



ADVANCED GCE
BIOLOGY
 Central Concepts

2804

Candidates answer on the question paper

OCR Supplied Materials:
 None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Thursday 29 January 2009
Afternoon

Duration: 1 hour 30 minutes



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **90**.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **20** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	12	
2	16	
3	10	
4	13	
5	13	
6	13	
7	13	
TOTAL	90	

Answer **all** the questions.

- 1 Respiration is the process by which chemical energy in organic molecules is released by oxidation. This energy is then made available to living cells in the form of ATP (adenosine triphosphate).

Fig. 1.1 represents the structure of ATP.

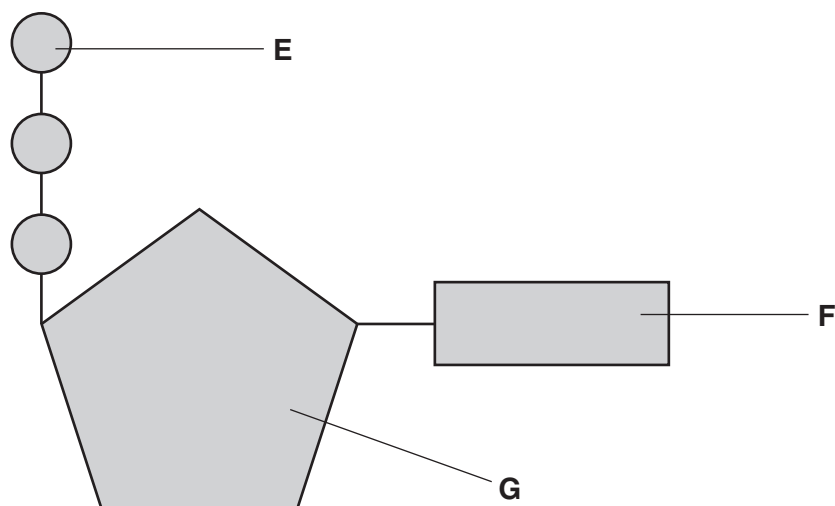


Fig. 1.1

- (a) Name the parts of the molecule labelled **E**, **F** and **G**.

E

F

G [3]

- (b) ATP can be converted to ADP (adenosine diphosphate) and Pi (inorganic phosphate). This reaction releases energy.

- (i) Name the molecule that reacts with ATP to release energy **and** state the type of reaction taking place.

molecule

type of reaction [2]

- (ii) State the amount of energy released in this reaction for every mole of ATP broken down.

.....kJ [1]

- (c) ATP is often described as the 'universal energy carrier'.

Explain why it is described in this way.

.....

.....

.....

.....

.....

..... [3]

- (d) Parasites, such as tapeworms, can survive in the gut in anaerobic conditions.

Suggest how they obtain ATP under these conditions.

.....

.....

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.....

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..... [3]

[Total: 12]

- 2 The domestic dog, *Canis familiaris*, is one of the most striking examples of variation in a domestic animal because of the large number of different breeds. It was first domesticated at least 14 000 years ago and is thought to have descended from the grey wolf, *Canis lupus*.

(a) Table 2.1 shows the taxonomy of the grey wolf.

- (i) Complete the table by writing your answers in the appropriate boxes.

Table 2.1

taxonomic rank	name
kingdom	Animalia
phylum	Chordata
.....	Mammalia
.....	Carnivora
family	Canidae
genus
species

[4]

- (ii) Define the term *species*.

.....

 [2]

- (b) Five ancient breeds of dog are recognised, from which all other breeds are thought to have descended by artificial selection. One of these ancient breeds is the greyhound, *Canis familiaris leineri*. Most greyhounds are bred for racing.

Explain how artificial selection in greyhounds has taken place.

