New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011–2012

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

GSD11

TUESDAY 15 MAY 2012, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all seven** 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 Questions **3(a)(v)** and **7(b)**.

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

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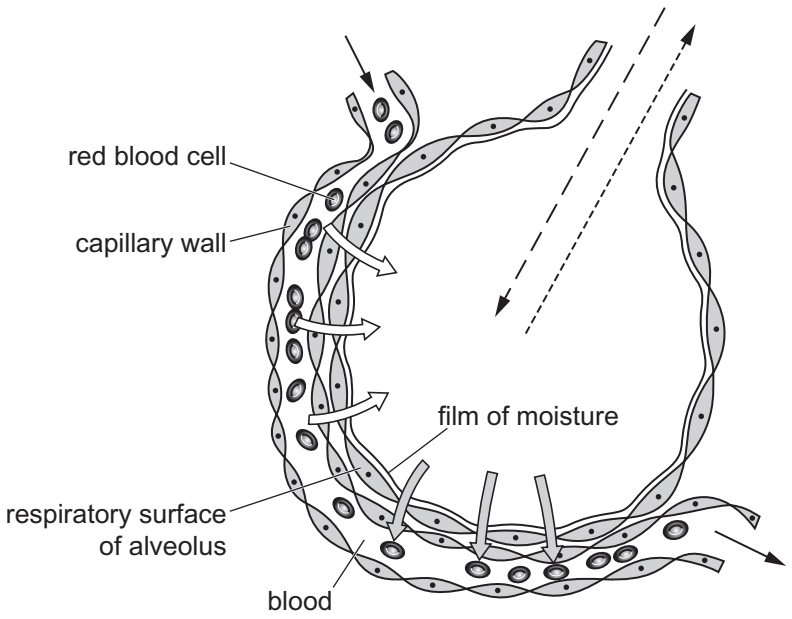
Examiner Only	
Marks	Remark

1 The lungs have many small air sacs called alveoli. Gas exchange occurs across the surface lining of the alveoli. The diagram shows a single alveolus and blood capillary.



(a) Use the diagram to give **three** ways in which the alveolar respiratory surface is adapted for gas exchange.

1. _____

2. _____

3. _____ [3]

The table below gives the percentage composition of gases from two air samples.

Gas	Percentage composition	
	Sample A	Sample B
Nitrogen	79	79
Oxygen	21	16
Carbon dioxide	0.04	4

(b) Sample B is from exhaled air. Explain how you know this.

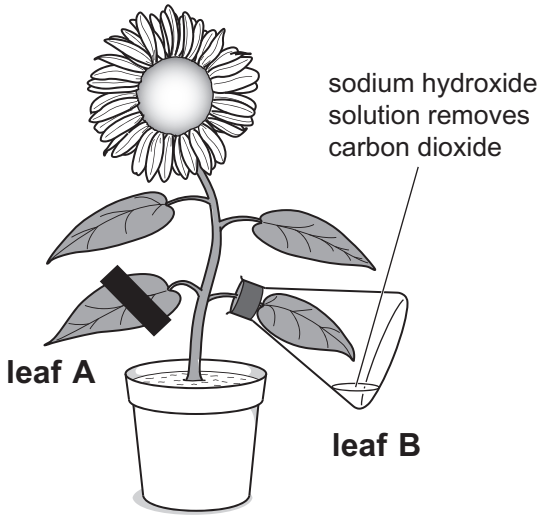
_____ [1]

(c) What is the function of cell respiration?

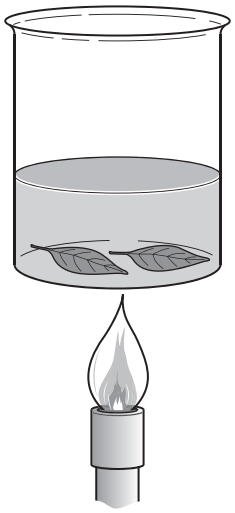
_____ [1]

2 The diagrams show the procedure used to investigate factors necessary for photosynthesis. A positive starch test will show that photosynthesis has taken place.

