New Specification

Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2017–2018

Double Award Science: Biology

Unit B1
Higher Tier

ML

[GDW12]

TUESDAY 15 MAY 2018, AFTERNOON

TIME

1 hour, plus your additional time allowance.

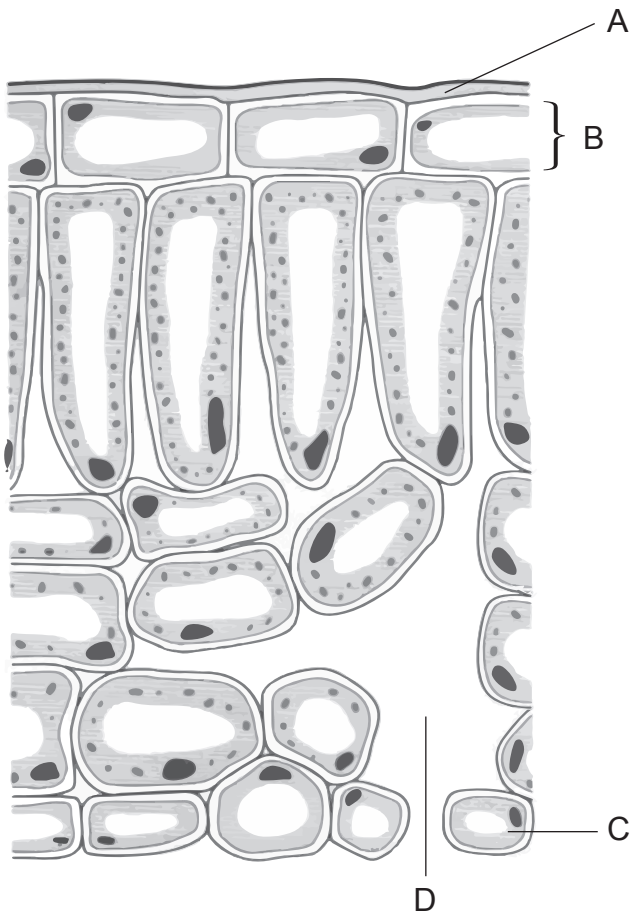
INSTRUCTIONS TO CANDIDATES

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(a)**.

1 **(a)** The diagram shows the cross section of a leaf.



(i) Name layer B.

_____ [1]

(ii) Name cell C.

_____ [1]

(b) A is the cuticle.

(i) Write down **one** way the cuticle is adapted for light absorption.

_____

_____ [1]

(ii) Write down **one** way the cuticle is adapted to reduce water loss.

_____

_____ [1]

(c) Name D and write down its function.

Name _____

Function _____

_____ [2]

[Turn over

2 A man completed a questionnaire to look at his risk of developing diabetes in the next 10 years.
Some information about the man is given below.

> The man is 64 years old.
>
> He is being treated for high blood pressure.
>
> His brother has diabetes.

The table below shows three questions from the questionnaire.
It also shows the point scoring system used.

(a) Use the information above about the man to complete his questionnaire.
Write the points he scored in the empty boxes in the table below.
The points scored for the first question are already done for you.

Question	Point scoring system	Points scored
Do you have a diabetic parent, brother or sister?	Yes = 2 No = 0 Don't know = 1	2
Are you being treated for high blood pressure?	Yes = 2 No = 0 Don't know = 1	
What age are you?	40–49 = 0 50–59 = 1 over 60 = 2	

[2]

(b) Which type of diabetes is this man most likely to develop in the next 10 years?

_____ [1]

(c) The results from the questionnaire showed this man has a high risk of developing diabetes in the next 10 years.

Write down **two** lifestyle changes he should make to reduce his risk of developing diabetes in the next 10 years.

