



ADVANCED
General Certificate of Education
January 2012

Centre Number

71

Candidate Number

Biology
Assessment Unit A2 1
assessing
Physiology and Ecosystems

[AB211]

**WEDNESDAY 25 JANUARY, MORNING****TIME**

2 hours.

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.

There is an extra lined page at the end of the paper if required.

Answer **all nine** questions.

You are provided with **Photographs 1.6A and 1.6B** for use with Question 6 in this paper.

Do not write your answers on these photographs.

INFORMATION FOR CANDIDATES

The total mark for this paper is 90.

Section A carries 72 marks. Section B carries 18 marks.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

You are reminded of the need for good English and clear presentation in your answers. Use accurate scientific terminology in all answers.

You should spend approximately **25 minutes** on Section B.

You are expected to answer Section B in continuous prose.

Quality of written communication will be assessed in **Section B**, and awarded a maximum of 2 marks.

For Examiner's use only

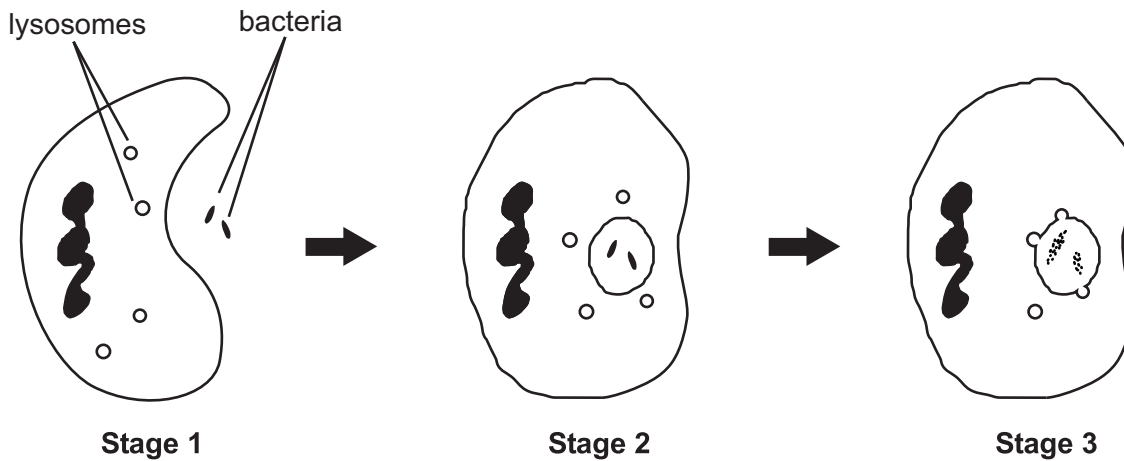
Question Number	Marks
1	
2	
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9	

Total Marks

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Section A

1 The diagram below summarises the process of phagocytosis.



Describe what is happening between stages 1 and 2, and between stages 2 and 3.

