Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Double Award Science: Biology

Unit B1
Higher Tier

ML

[GSD12]

TUESDAY 15 MAY, AFTERNOON

TIME

1 hour, 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.
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 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**.

1 **(a)** This photograph shows the growth response of plant seedlings growing in a tray. The light is coming from one direction.

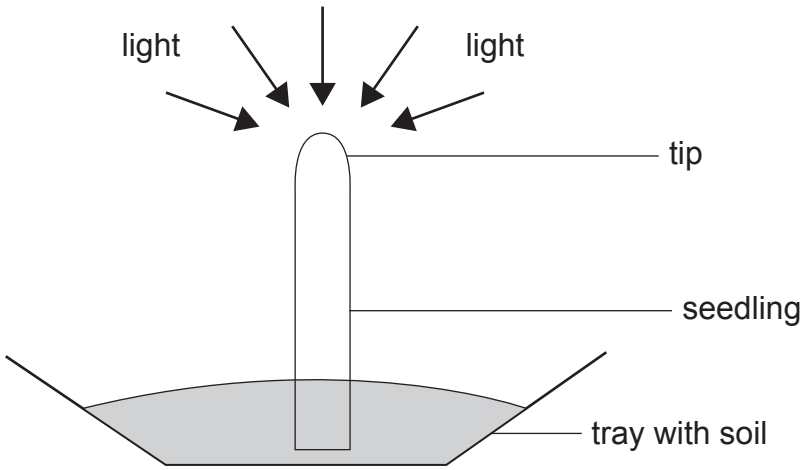
© Graham Jordan / Science Photo Library

(i) Draw an arrow beside the photograph to show the direction of the light that has produced this growth response in the seedlings. [1]

(ii) Name this growth response in seedlings.

_____ [1]

One other seedling was grown in a tray with light coming from all directions as shown in the diagram below.



Source: Chief Examiner

The seedling was growing in the tray for four days.

(b) Describe and explain the growth response of this seedling after four days in the light.

Description _____

_____

Explanation _____

_____

_____

_____

_____

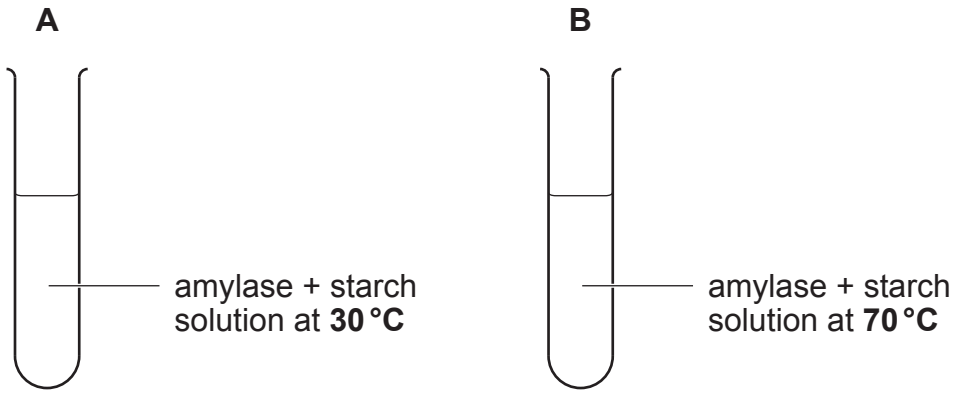
_____

_____ [4]

[Turn over

2 A student investigated the effect of temperature on the breakdown of starch by the enzyme amylase.

The diagram below shows how the student set up the investigation.



(a) What are **two** factors the student should have controlled in the investigation?

1. _____

2. _____ [2]

After four hours starch was still present in test tube **B**.

(b) Use your knowledge of enzyme action to explain why.

_____

_____

_____

_____

_____

_____

_____

_____

_____ [3]

(c) Glucose is produced when starch is broken down by amylase.

(i) Describe the test for glucose.