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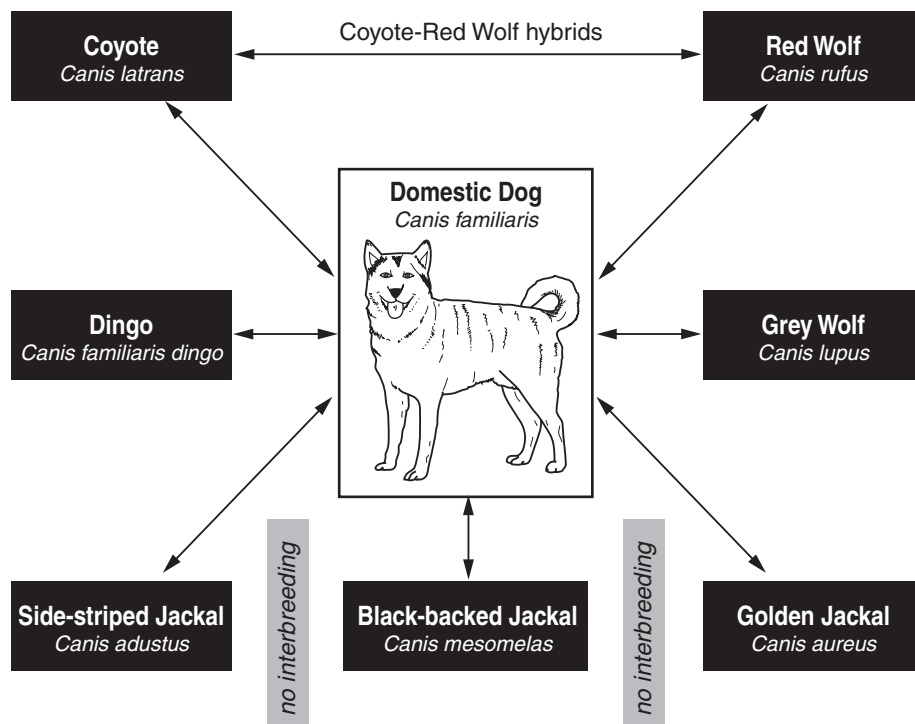
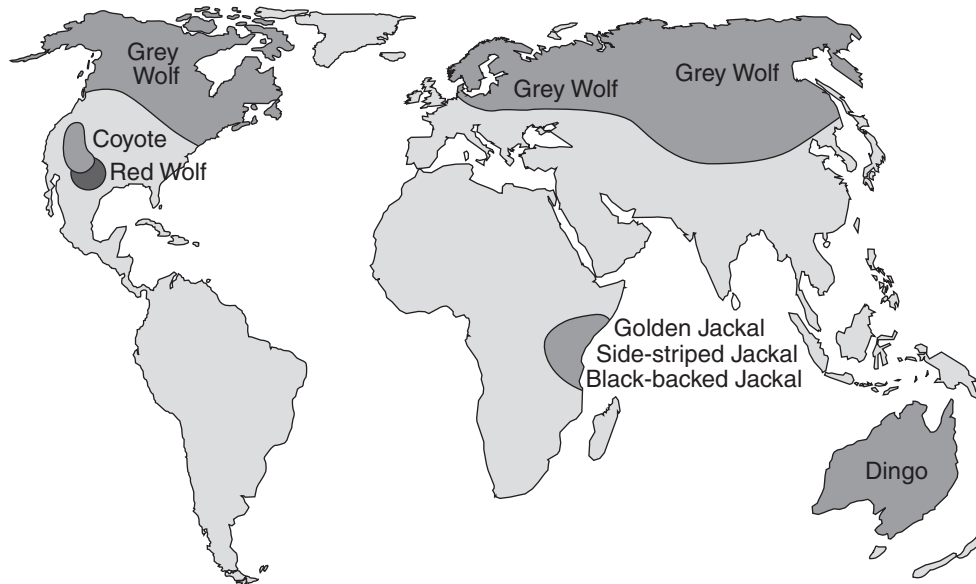
.....

..... [5]

- (c) The global distribution of most of the species belonging to the genus *Canis* is shown in Fig. 2.1.

As a result of the spread of human culture, distribution of the domestic dog is global. The domestic dog has been able to breed with all other members of the genus to form fertile hybrids.

The ranges of the three distinct species of jackal overlap in the Serengeti of East Africa.



Source: Advanced Biology A2 (2008). Page 189, BIOZONE International. By Tracey Greenwood, et al.