(a) Between stages 1 and 2

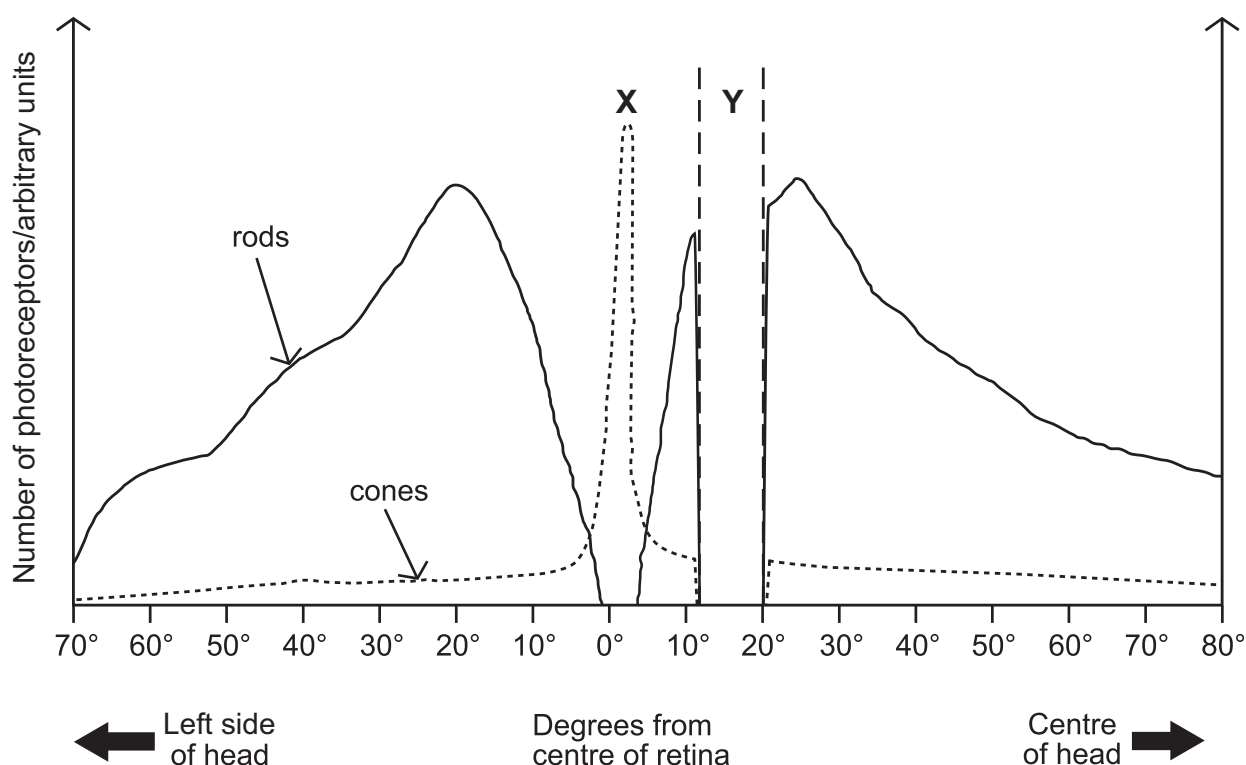
[1]

(b) Between stages 2 and 3

[2]

Examiner Only	
Marks	Remark

- 2 (a) Photoreceptor cells (rods and cones) are not distributed evenly across the retina. The diagram below shows the distribution of rods and cones across the retina of the human left eye.



- (i) Name regions of the retina represented by X and Y.

X _____

Y _____

[2]

- (ii) The diagram shows that there are more photoreceptor cells (rods and cones) at the edge of the retina closest to the centre of the head compared to the edge closest to the side of the head. Suggest a reason for this.

 _____ [1]

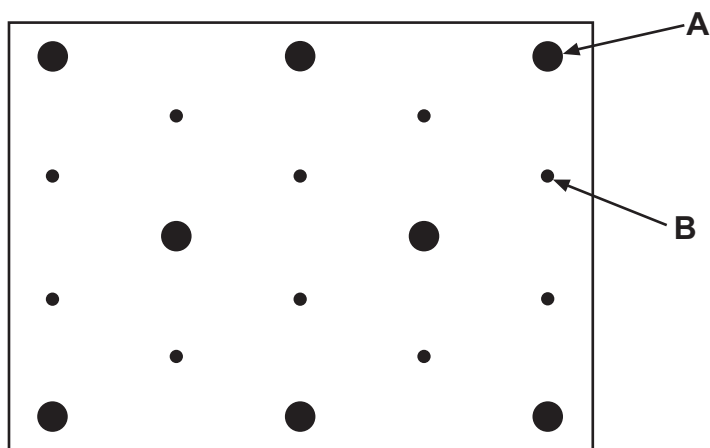
- (iii) Peripheral vision can be described as vision at the limits of our field of view. With reference to both rods and cones, explain why peripheral vision has reduced visual acuity.

