



General Certificate of Secondary Education
2017–2018

Centre Number

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Candidate Number

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Double Award Science: Biology

Unit B1
Higher Tier

MV18

[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 on blank pages.

Complete in black ink only.

Answer **all ten** questions.

Information for Candidates

The total mark for this paper is 70.

Figures in brackets printed at the end of each question indicate the marks awarded to each question or part question.

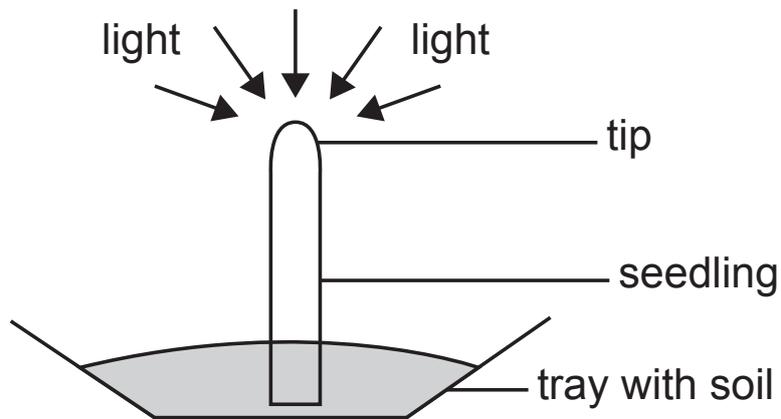
Quality of written communication will be assessed in Question 4.

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



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

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



The seedling was left in the tray for four days.

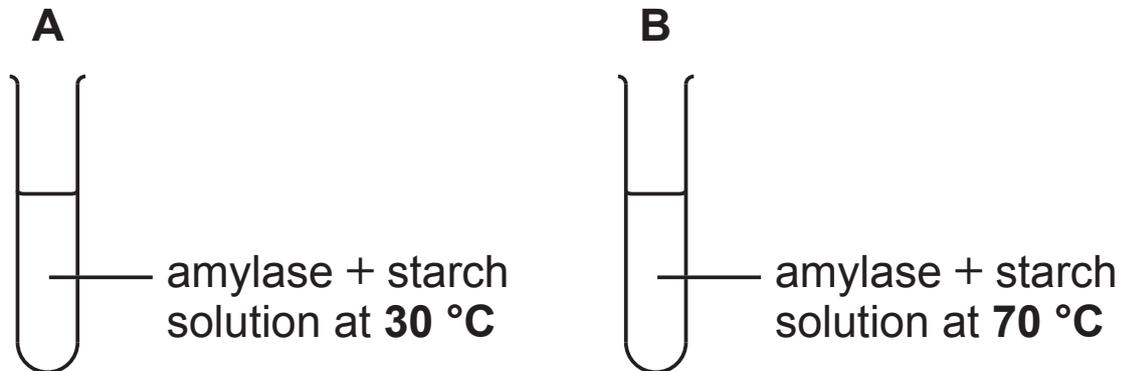
(b) Describe and explain the growth response of this seedling after four days in the light. [4 marks]

Description _____

Explanation _____

- 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) Give **two** factors the student should have controlled in the investigation. [2 marks]

1. _____
2. _____

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

(b) Use your knowledge of enzyme action to explain why.
[3 marks]