1. _____

_____

2. _____

_____ [2]

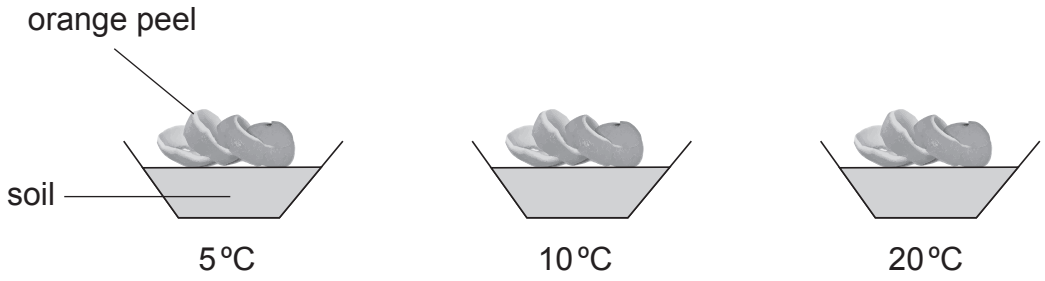
(d) What is **one** possible long-term effect of diabetes?

_____ [1]

[Turn over

3 Pupils carried out an investigation into the effect of temperature on the rate of decomposition of orange peel.
They placed the same mass of orange peel in three dishes containing soil.
Each dish was kept at a different temperature for four weeks.
The pupils recorded the percentage of orange peel **remaining** at the end of each week for four weeks.

The diagram shows their set-up at the start of the experiment.



The table below gives the pupils' results.

Temperature orange peel is kept at/°C	Percentage of orange peel **remaining** at the end of:			
	Week 1	**Week 2**	**Week 3**	**Week 4**
5	100	90	75	60
10	95	80	60	40
20	90	70	45	20

(a) What percentage of orange peel had **decomposed** by the end of **week 4** at 5 °C?

_____ % [1]

(b) What effect did temperature have on the rate of **decomposition** of the orange peel over the four weeks?
Write down data from week four to help you with your answer.

_____

_____

_____

_____ [2]

(c) **(i)** Temperature is **one** factor that can affect the rate of decomposition.
Write down one other factor that can affect the rate of decomposition.

_____ [1]

(ii) Name the **two** types of microorganism that can carry out decomposition.

1. _____

2. _____ [2]

(iii) Describe how these microorganisms carry out the decomposition of the orange peel.

_____

_____

_____

_____

_____

_____

_____

_____ [3]

[Turn over

4 **(a)** Enzymes are biological catalysts that speed up the rate of reactions.
Use your knowledge of enzyme structure to **describe and explain** how enzyme controlled reactions are affected by the following:

- low temperature
- optimum temperature
- very high temperature

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

[6]

(b) Describe and explain how inhibitors affect the action of enzymes.

[2]

[Turn over

5 The nervous system coordinates responses in the body.

(a) Write down **two** differences between voluntary and reflex actions in the nervous system.

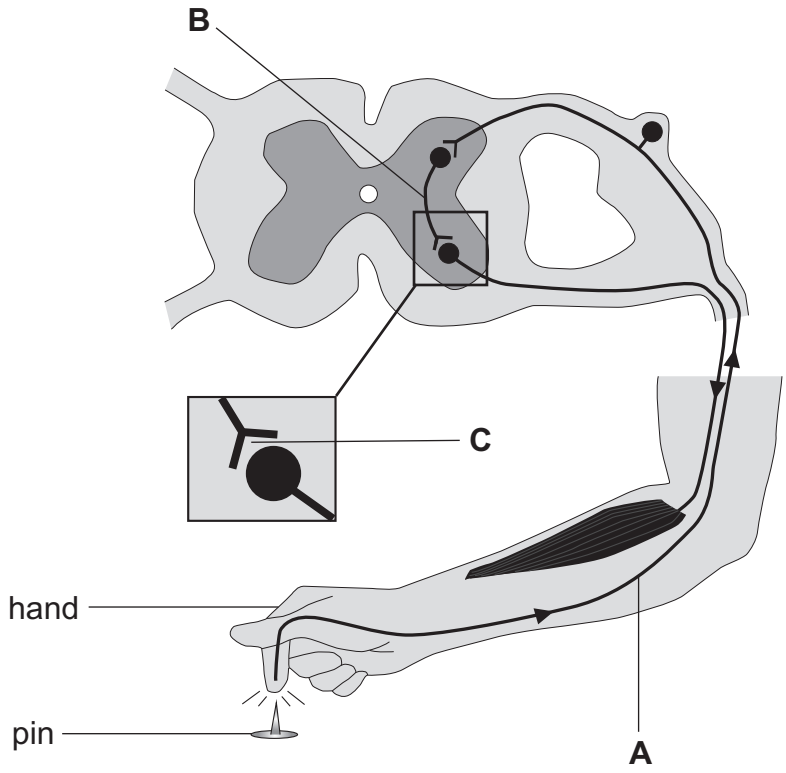
1. _____

_____

2. _____

_____ [2]

(b) The diagram shows a reflex arc.