 _____ [2]

Examiner Only	
Marks	Remark

[3]

[Turn over



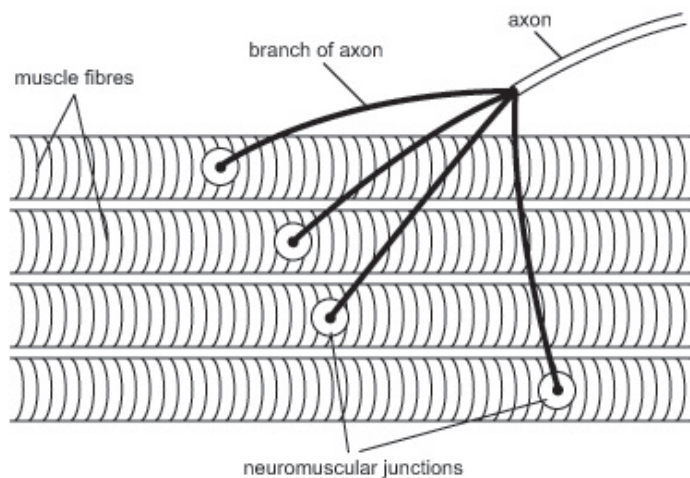
- A**

B _____ [2]

-
- [1]

-
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- [3]

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- (i) In terms of outcome, identify the main difference between neuromuscular junctions and neurone to neurone synapses in the nervous system.

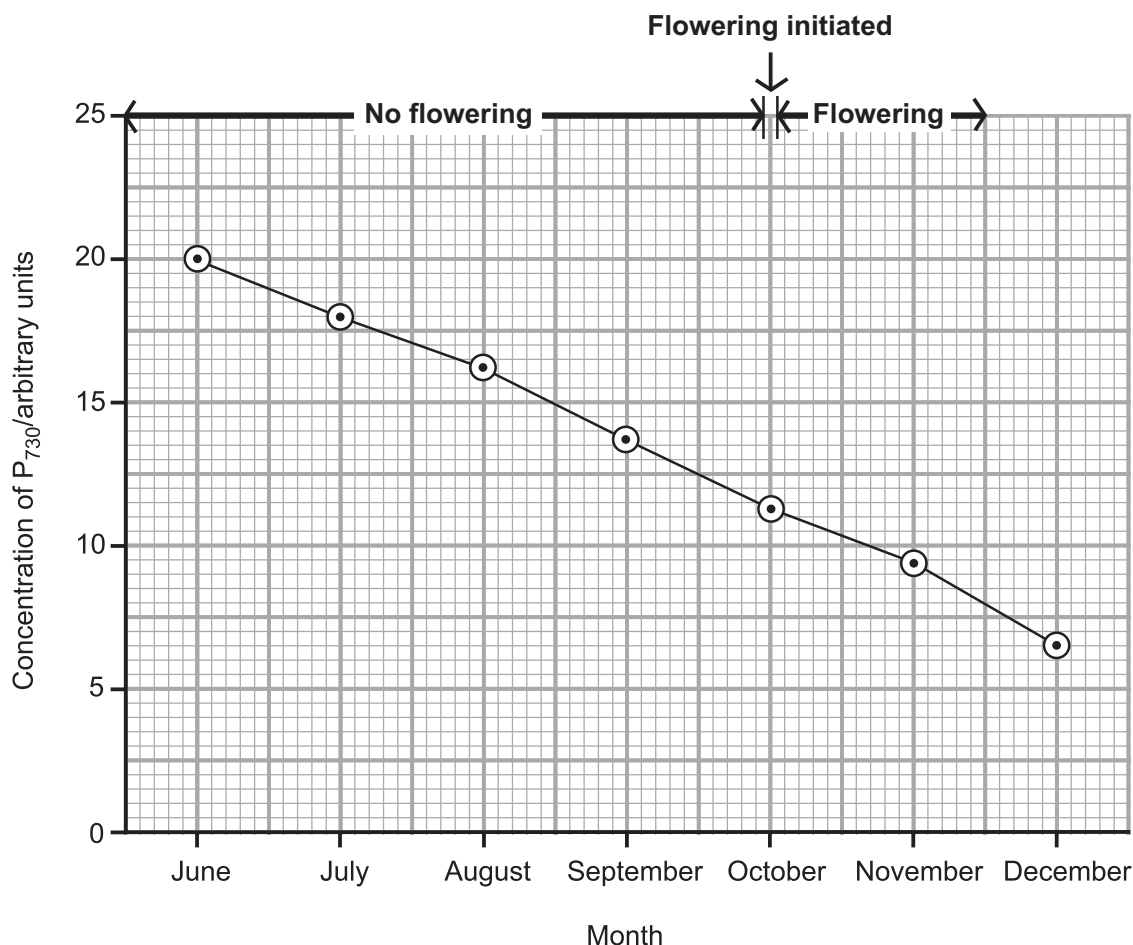
[1]