_____

_____

_____

_____ [2]

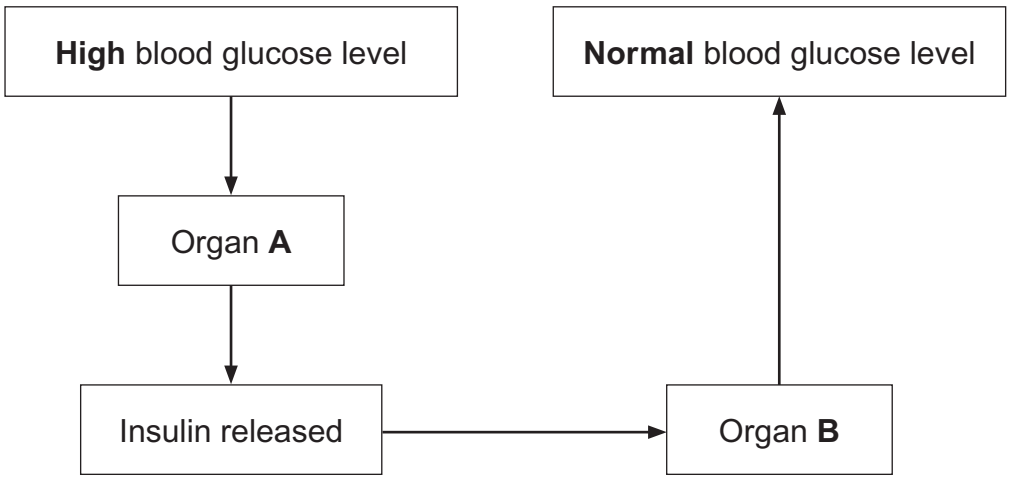
(ii) Finish the following sentence by writing in the blank space.

The test reagent for glucose changes colour from

_____ to brick red when glucose is present. [1]

[Turn over

3 **(a)** The diagram below shows part of the mechanism that controls blood glucose levels.



(i) Name organ **A**.

_____ [1]

(ii) Name organ **B**.

_____ [1]

(iii) What type of substance is insulin?

_____ [1]

(b) (i) What effect does insulin have on blood glucose levels?

_____ [1]

(ii) Write down **two** ways insulin acts to produce this effect on blood glucose levels.

1. _____

_____

_____

2. _____

_____

_____ [2]

[Turn over

(c) The table below shows the number of people with diabetes in Northern Ireland from 2012 to 2016.

Year	Number of people with diabetes in Northern Ireland
2012	75 837
2013	79 072
2014	81 867
2015	84 836
2016	88 305

Facts & Figures: Annual diabetes prevalence figures
© The British Diabetic Association operating as Diabetes UK

(i) Describe the overall trend in the number of people with diabetes in Northern Ireland from **2012 to 2016**.
Use data from the table in your answer.

_____

_____

_____ [2]

(ii) Write down **one** reason for this trend.

_____

_____ [1]

(iii) Use the data in the table above to calculate the percentage change in the number of people with diabetes in Northern Ireland from 2012 to 2016.

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

Show your working.

_____ % [3]

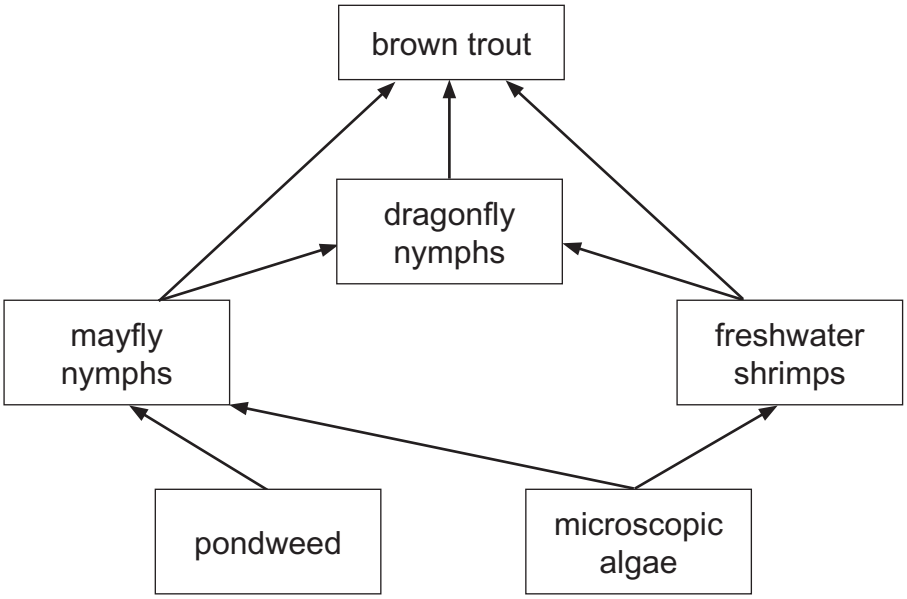
4 Describe the steps used in testing a leaf for starch.
Write down the reason for each step.

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

[6]

[Turn over

5 This diagram below shows a food web from a lake.



(a) Name a producer in this foodweb.