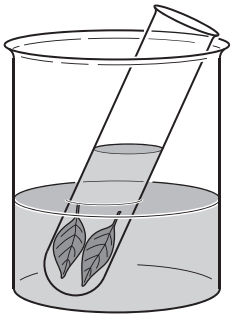
stage 1 plant put in darkness for 48 hours



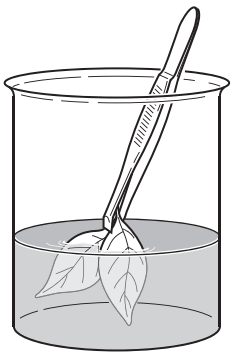
stage 2 plant put into light and treated as shown



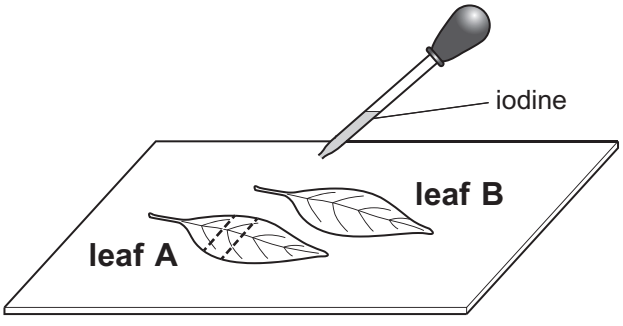
stage 3 leaf A and leaf B removed and put into boiling water



stage 4 leaves put into hot alcohol



stage 5 leaves put into hot water



stage 6 leaves tested for starch

(a) Why was the plant placed in darkness for 48 hours in stage 1?

_____ [1]

(b) Why were the leaves boiled in water for a few minutes in stage 3?

_____ [1]

(c) Describe and explain the results you would expect for leaf A and leaf B.

Leaf A _____

_____

_____

_____ [3]

Leaf B _____

_____

_____ [2]

Examiner Only	
Marks	Remark

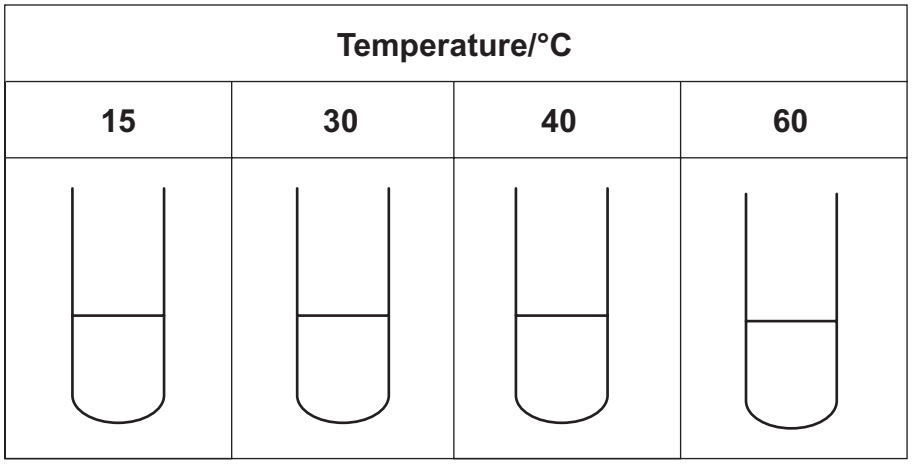
Examiner Only	
Marks	Remark

3 Some washing powders contain enzymes which help to break down stains on clothes. A student tested two enzymes (enzyme 1 and enzyme 2) to find which was more effective at breaking down fat stains on clothing over a range of temperatures.

(a) (i) Name the enzyme that breaks down fats.

_____ [1]

The diagram shows the experimental set-up the student used to find out the time taken to break down fat in the test tubes.



(ii) What substances would need to be present in each of the test tubes?