- (ii)** The diagram shows that the axon of one motor neurone branches to supply a number of muscle fibres. Suggest a reason for this.

[1]

Examiner Only	
Marks	Remark

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- (i) Explain how the results indicate that the plant species investigated is a short-day plant.

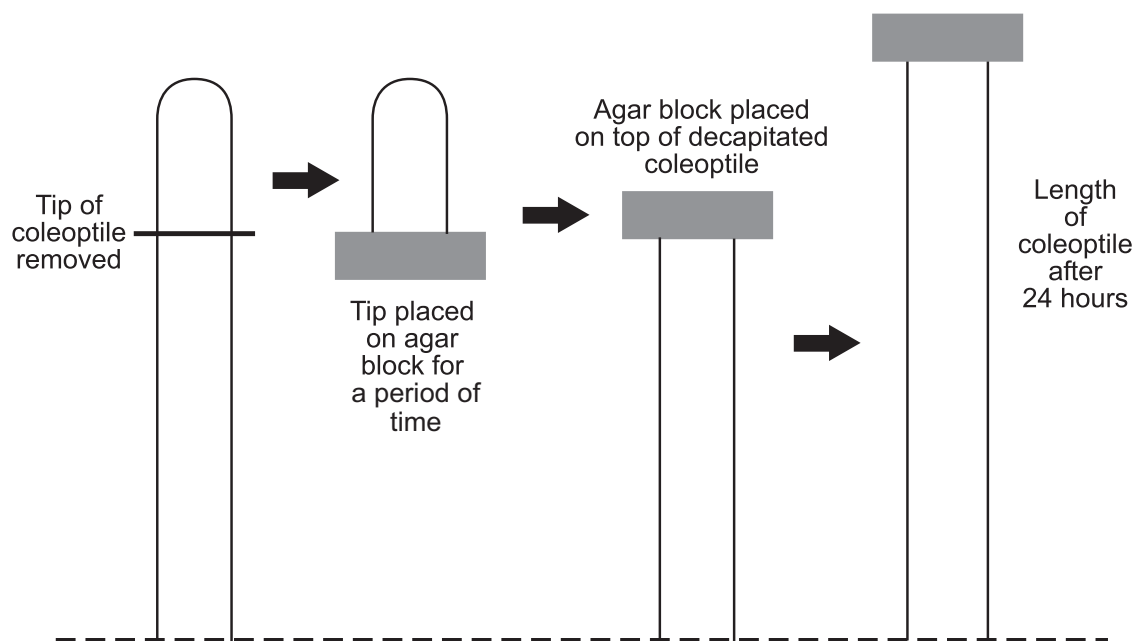
[1]

- (ii) It is commercially important that fresh flowers are available at Christmas time. Describe how the photoperiod should be manipulated to ensure flowering is delayed until December. Explain why this would be effective.