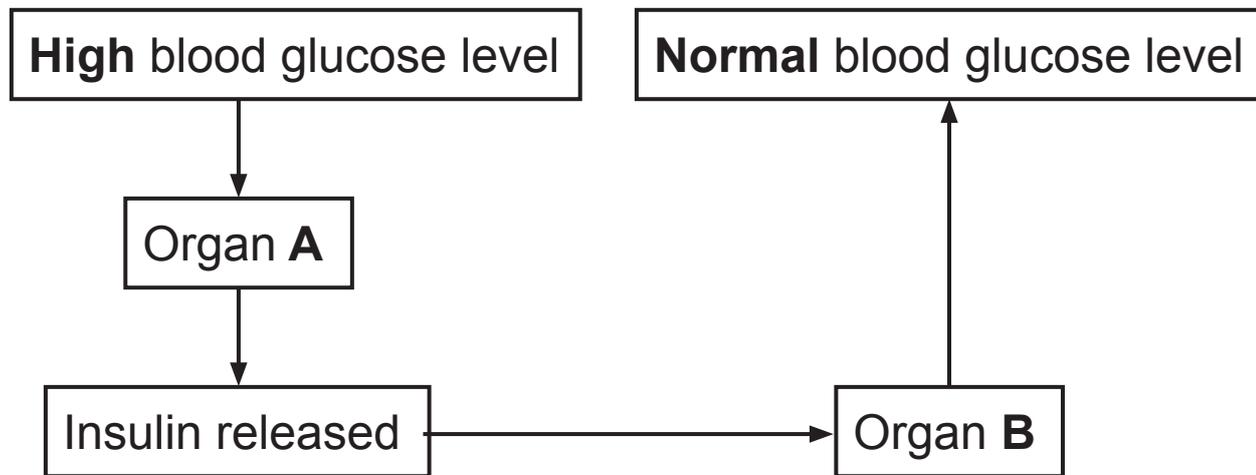
(c) Glucose is produced when starch is broken down by amylase.

(i) Describe the test for glucose. [2 marks]

(ii) Complete the following sentence by writing in the blank space. [1 mark]

The test reagent for glucose changes colour from _____ to brick red when glucose is present.

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



(i) Name organ **A**. [1 mark]

(ii) Name organ **B**. [1 mark]

(iii) What type of substance is insulin? [1 mark]

(b) (i) What effect does insulin have on blood glucose levels? [1 mark]

(ii) Give **two** ways insulin acts to produce this effect on blood glucose levels. [2 marks]

1. _____

2. _____

- (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

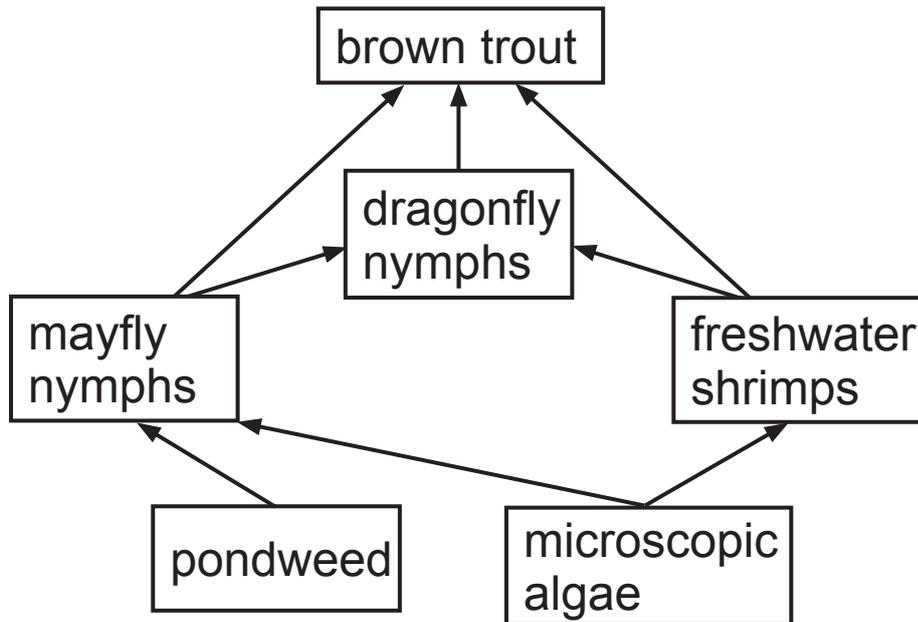
- (i) Describe the overall trend in the number of people with diabetes in Northern Ireland from **2012 to 2016**. Use data from the table to support your answer.
[2 marks]

- (ii) Suggest **one** reason for this trend. [1 mark]

- (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 marks]

_____ %

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



(a) Name a producer in this food web. [1 mark]