_____ and _____ [1]

(iii) Give **two** variables that the student should have kept the same.

1. _____

2. _____ [2]

(iv) What are fats broken down into?

_____ and _____ [2]

The table shows the student's results using the two enzymes.

	Time taken to break down fat/minutes	
Temperature/°C	**Enzyme 1**	**Enzyme 2**
15	30	40
30	10	20
40	15	18
60	50	120

(v) Most washes in washing machines are carried out at temperatures between 30 °C and 60 °C and the washing cycle lasts no more than 90 minutes.

Describe and explain the results for the two enzymes and explain why enzyme 1 is more effective when added to washing powder.

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

[6]

Examiner Only

Marks	Remark

(b) (i) Starch present in foods can also stain clothes. It is broken down by a different type of enzyme. Name the enzyme involved.

_____ [1]

(ii) Suggest why this enzyme would not break down fat stains.

_____

_____ [1]

(iii) When starch is broken down, it is converted into glucose. Describe how you would carry out a food test for glucose and the results you would obtain if glucose was present.

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

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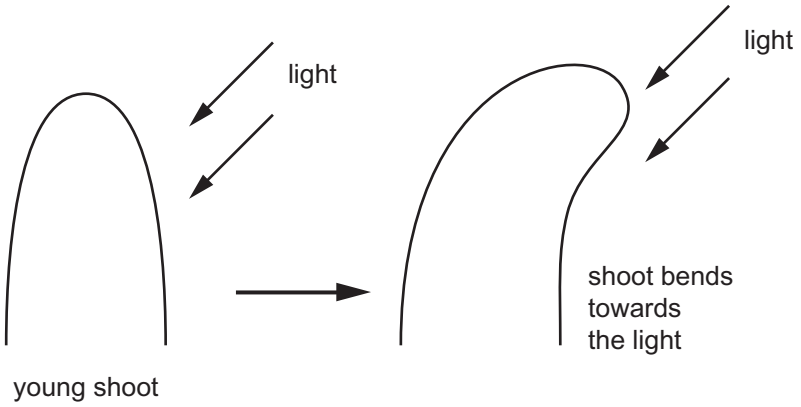
Examiner Only	
Marks	Remark

4 The diagram shows the growth response of a young shoot to light from one direction.



(a) (i) Name the growth response shown by the young shoot.

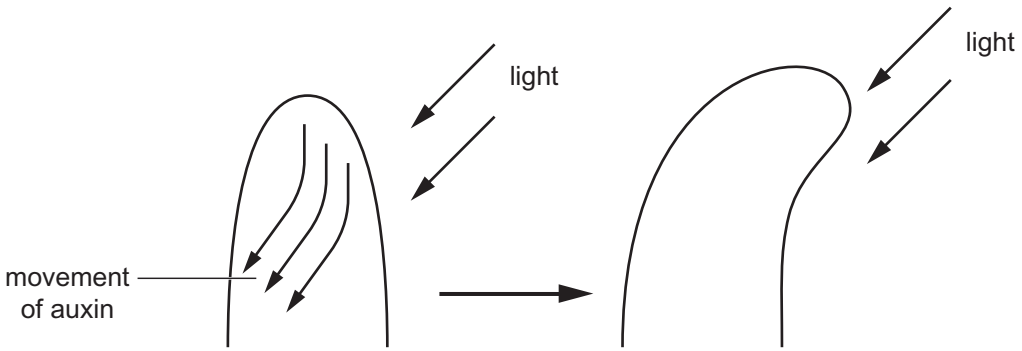
_____ [1]

(ii) Auxin is the substance that causes this growth response.

What type of substance is auxin?

_____ [1]

The diagram shows the movement of auxin in the shoot tip.



(b) Suggest how bending of the shoot tip is brought about by auxin.

_____

_____

_____ [2]

(c) (i) Auxin is a chemical messenger in plants. Name the chemical messenger in humans that regulates blood glucose levels.