_____ [1]

(b) Write down the **two** trophic levels the brown trout is feeding at.

_____ and _____ [2]

(c) Another type of fish that also feeds on dragonfly nymphs was introduced into the lake.
Describe and explain how this would affect the number of brown trout in the lake.

_____

_____

_____

_____

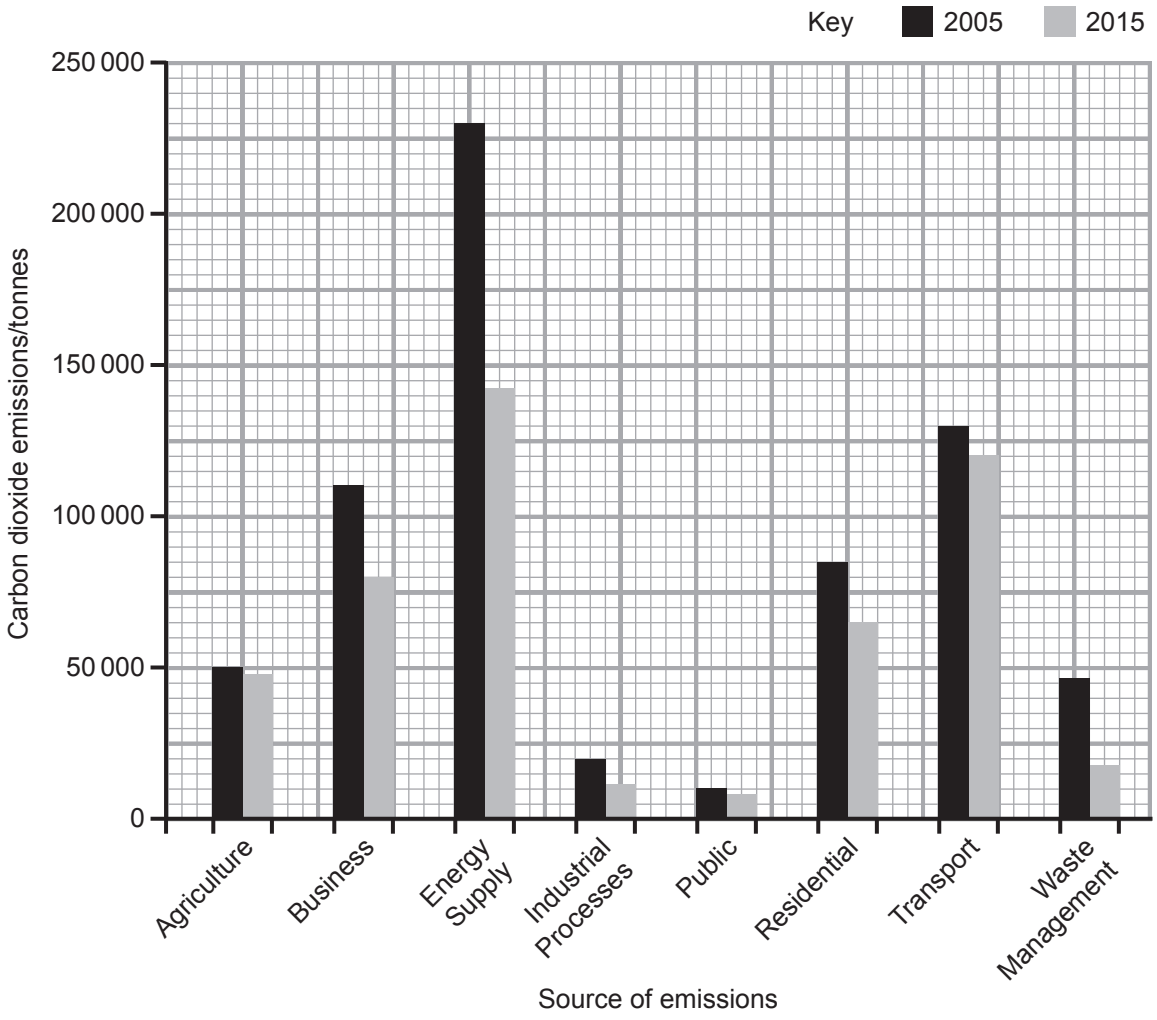
_____ [2]

(d) Explain why short food chains are more energy efficient than long food chains.

[3]

[Turn over

6 The graph below shows carbon dioxide emissions from different sources in the UK in 2005 and 2015.



Source: naei.beis.gov.uk © Crown 2018 copyright Defra & BEIS via naei.beis.gov.uk, licenced under the Open Government Licence (OGL).