Fig. 2.1

(i) State the type of isolating mechanism preventing,

- the three species of jackal from interbreeding;

.....

- the dingo mating with all other members of the genus *Canis* apart from the domestic dog.

..... [2]

(ii) Using the information in Fig. 2.1, explain whether members of the genus *Canis* should be described as separate species.

.....

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.....

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.....

.....

..... [3]

[Total: 16]

- 3 The kidneys have an important homeostatic function in controlling the composition of the body fluids.

(a) Explain what is meant by *homeostasis*.

.....

.....

..... [2]

Fig. 3.1 shows the events involved in the reabsorption of amino acids in the proximal convoluted tubule of the kidney.

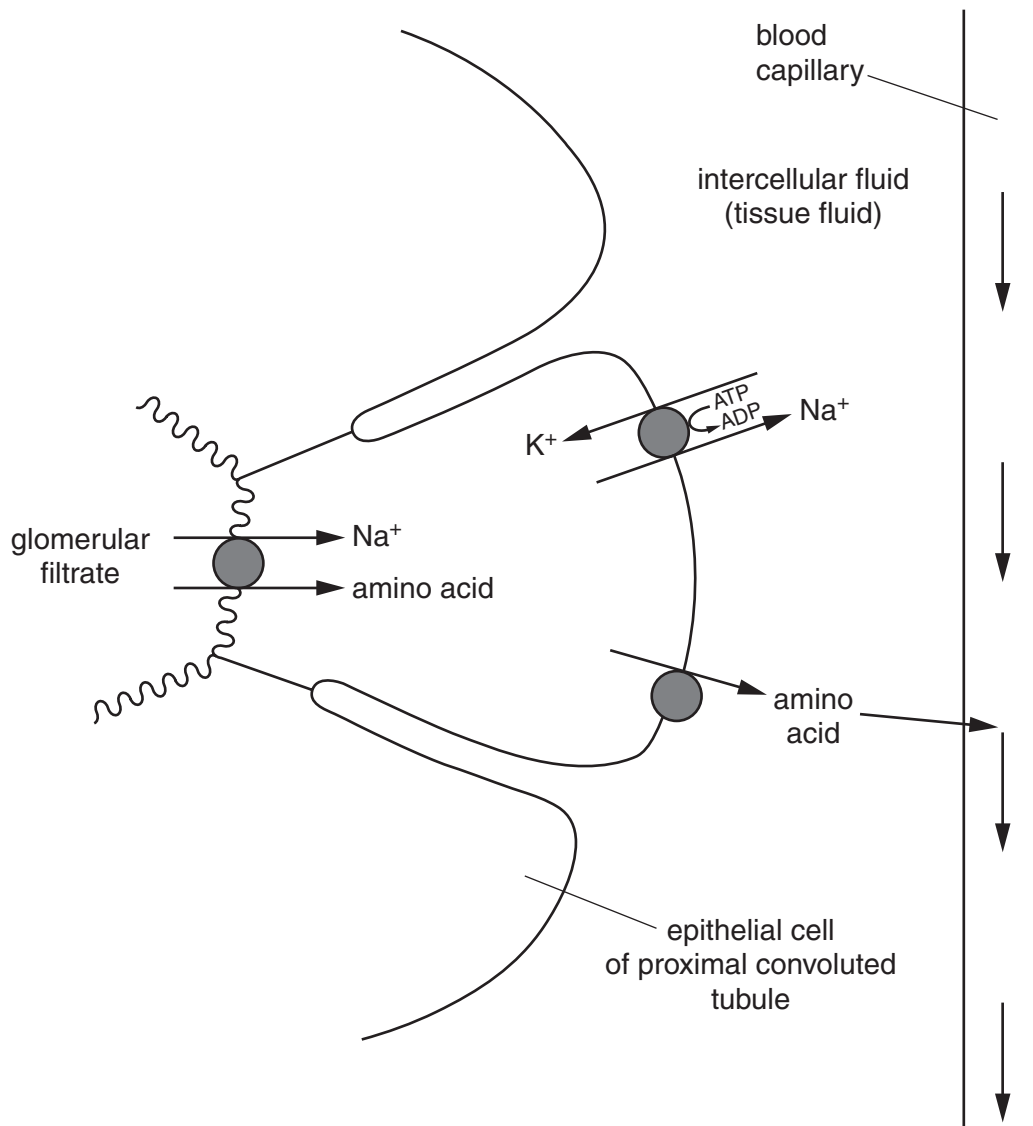


Fig. 3.1

- (b)** In this question, one mark is available for the quality of spelling, punctuation and grammar.