_____ [1]

(ii) Name the target organ for this chemical messenger.

_____ [1]

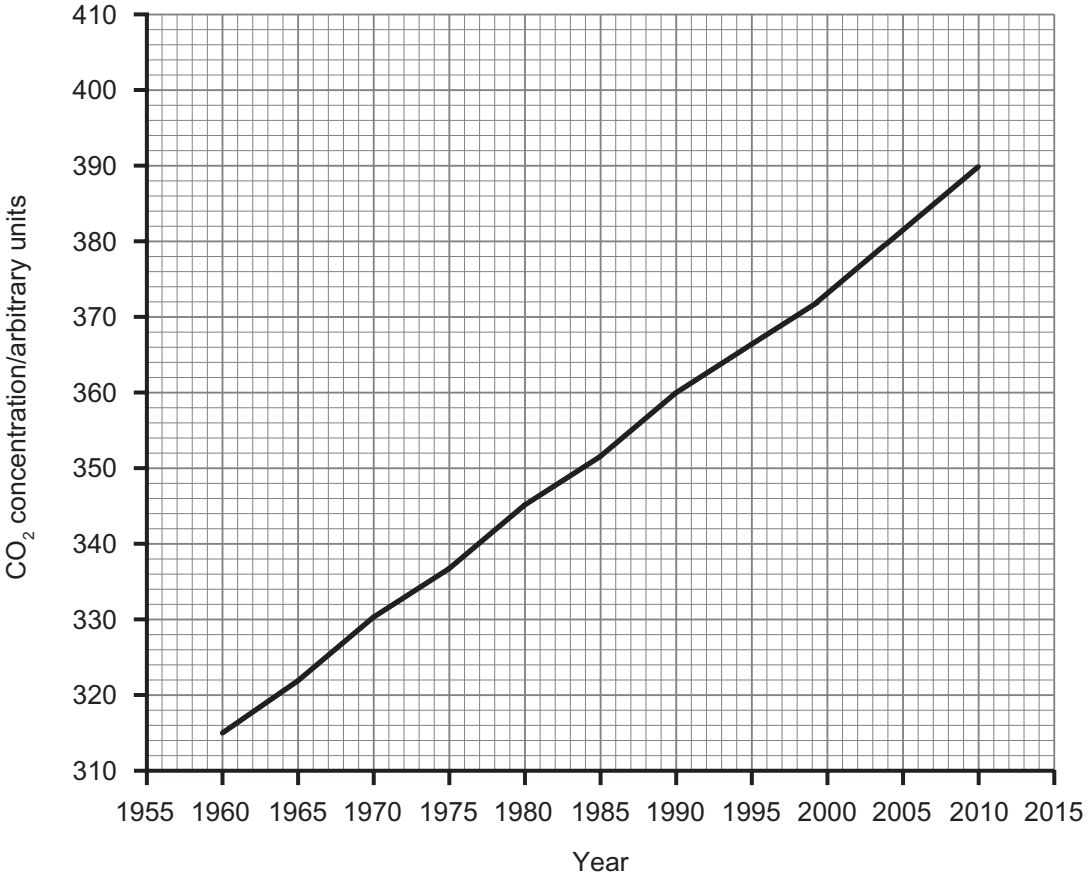
(iii) Give **one** difference between the ways these two chemical messengers are transported.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 **(a)** The graph shows the carbon dioxide concentration in the air in Hawaii from 1960 to 2010.



(i) Describe the trend shown in the graph.