(a) How many tonnes of carbon dioxide were emitted by transport in 2005?

_____ tonnes [1]

(b) Name the source that had the greatest reduction in tonnes of carbon dioxide emitted between 2005 and 2015.

_____ [1]

Look at the three statements in the table below.

(c) Using the data in the graph opposite write a tick (✓) in the box which describes each statement.

Statement	True	False	Cannot tell from data
The number of tonnes of carbon dioxide emitted from cars was lower in 2015 than in 2005.			
The number of tonnes of carbon dioxide emitted from all sources was lower in 2015 than in 2005.			
The reduction in carbon dioxide emitted between 2005 and 2015 was greater for agriculture than for industrial processes.			

[3]

[Turn over

7 Look at the table below. It is about aerobic and anaerobic respiration in **muscle**.

Complete the table by writing either **Yes** or **No** in each of the empty boxes.

	Type of respiration in **muscle**	
	Aerobic	**Anaerobic**
Uses oxygen		
Produces carbon dioxide		
Produces alcohol		
Produces lactic acid		

[4]

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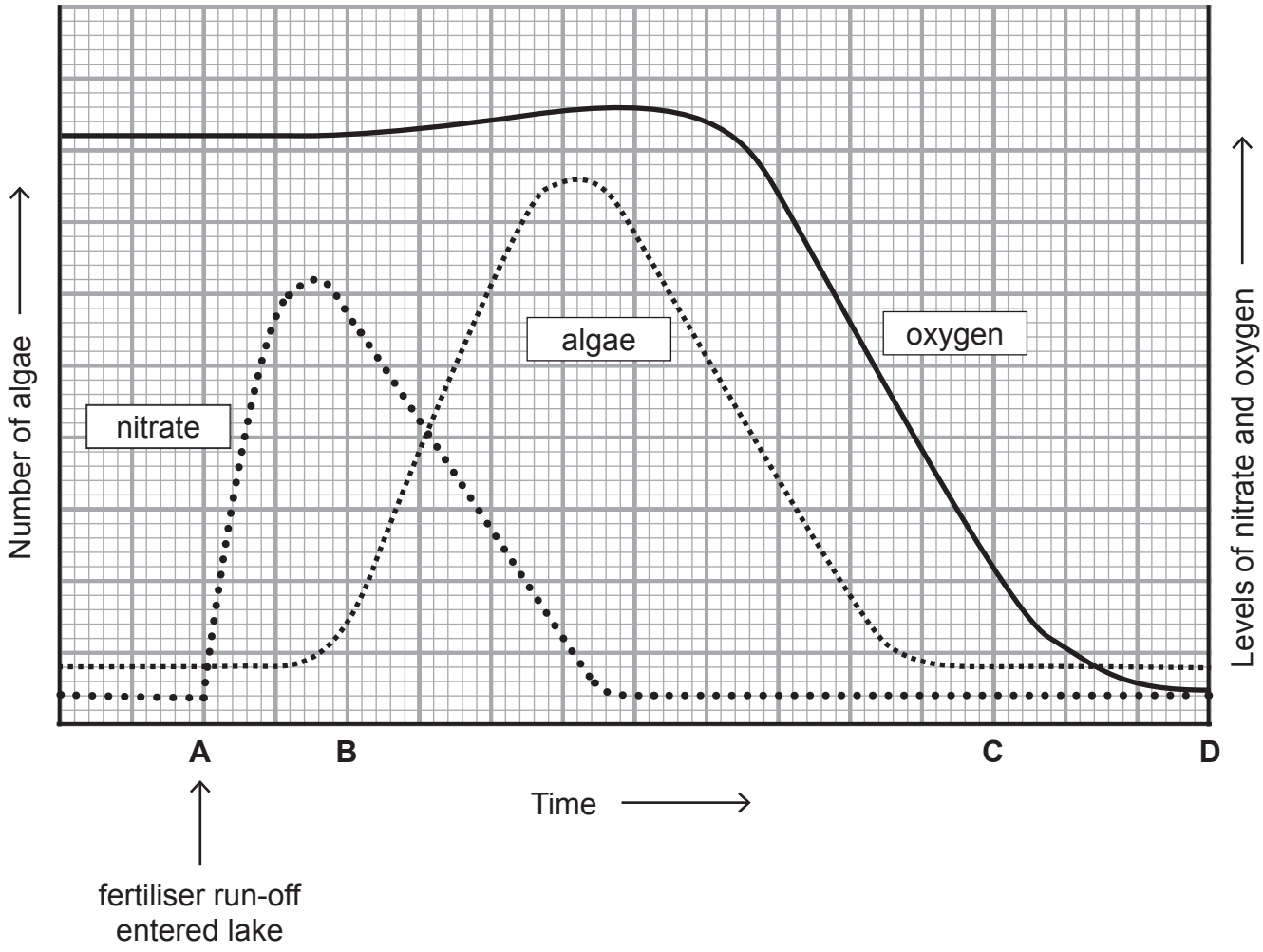
(Questions continue overleaf)