© Barking Dog Art

(i) Name the **two** types of neurones A and B.

A _____

B _____ [2]

(ii) Name the gap between the two neurones at C.

_____ [1]

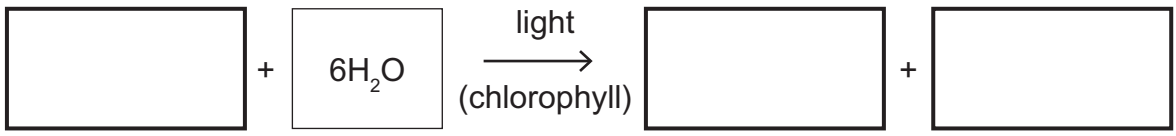
(iii) Name the **two** types of effector in the body.

1. _____

2. _____ [2]

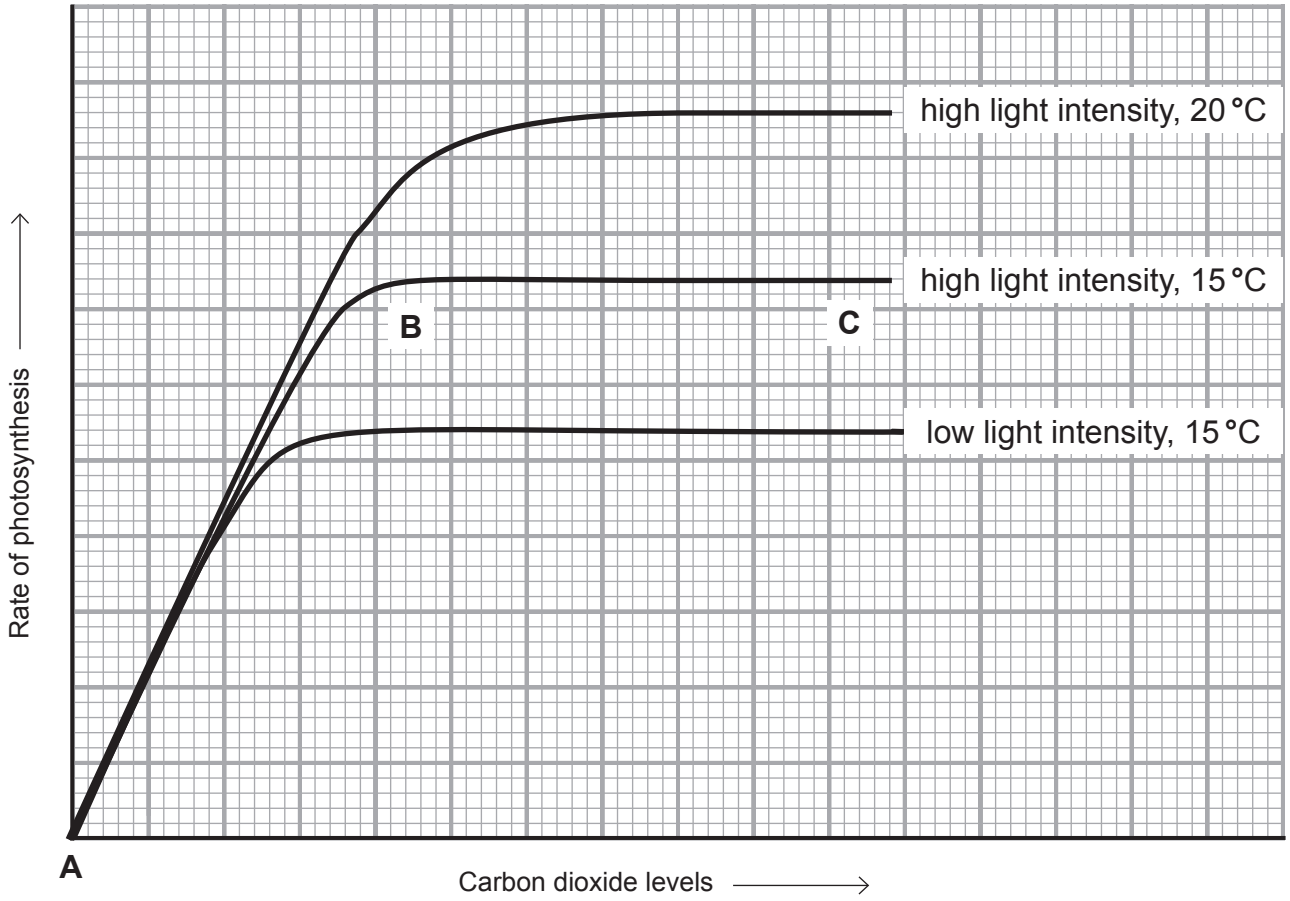
[Turn over

6 **(a)** Complete the balanced chemical equation for photosynthesis by writing in the empty boxes.



[3]

(b) The graph below shows how different factors affect the rate of photosynthesis in a plant.



Adapted from © Biology Discussion

Use the information in the graph opposite to answer the following questions.

(i) What is the factor that is limiting the rate of photosynthesis between A and B?
Explain your answer.

Factor _____

Explanation _____