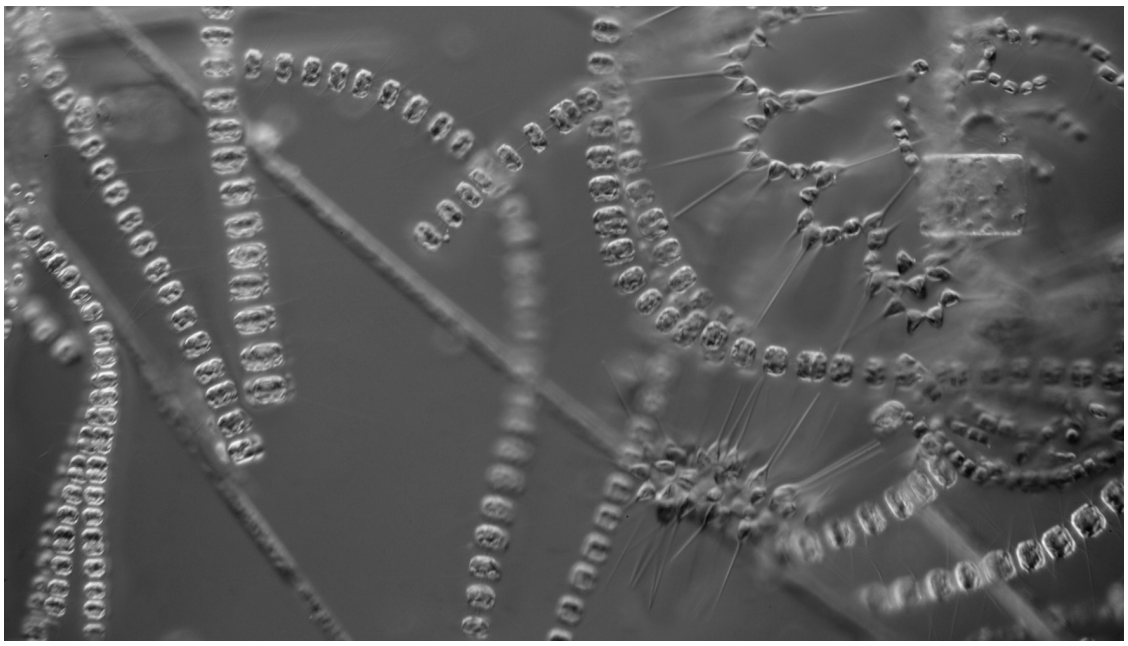
_____ [1]

(ii) Use the graph to suggest what the carbon dioxide concentration in the air will be in 2015.

_____ arbitrary units [1]

Changes in the climate affect the seas and the organisms living in them.

The photograph shows phytoplankton, tiny floating plants found in the sea.



© Wim Van Egmond, Visuals Unlimited / Science Photo Library

Phytoplankton numbers and pattern of distribution are affected by climate change, water temperature and mineral levels in the water.

The impact of climate change on certain species can be used to monitor environmental change.

(b) What are these type of species called?

_____ [1]

(c) Before 1960, one particular species of phytoplankton was only found in the sea around the south coast of England. It is now also found in the sea around Scotland.

Suggest and explain why this species of phytoplankton is now found in the sea around Scotland.

_____

_____ [2]

Examiner Only

Marks	Remark

(d) Every year, off Alaska, as the sea warms up during the spring, the currents change and bring up minerals from the depths. This causes a massive increase in the numbers of phytoplankton in the sea.

Herring that feed on the phytoplankton provide food for the gulls, sea lions and humpback whales that travel thousands of miles from the equator to feed on the herring in the summer.

(i) What is the energy source for this food web?

_____ [1]

(ii) Explain the importance of mineral nitrates to this food web.

_____

_____ [2]

(iii) Using the information given, draw the food web showing all the organisms mentioned.