(b) Give the **two** trophic levels the brown trout is feeding at. [2 marks]

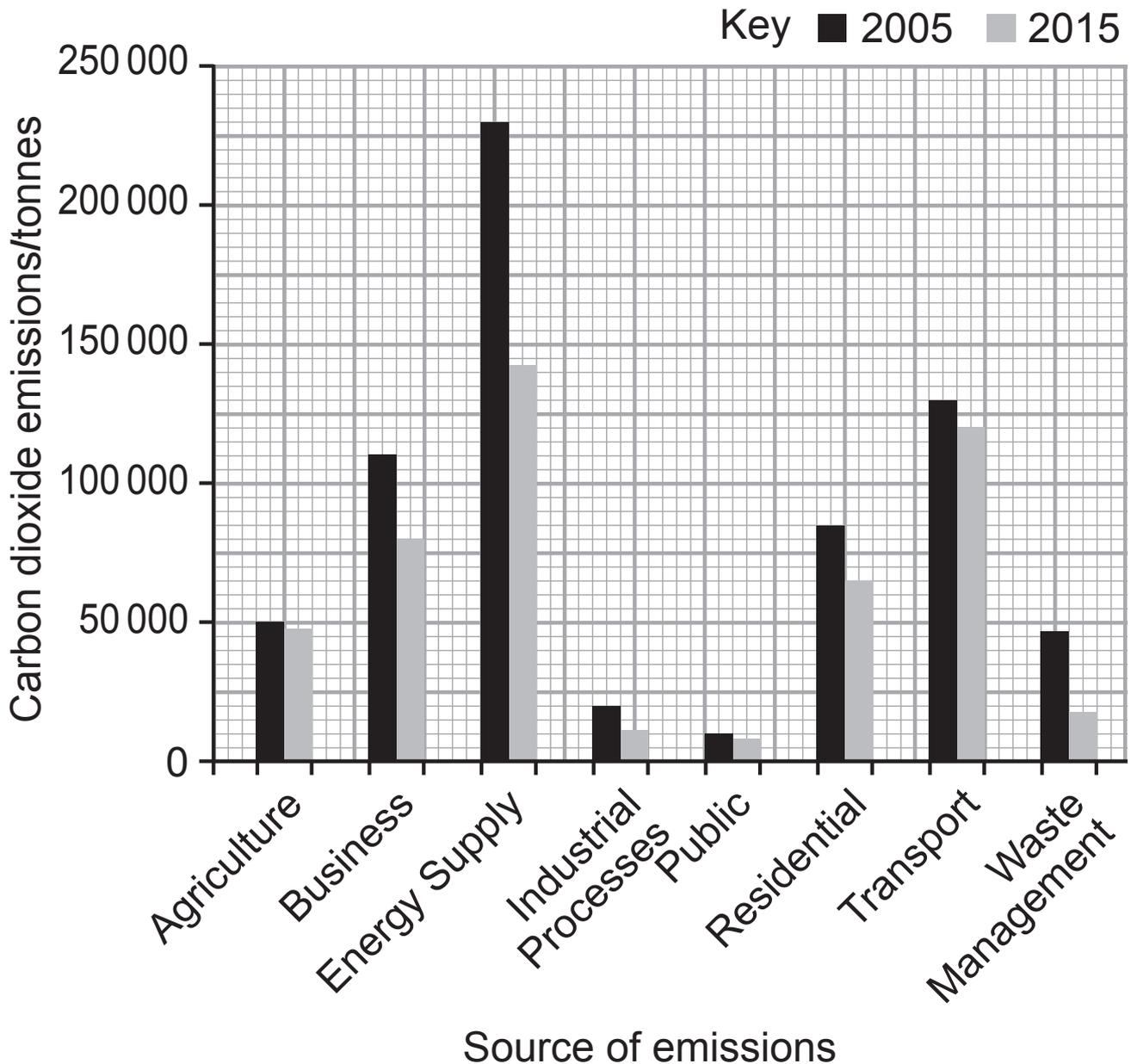
_____ and _____

(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 marks]

(d) Explain why short food chains are more energy efficient than long food chains. [3 marks]

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



- (a) How many tonnes of carbon dioxide were emitted by transport in 2005? [1 mark]

_____ tonnes

- (b) Give the source that had the greatest reduction in tonnes of carbon dioxide emitted between 2005 and 2015.
[1 mark]
-

Three statements are given in the table below.