8 The graph shows:

- the number of algae
- the levels of nitrate and oxygen

in a lake at different times before and after fertiliser run-off has entered the lake from neighbouring fields.



Source: Chief Examiner

(a) Describe and explain the changes in the number of **algae** in the lake between times **A** and **C**.

Description _____

_____

_____ [1]

Explanation _____

_____

_____

_____

_____

_____ [2]

(b) The **oxygen** levels in the lake increased and then decreased between times **B** and **D**.

(i) Explain why the oxygen levels **increased**.

_____

_____ [1]

(ii) Explain why the oxygen levels **decreased**.

_____

_____

_____

_____

_____

_____

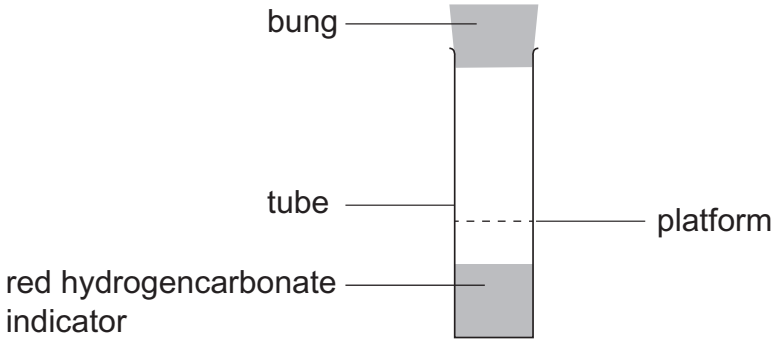
_____

_____ [3]

[Turn over

9 A student investigated respiration in three types of small animals, A, B and C.
The student placed the same mass of each type of animal on a platform in a tube.
This tube contained hydrogencarbonate indicator.
She recorded the time taken for the indicator in each tube to turn yellow.

The diagram shows the experimental set-up.



Source: Principal Examiner

The table shows the student's results.

Type of animal	Time taken for hydrogencarbonate indicator to turn yellow/min
A	6
B	2
C	4

(a) Use the information in the table above to give the type of animal A, B or C that respired the fastest.
Write down one reason why this animal respired the fastest.

Type of animal

_____

Reason

_____

_____ [2]

(b) The student used the same experimental set-up to investigate respiration and photosynthesis in the same mass of cabbage and spinach leaves.
She placed a lamp the same distance from each tube and recorded the colour of the hydrogencarbonate indicator after one hour.

The table shows the student's results.

Type of leaf	Colour of hydrogencarbonate indicator after one hour
cabbage	red
spinach	purple

(i) Explain the student's result for the cabbage leaves.

_____

_____

_____

_____ [2]

(ii) Explain the student's result for the spinach leaves.

_____

_____

_____

_____ [2]

Spinach leaves contain more chlorophyll than cabbage leaves.

(iii) Explain how the colours of the hydrogencarbonate indicator shown in the table above show that this statement is true.

_____

_____

_____ [1]

[Turn over

10 The nitrogen cycle has several types of nitrogen bacteria.

(a) What is the role of nitrogen-fixing bacteria?

_____

_____ [1]

Soil contains millions of nitrogen bacteria.

The table below shows the numbers of different types of nitrogen bacteria in samples from three different soils, A, B and C.
The samples of soil were of equal mass.

Type of nitrogen bacteria	Number of bacteria/millions		
	Soil A	Soil B	Soil C
nitrogen-fixing	350	500	90
nitrifying	450	400	110
denitrifying	200	100	800

Source: Principal Examiner

(b) Look at the information in the table. Which soil A, B or C has the lowest **nitrate** content?
Explain your answer.

Soil _____ [1]

Explanation _____

_____

_____

_____

_____

_____ [2]

(c) In soils that are low oxygen, plants cannot absorb enough nitrates from the soil to grow well.
Explain why.

[3]

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

Examiner Number