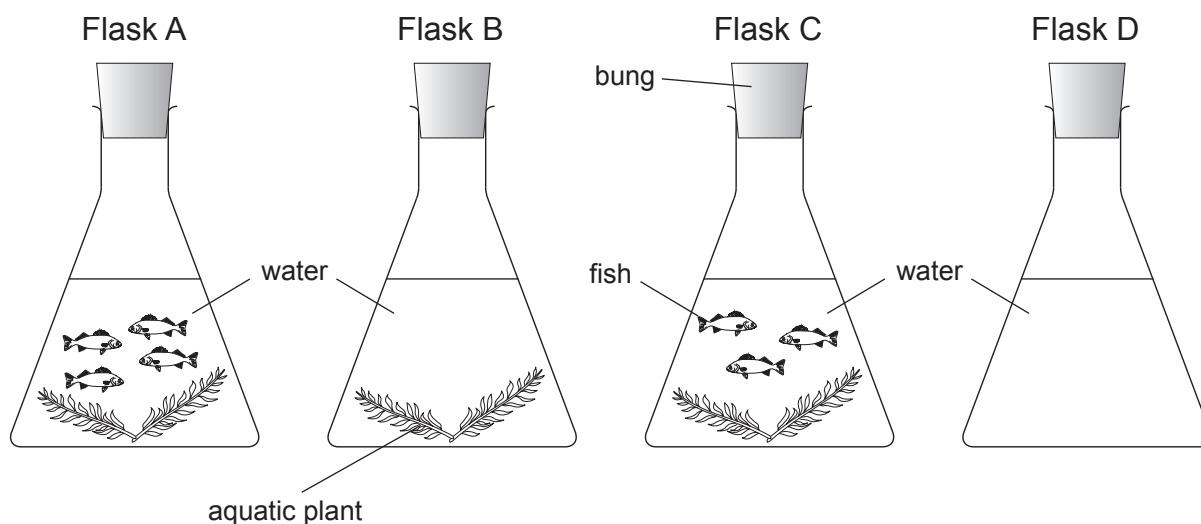
- (d) Give the term used to describe the nitrate enrichment of this lake.

_____ [1]

[Turn over



- 9 A student set up an experiment using four flasks A, B, C and D as shown in the diagram below.
He placed the four flasks in bright light for one hour.



Source: Chief Examiner

Flask B contained the highest level of **oxygen** after one hour.

(a) Explain why.

[3]



Flask A contained the highest level of **carbon dioxide** after one hour.

(b) Explain why.

[2]

Hydrogencarbonate indicator was added to flask D at the start of the experiment.
Give the colour of this indicator after one hour.

(c) Explain your answer.

Colour _____

[1]

Explanation _____

[1]

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Question Number	Marks
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Examiner Number

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