- (c) Using the data in the graph opposite write a tick (✓) in the box which describes each statement. [3 marks]

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.			

- 7 The table below gives some information about aerobic and anaerobic respiration in **muscle**.

Complete the table by writing either **Yes** or **No** in each of the empty boxes. [4 marks]

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

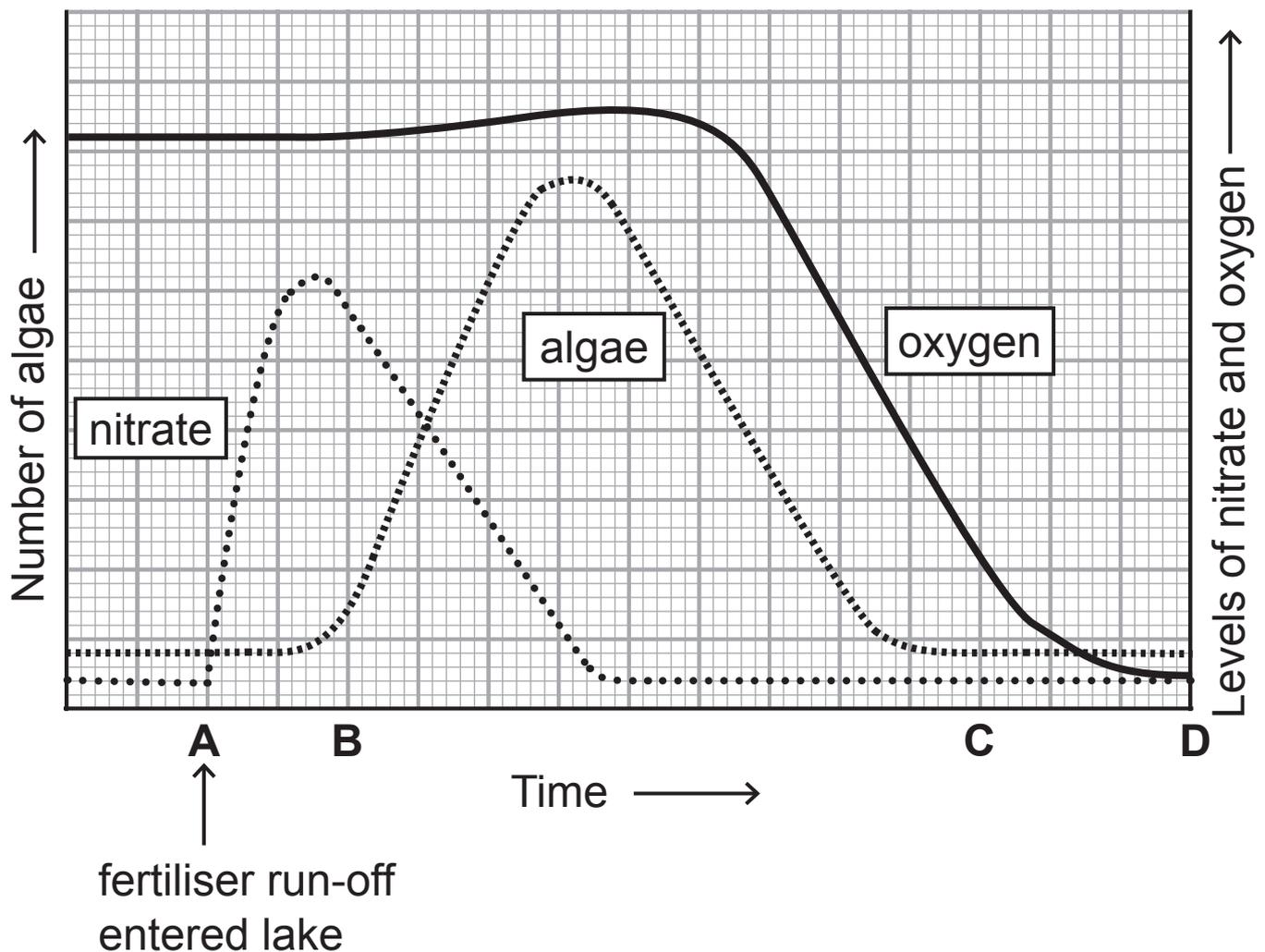
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(Questions continue overleaf)

