



Rewarding Learning

ADVANCED
General Certificate of Education
2012

Centre Number

71

Candidate Number

Biology

Assessment Unit A2 1

assessing

Physiology and Ecosystems

[AB211]

MONDAY 14 MAY, 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 **Photograph 1.4** for use with Question 4 in this paper.

Do not write your answers on this photograph.

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	
3	
4	
5	
6	
7	
8	
9	

Total Marks

Section A

- 1 (a) The table below concerns two plant hormones and their functions. Complete the table.

Hormone	Function
Cytokinin	
	promotes elongation of internodal regions

[2]

- (b) Many people grow plants in pots on window ledges. The plants will only grow straight if they are turned frequently.

A particularly fast-growing plant was placed on a window ledge and turned occasionally. It did not grow straight but developed a 'corkscrew' appearance as shown in the diagram below.



[1]

[1]

[3]

 [1][illegible]

Research in scientific journals is 'peer-reviewed'. This means that other scientists working in the same field review the procedures used and the conclusions derived from the research.

(iii) Explain the importance of peer review in reviewing scientific research.

[2]

Examiner Only	
Marks	Remark

(a) Suggest how the scientists could capture and mark the initial sample of grasshoppers. Your answer should describe the sampling procedure used, the technique used to capture the insects and the marking procedure.

[4]

- (i) Explain why the subsequent sample should not be taken **immediately** after the initial sample.

[1]

8

- (ii) Suggest **two** distinct reasons for obtaining a subsequent sample for analysis so quickly (one day later) after the initial sample was taken.

1. _____

2. _____

_____ [2]

- (c) The table below shows the results obtained from the survey.

Sample	Total number of grasshoppers	Number of marked grasshoppers
Initial sample (caught and marked)	64	64
Subsequent sample (caught for analysis)	42	8

Calculate the estimated population size of grasshoppers in the meadow. (Show your working.)

_____ [2]

- (d) It was proposed that the meadow be designated as a nature reserve since it contained a new species of grasshopper.

Suggest what further work should be carried out by the scientists before recommending special protection for the grasshoppers.

_____ [1]

Examiner Only

Marks Remark

- (e) It was noted that the grasshoppers “use the heat from the sun to raise their body temperature”.

Suggest reasons for this behaviour.

[3]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

(a) (i) State **two** biological processes that contribute to the “self-regulating system” of the Earth and its atmosphere.

(ii) Explain the link between increasing atmospheric carbon dioxide levels and global warming.

[2]

(iii) Suggest how an increased reliance on farming has contributed to global warming.

[2]

7932.03R

- (b) Willow is a fast-growing biofuel that can be harvested after as little as three year's growth.

Explain why the growing of willow plants and its use as a biofuel is advantageous to the environment.

[4]

Examiner Only	
Marks	Remark

A typical male runner can have around 90g of stored glycogen reserves in the liver and a further 350–400g stored in the muscles at the start of a race. During a race, up to 4g of this reserve can be used up each minute. In addition, distance runners lose considerable quantities of sweat, rich in sodium, potassium, calcium, magnesium and other ions.

The isotonic drink *Powerade* provides the following nutritional information.

Nutrition Information – typical values per 100 ml			
Energy	70 kJ	Fat	0 g
Protein	0 g	Of which saturates	0 g
Carbohydrate	3.9 g	Fibre	0 g
Of which sugars	3.9 g	Sodium	0.05 g
Other added nutrients per 100 ml			
Potassium 12.5 mg	Calcium 1.3 mg	Magnesium 0.6 mg	

Source: Powerade – The Coca Cola Company

Isotonic drinks have many advantages. They replace ions lost in sweat and can reduce the depletion of glycogen reserves. The uptake of the ions into the cells also reduces dehydration.

- (a) (i)** How does the data for *Powerade* suggest that sodium is the principal ion lost in sweat?