[2]

Examiner Only	
Marks	Remarks

- (b) Fritz Went was one of the scientists who investigated plant growth hormones. In 1928 he carried out the following experiment.

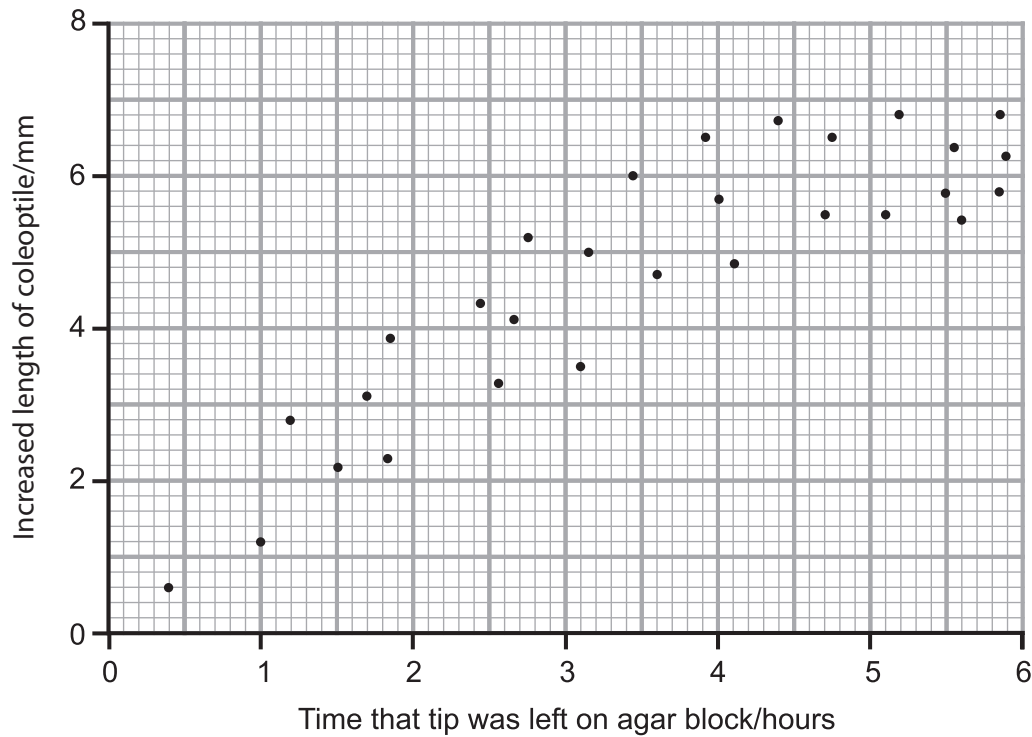


- (i) Explain the change in the length of the coleoptile after 24 hours.

[2]

Examiner Only	
Marks	Remark

Such experiments have indicated that the increased length of decapitated coleoptiles is dependent on the length of time that the coleoptile tip was left on the agar block. The results are shown on the graph below.



(ii) Describe and explain fully these results.

[3]

(iii) Suggest **one** reason to account for the high degree of variability in the results.

[1]

Examiner Only	
Marks	Remark

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X _____ **[1]**

Photograph 1.6A

Photograph 1.6B _____ [2]

(i) State precisely where ADH is produced in the body.

[1]

(ii) State where most water reabsorption takes place in the kidney. State also the process by which this water is reabsorbed.