[2]

(iv) Describe and explain what will happen to the number of sea lions if the number of phytoplankton decreases.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

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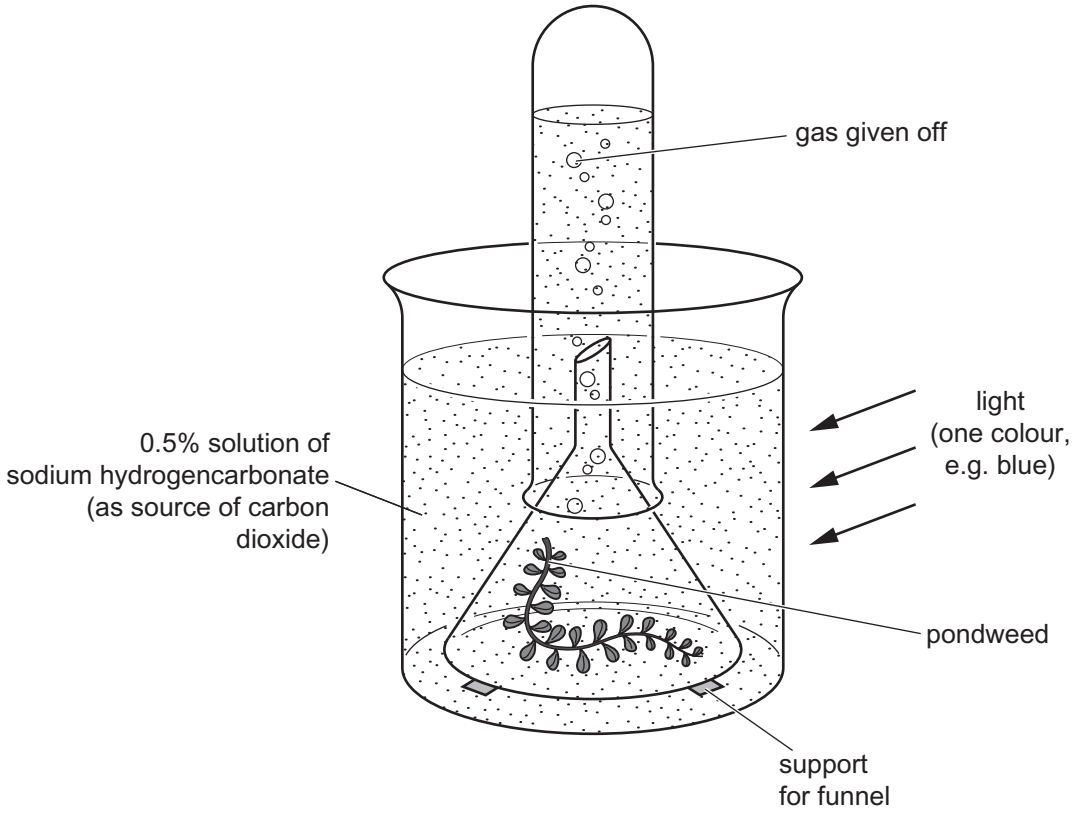
Examiner Only	
Marks	Remark

6 **(a)** Complete the word equation for photosynthesis.

$$\text{\_\_\_\_\_} + \text{water} \xrightarrow[\text{sunlight}]{\text{chlorophyll}} \text{glucose} + \text{\_\_\_\_\_} \quad [2]$$

(b) Normal light is made up of different individual colours. A student carried out an experiment to test the effect of different individual colours on the rate of photosynthesis. The diagram shows the apparatus he used.

The pondweed was exposed to one colour of light, e.g. blue, for five minutes and then the number of bubbles of gas given off in 10 minutes was recorded. He repeated the experiment with different individual colours of light.