[1]

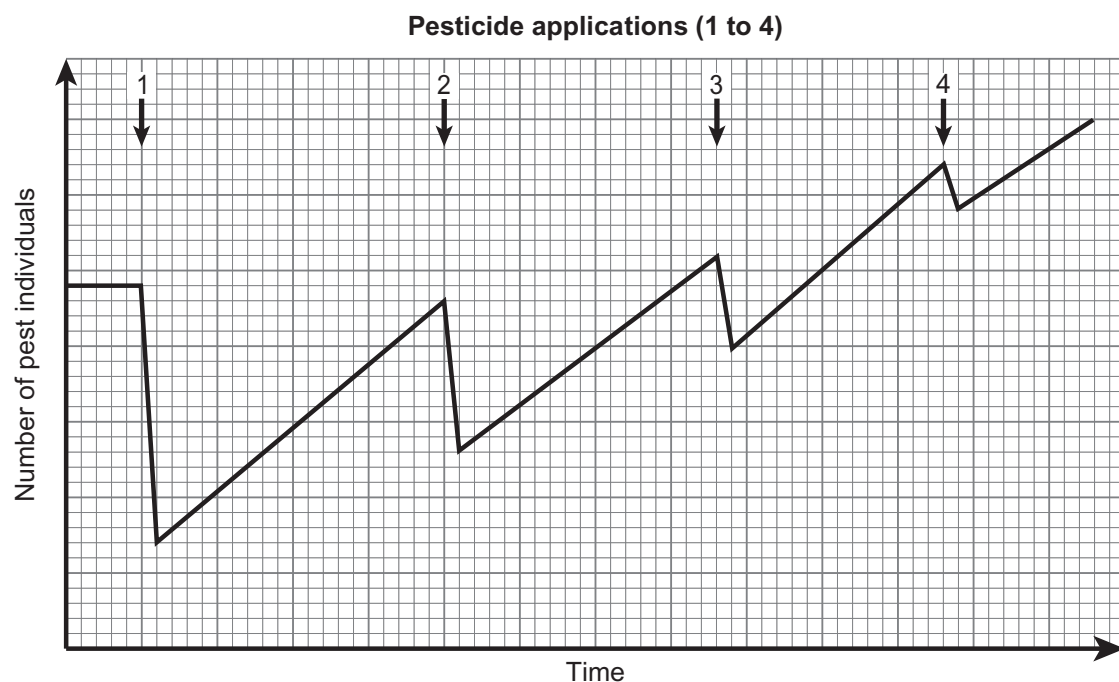
- (ii) Suggest why all the carbohydrate in *Powerade* is in the form of sugars.

[1]

[illegible]

Examiner Only	
Marks	Remark

Many pesticides kill a wide range of insects. The graph below shows the effect of a series of pesticide applications on the numbers of a common pest of maize plants.



Integrated Pest Management Systems involve the use of a range of strategies to combat pests.

(c) Explain how the use of crop rotation and the sterilisation of the males of pest species can reduce the damage caused by pests.

- crop rotation _____

- sterilisation of the males of pest species _____
_____ [2]

Examiner Only	
Marks	Remark

9 An immune response is the way in which the body responds to invasion by a specific antigen. Modern medicine has further developed procedures to influence the body's ability to respond to invading antigens.

- (a) With reference to antibody-mediated immunity, acquired naturally and artificially, describe how humans are protected against disease. [10]
- (b) Tissue to be transplanted (e.g. donor kidneys) contain antigens which may promote an unwanted immune response. Outline the process of transplant rejection and discuss the strategies used to reduce rejection. [6]

Quality of written communication [2]

- (a)** With reference to antibody-mediated immunity, acquired naturally and artificially, describe how humans are protected against disease.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