Describe the processes responsible for the reabsorption of amino acids in the proximal convoluted tubule.

..... [7]

Quality of Written Communication [1]

[Total: 10]

Turn over

4 The ABO blood group phenotype in humans is controlled by multiple alleles.

(a) Explain the following terms:

multiple alleles

.....

phenotype

..... [4]

(b) Complete the genetic diagram below to show the possible blood groups of children from two heterozygous parents. The father is blood group A and the mother blood group B.

Use the following symbols to represent the alleles: I^A , I^B and I^O .

I^A and I^B are codominant and I^O is recessive to I^A and I^B .

parental phenotype:	blood group A	blood group B
---------------------	---------------	---------------

parental genotypes:
---------------------	-------	-------

gametes:
----------	-------	-------

children genotypes:

children phenotypes: [4]

(c) If these parents have **non-identical** twins, what is the probability that both will have blood group **A**? Show your working.

Answer = [2]

- (d)
- Approximately 1% of all live births produce children who have a genetic disorder.
 - A high proportion of infant mortality is due to such disorders.
 - Around 1 in 20 children admitted to hospital in the UK have a disorder which is entirely genetic in origin.
 - Certain alleles make certain health problems more likely in adulthood.

Outline the implications of the findings of the Human Genome Project for the diagnosis and treatment of genetic disorders.

.....

.....

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.....

.....

.....

.....

..... [3]

[Total: 13]

- 5 Dispersed throughout the pancreas and occupying approximately 2% of its total mass are small clumps of endocrine tissue. These clumps of tissue secrete the hormones insulin and glucagon which are vital for the regulation of blood glucose concentration.

(a) (i) Name the endocrine tissue found in the pancreas.

..... [1]

(ii) Describe the molecular structure of the hormones insulin and glucagon.

.....

..... [2]

- (b) Fig. 5.1 shows the changes in blood glucose, insulin and glucagon concentrations following a drink of glucose solution.