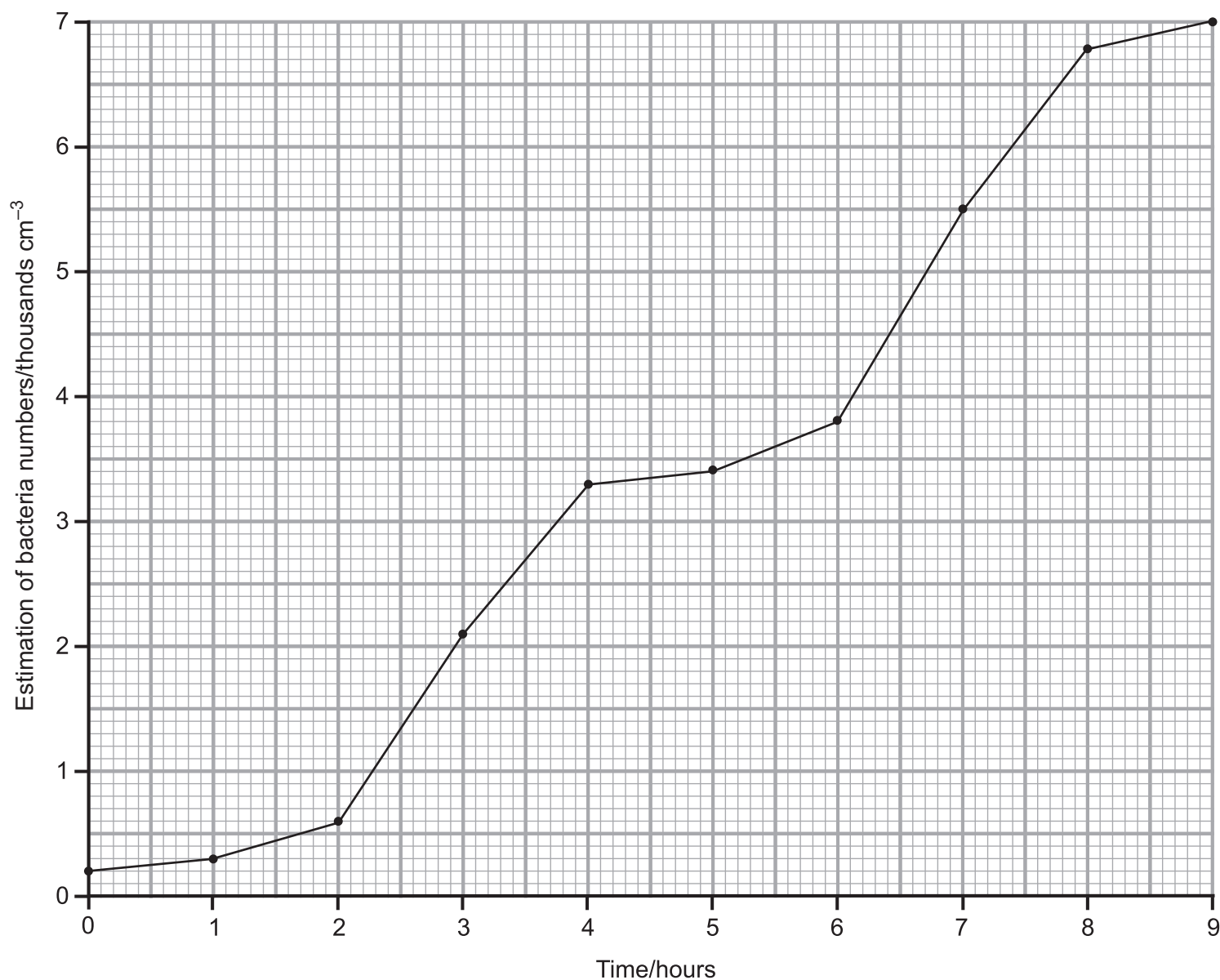
[2]

Examiner Only	
Marks	Remarks

7 Bacteria growing in laboratory cultures typically show an exponential growth pattern.

A particular species of bacterium was grown in culture with two food sources, glucose and maltose. The bacteria utilise the glucose first as a food source. However, they can use maltose as a food source when glucose supplies run low. Unable to use maltose directly, the bacteria produce enzymes to hydrolyse it into glucose.

The growth curve produced is shown on the graph below.