[illegible]This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

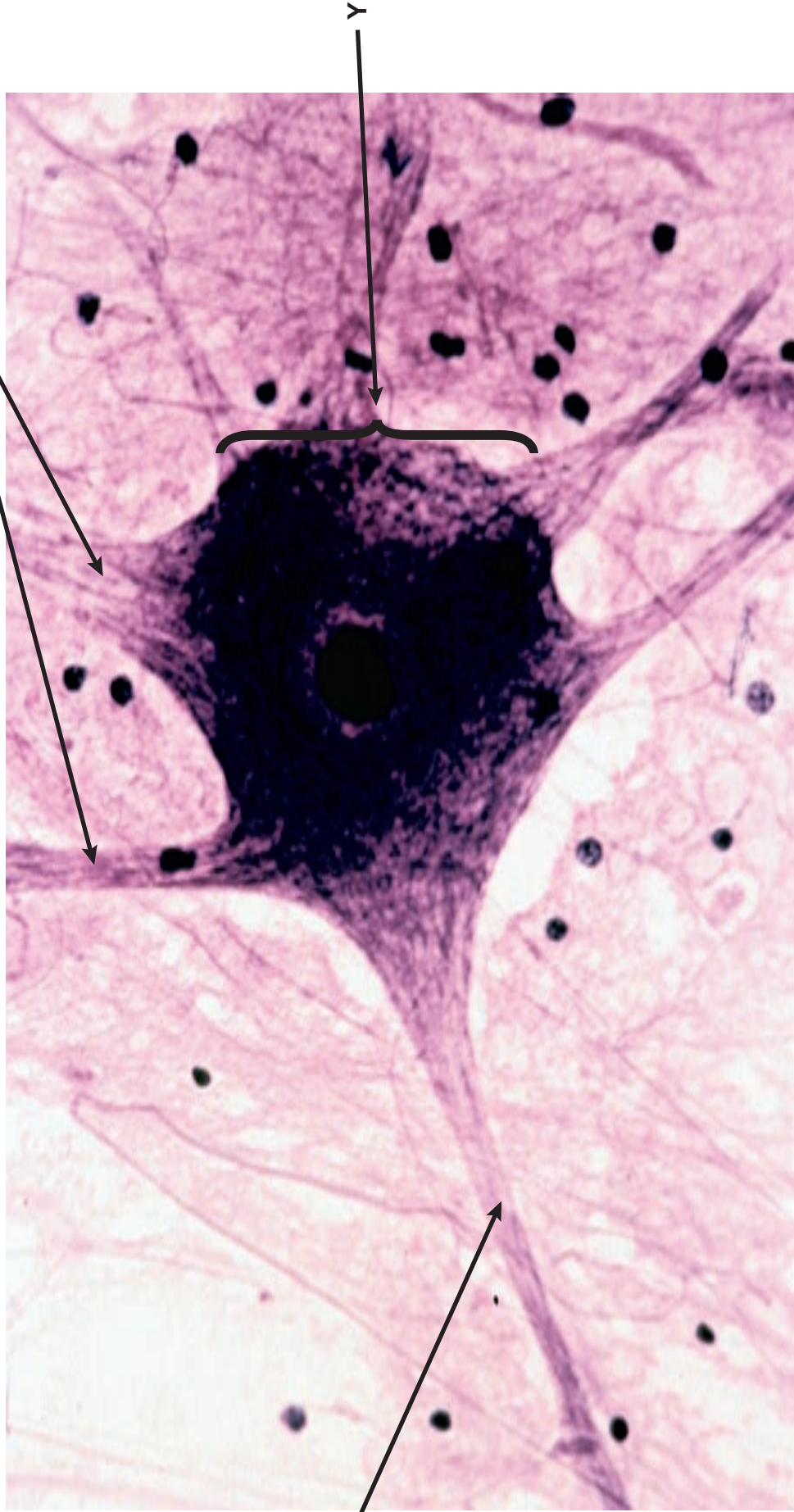
(b) Tissue to be transplanted (e.g. donor kidneys) contain antigens which may promote an unwanted immune response. Outline the process of transplant rejection and discuss the strategies used to reduce rejection.

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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will be happy to rectify any omissions of acknowledgement in future if notified.

Photograph 1.4
(for use with Question 4)



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