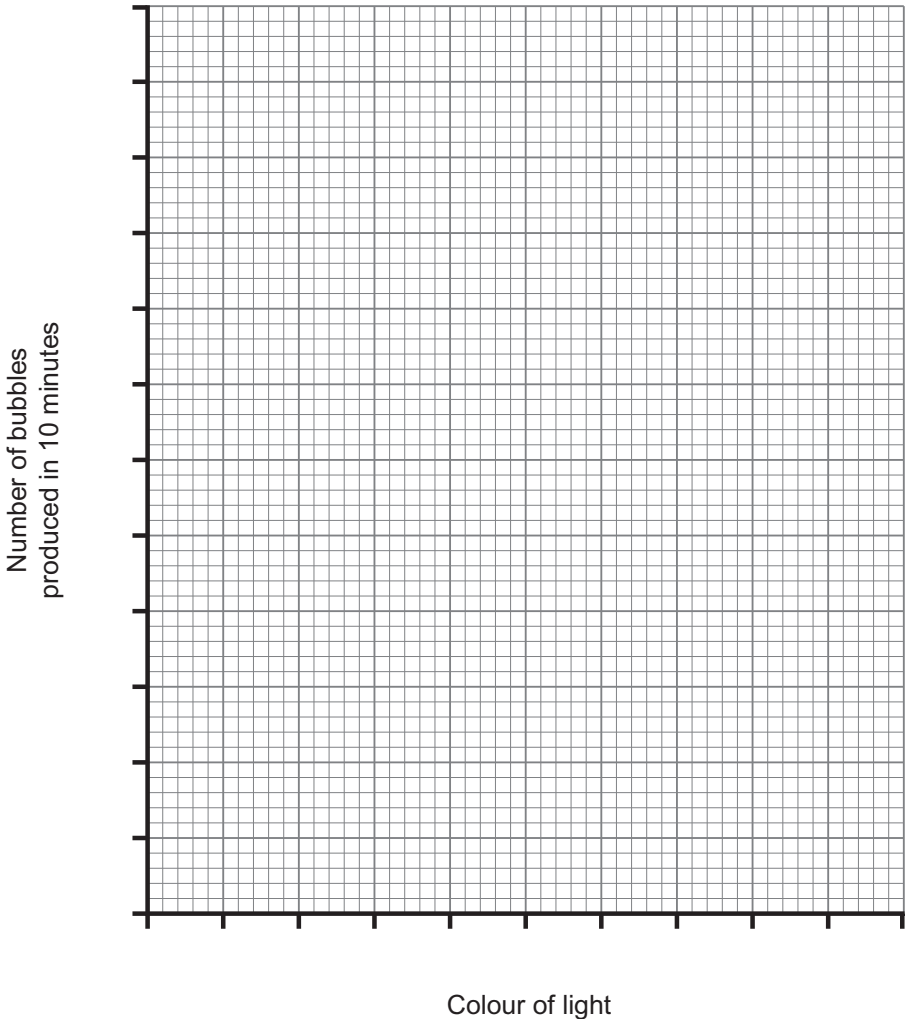


Source: Adapted from 'Understanding Biology: Through Problem Solving' by TH Hoey, Nelson Thornes, ISBN-0216929385

The table shows the results of the experiment.

Colour of light	Number of bubbles produced in 10 minutes
Violet	80
Blue	110
Green	40
Yellow	50
Red	90

(i) Scale the axes below and draw a **bar chart** to show these results.



[4]

(ii) Suggest why measurements were only taken after the pondweed had been left for five minutes in each individual colour of light.

_____

_____ [1]

Examiner Only

Marks	Remark

(iii) Give **one** factor that should be kept constant during the experiment.

_____ [1]

(iv) The photograph shows a geranium plant.

Source: Principal Examiner

Using the results from the experiment, explain why a grower would use blue light to maximise profit when growing geraniums.