8 The graph shows:

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

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



- (a) Describe and explain the changes in the number of **algae** in the lake between times **A** and **C**.
[1 mark for description, 2 marks for explanation]

Description _____

Explanation _____

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

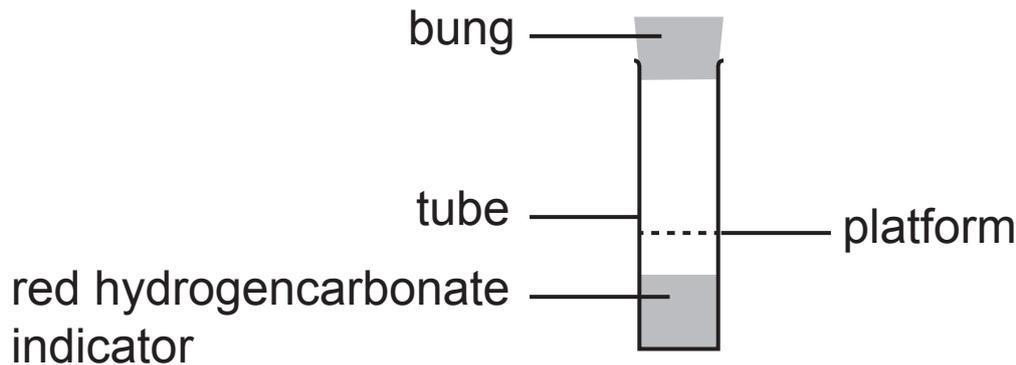
(i) Explain why the oxygen levels **increased**. [1 mark]

(ii) Explain why the oxygen levels **decreased**.
[3 marks]

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(Questions continue overleaf)

- 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 containing hydrogencarbonate indicator. She recorded the time taken for the indicator in each tube to turn yellow. The diagram shows the experimental set-up.



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 that respired the fastest. Give a reason for your choice. [2 marks]

Type of animal

Reason

(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 marks]

(ii) Explain the student's result for the spinach leaves.
[2 marks]

Spinach leaves contain more chlorophyll than cabbage leaves.

(iii) Explain how the colours of the hydrogencarbonate indicator shown in the table above support this statement. [1 mark]

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(Questions continue overleaf)

10 The nitrogen cycle involves several types of nitrogen bacteria.

(a) What is the role of nitrogen-fixing bacteria? [1 mark]

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

(b) Use the information in the table on page 24 to give the soil A, B or C which has the lowest **nitrate** content.
Explain your answer.

[1 mark for soil, 2 marks for explanation]

Soil _____

Explanation _____

(c) In soils that lack oxygen, plants cannot absorb enough nitrates from the soil to grow well.
Explain why. [3 marks]

THIS IS THE END OF THE QUESTION PAPER

SOURCES

Q1(a)© Graham Jordan / Science Photo Library

Q1(b)Source: Chief Examiner

Q3(c).....Facts & Figures: Annual diabetes prevalence figures © The British Diabetic Association operating as Diabetes UK

Q6.....Source: naei.beis.gov.uk © Crown 2018 copyright Defra & BEIS via naei.beis.gov.uk, licenced under the Open Government Licence (OGL).

Q8.....Source: Chief Examiner

Q9.....Source: Principal Examiner

Q10.....Source: Principal Examiner

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Question Number	Marks
1	
2	
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9	
10	
Total Marks	

Examiner Number

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