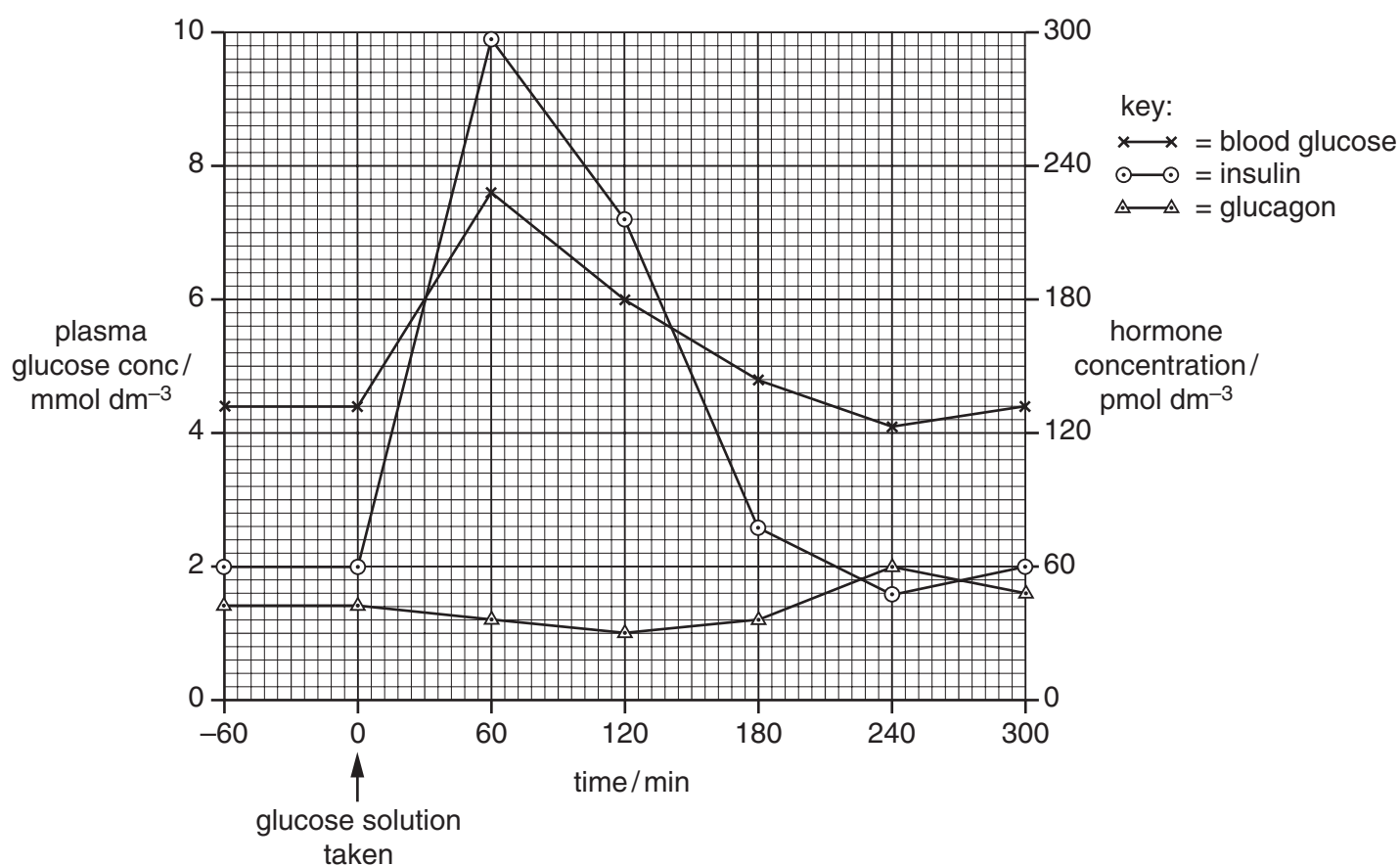


Fig. 5.1

- (i) Calculate the percentage increase in **insulin** concentration in the first 60 minutes after drinking the glucose solution. Show your working.

Answer =% [2]

[7]

Turn over

- 6 In an estuary, a salt marsh often develops on muddy shores between the lowest and the highest tide levels. A salt marsh is characterized by the vegetation that grows in these conditions. Succession can be seen from low tide level through the network of creeks and gulleys up to high tide level and beyond onto higher ground.

Students carried out research on two separate salt marshes, **A** and **B**. They measured the elevation range above the mean sea level where five key plant species were found. Their results are shown in Fig. 6.1.