_____

_____

_____ [2]

(ii) What is the factor that is limiting the rate of photosynthesis between B and C?

_____ [1]

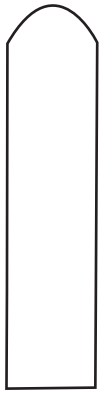
[Turn over

7 Auxin is produced in plant shoots.

(a) What type of substance is auxin?

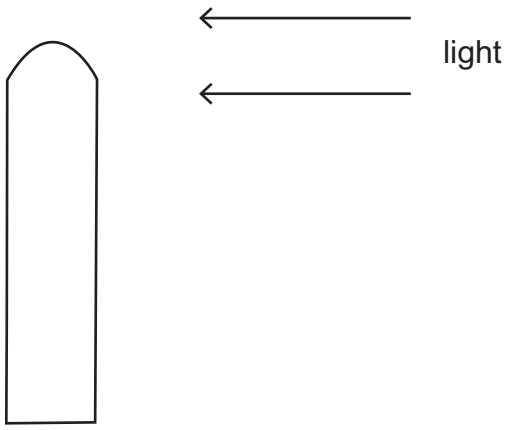
_____ [1]

(b) The diagram shows a plant shoot.



(i) Put an **X** on the diagram to show where auxin is produced. [1]

The diagram below shows light shining on a plant shoot from one side.



(ii) Where will most auxin be in this shoot after several hours? Shade the diagram above to show this. [1]

(iii) What would the shoot in part (ii) above look like after two days? Complete the diagram below to show this.

[1]

(iv) Explain why the shoot looks like this after two days.