- (a) Calculate the hourly rate of growth between 2 and 4 hours.
(Show your working.)

Examiner Only	
Marks	Remark

Answer _____ thousands cm⁻³ hr⁻¹ [2]

[4]

- (c) Traditionally, bacterial numbers are counted using the technique of serial dilution and then counting the numbers of bacteria under the microscope. However, in this experiment the bacterial numbers were estimated using a colorimeter.

- (i) Describe how a colorimeter could be used to estimate bacterial numbers.

[3]

- (ii) Suggest **one** advantage of using a colorimeter in this experiment.

[1]

Examiner Only	
Marks	Remarks

Some species of wasps are parasitic on the holly leaf miners. These wasps also have an egg-laying tube by which an egg is deposited inside the holly leaf miner larva. After the wasp larva hatches from its egg it feeds on the miner larva for a period of time. As the holly leaf miner larva is consumed from within, it will eventually die. Just before this happens the wasp (now an adult) emerges from the leaf through its own exit hole which is distinctly different from the holly leaf miner exit hole. In any one holly tree, the number of miners subject to parasitic attack varies, but normally some miners survive to exit the leaf, mate, and continue the cycle.

- (a)** Draw a labelled pyramid of numbers representing the organisms listed in the passage.

[2]

- (b)** Using the information provided, state why the wasps are categorised as parasites and not predators.

[1]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

Examiner Only	
Marks	Remark

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Examiner Only	
Marks	Remark

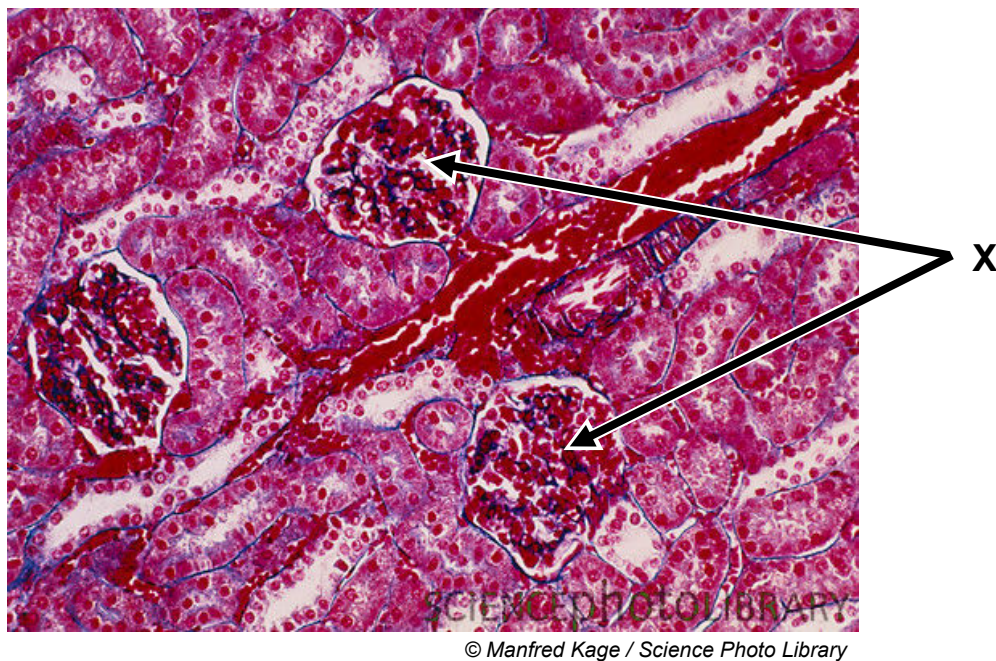
THIS IS THE END OF THE QUESTION PAPER

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GCE Biology Advanced (A2)
Assessment Unit A2 1
Physiology and Ecosystems
January 2012

Photographs 1.6A and 1.6B
(for use with Question 6)

Photograph 1.6A



Photograph 1.6B