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

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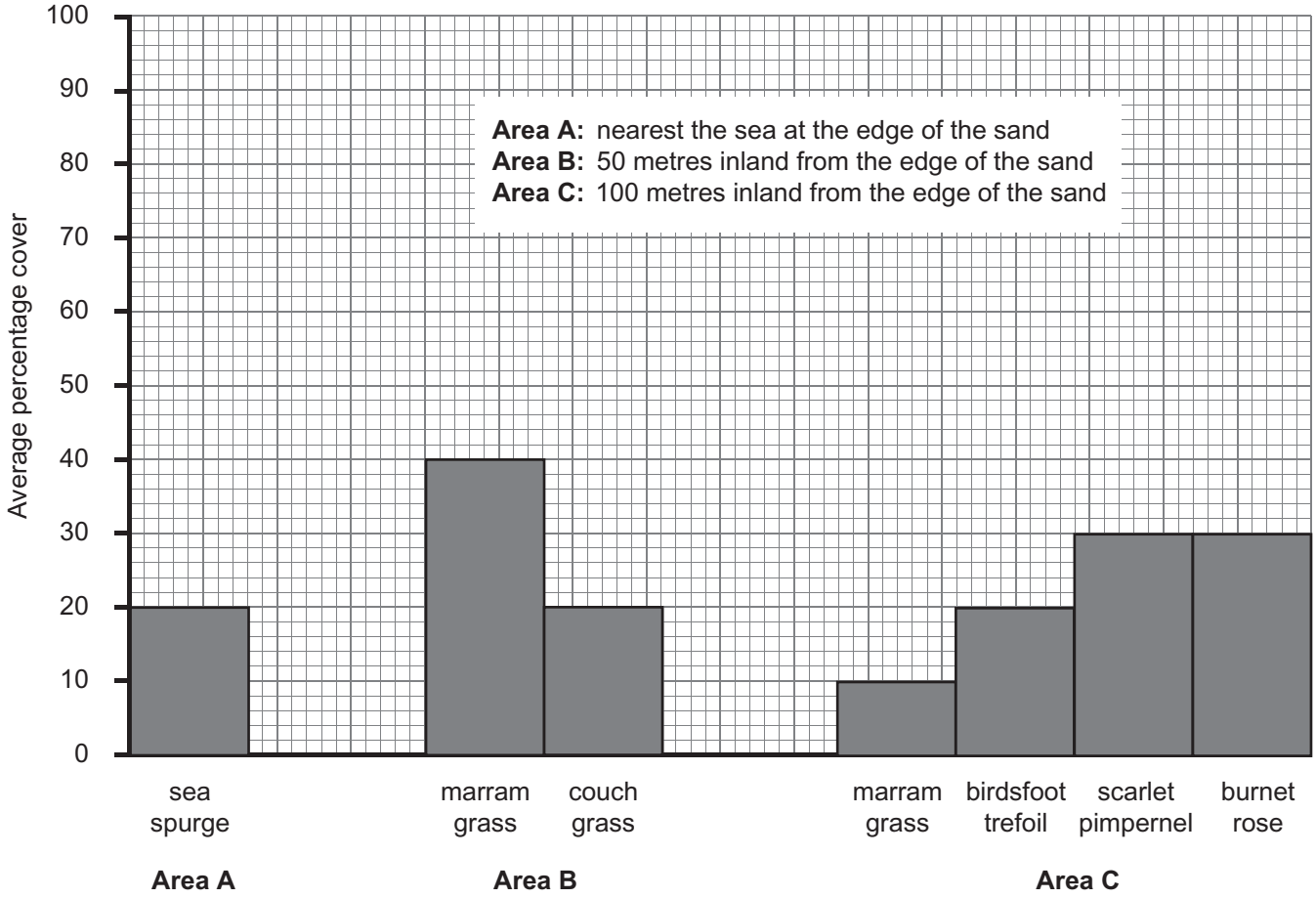
7 **(a)** Pupils carried out an investigation into plant distribution and physical (abiotic) factors on sand dunes in April. The graph below shows their results for the plant distribution.



(i) Give **two** trends shown by the graph across the three areas.

1. _____

2. _____ [2]

(ii) Suggest **one** explanation for these trends.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(b) Describe how the pupils would have carried out this investigation into plant distribution. Your account should describe how they would have measured **one** physical factor.

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

[6]

(c) The pupils also collected snails in the different areas of the dunes. The results from one group of pupils are given in the table.

Area A	Area B	Area C
5	8	15

(i) Suggest why the pupils found most snails in **Area C**.

[1]

(ii) If the pupils repeated the experiment in June, suggest why they would have found more snails in all the areas.

[1]

THIS IS THE END OF THE QUESTION PAPER

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