_____

_____

_____

_____

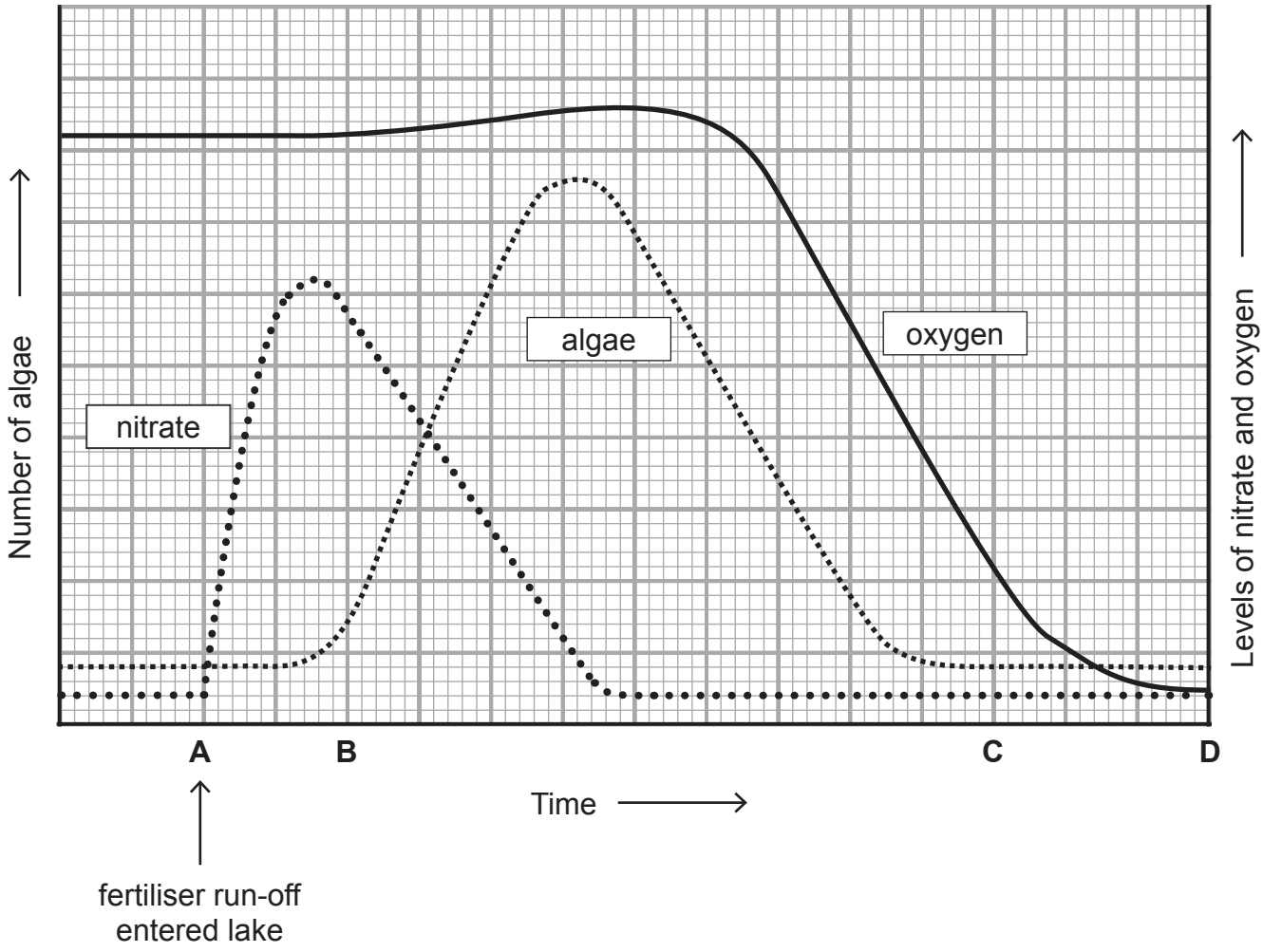
_____ [2]

[Turn over

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 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 then decreased between times **B** and **D**.

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

_____

_____ [1]

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

_____

_____

_____

_____

_____

_____

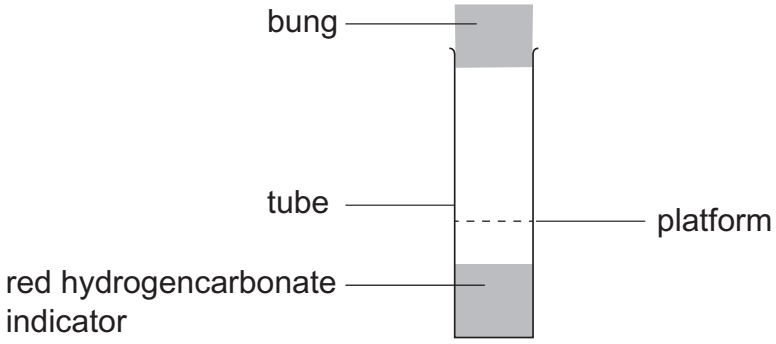
_____

_____ [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

(a) Explain why the hydrogencarbonate indicator turns yellow.

_____

_____ [1]

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

(b) Look at the table above.
Which type of animal respired the fastest?
Write down a reason for your answer.

Type of animal

_____

Reason

_____

_____ [2]

[Turn over

(c) 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 opposite, show this statement is true.

_____

_____

_____ [1]

[Turn over

10 There are several types of nitrogen bacteria in the nitrogen cycle.

(a) What is the function 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 table above. Which soil A, B or C has the lowest **nitrate** content? Explain your answer.

Soil _____ [1]

Explanation _____

_____

_____

_____

_____

_____ [2]

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

[3]

THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	**Marks**
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Examiner Number