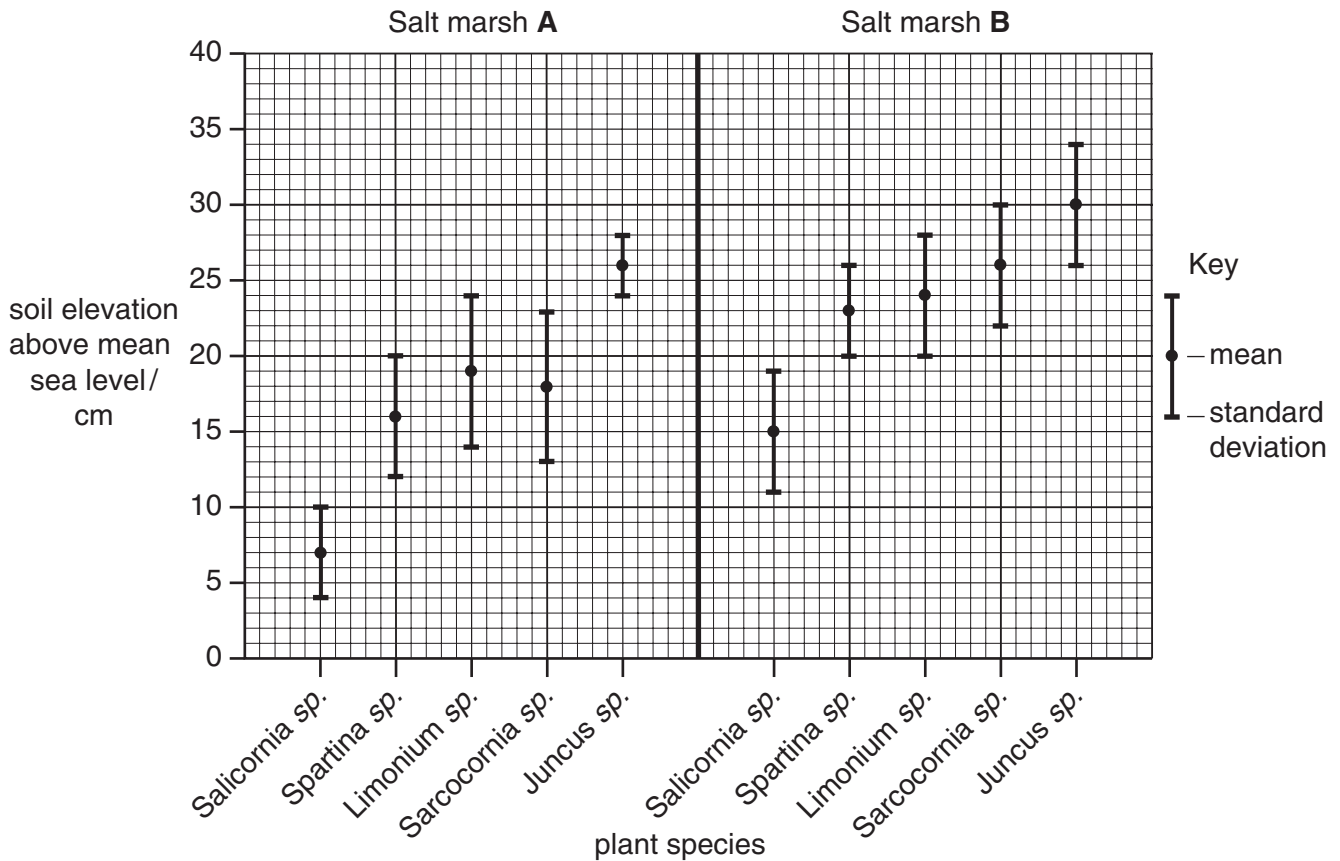


Fig. 6.1

- (a) (i) Suggest **two** environmental features that make a salt marsh an extreme habitat for plants to live in.

.....
 [2]

- (ii) State **one similarity** and **one difference** in the overall distribution of the five species on the two salt marshes.

similarity

.....

difference

..... [2]

- (iii) Suggest which **one** of the plant species shown in Fig. 6.1 is a pioneer species.

..... [1]

- (iv) Suggest how pioneer plants can alter the salt marsh environment.

.....
 [2]

- (b) Where two or more individuals share any resource that is insufficient to satisfy all their requirements fully, then competition results.

- (i) State **two** species, found in salt marsh **A**, that are likely to be involved in **interspecific** competition.

1

2 [1]

- (ii) Name **one** resource for which these plants will compete.

..... [1]

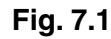
- (c) The students were also interested in measuring how the relative abundance of the five species changed with elevation above the mean sea level in the salt marsh.

Describe how this could be done.

.....

 [4]

[Total: 13]



- S**

[5]

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- (ii) Maize plants are insensitive to atrazine.

The cytoplasm of maize plant cells contains a tripeptide which binds to atrazine. The product is then transported to the vacuole.

Explain why maize plants are insensitive to atrazine.

.....

.....

.....

..... [2]

- (iii) Suggest how this insensitivity to atrazine can be of benefit to maize farmers.

.....

.....

.....

..... [2]

[Total: 13]

END OF QUESTION PAPER

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