

**6106/02 W2****Edexcel GCE****Biology****Biology (Human)****Advanced****Unit Test 6 Paper 02 W2****Tuesday 25 May 2004 – Morning****Time: 1 hour 20 minutes****Materials required for examination**Answer Book (AB08)  
Graph Paper (ASG2)  
Ruler**Items included with question papers**

Nil

**Instructions to Candidates**

In the boxes on the answer book provided, write the name of the examining body (Edexcel), your centre number, candidate number, the subject title, the paper reference, your surname, other names and signature.

The paper reference is shown above.

Answer BOTH questions in the answer book.

Show all the steps in any calculations and state the units. Calculators may be used.

Include diagrams in your answers where these are helpful.

Additional answer sheets may be used.

**Information for Candidates**

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

The total mark for this paper is 32.

**Advice to Candidates**

You must ensure that your answers to parts of questions are clearly numbered.

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling.

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### Answer BOTH questions

1. Whilst investigating the distribution of plants on coastal sand dunes, a student noticed that reeds only seemed to grow in the low-lying areas where the soil was wet. He formed the hypothesis that the number of reeds growing in the area increased as the water content of the soil increased.

To test his hypothesis, he selected an area of wet soil where there were many reeds growing. Using a  $0.25 \text{ m}^2$  quadrat, he laid out a belt transect from this area into the surrounding drier soil.

He placed 8 quadrats along the transect and counted the number of separate reed plants in each quadrat. He also took a small sample of soil from exactly the same depth from the centre of each quadrat. To find the water content, he weighed each soil sample, then dried it in an oven and reweighed it.

An extract from his field records is shown below.

Reed plants in each quadrat							
1	2	3	4	5	6	7	8
14	13	10	11	7	8	5	0

Soil sample results				
Wet mass				
1	2	3	4	5
81.7 g	80.2 g	80.5 g	81.9 g	79.9 g
6	7	8		
80.1 g	80.4 g	80.3 g		

Mass after drying in the oven				
1	2	3	4	5
58.2 g	57.0 g	57.8 g	60.1 g	61.2 g
6	7	8		
68.7 g	72.1 g	74.5 g		

- (a) Calculate the percentage water content of each of the soil samples. Then prepare a table and organise the data in a suitable way so that the percentage water content of the soil can be related to the number of reed plants. (4)
- (b) Use the data in your table to present the information in a suitable graphical form. (4)
- (c) To test the relationship between soil water content and the number of reed plants, the student used a rank correlation coefficient.

Calculate the rank correlation coefficient ( $r_s$ ) for these data using the information given below. Show your working.

$$r_s = 1 - \frac{6\Sigma D^2}{n(n^2 - 1)}$$

Where

$$\Sigma D^2 = 6$$

$n$  = the number of samples

(2)

- (d) The critical value of  $r_s$  at  $p = 0.05$  for this investigation is 0.738.

Using your calculated value of  $r_s$ , what conclusion concerning the relationship between soil water and number of reed plants can be drawn from this investigation?

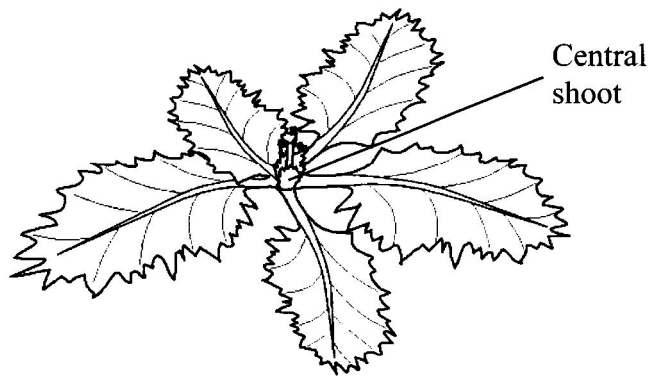
(1)

**(Total 11 marks)**

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2. It has been suggested that an insect called the crown weevil could be used as a control agent of the cotton thistle, which is a serious weed of some grasslands used to feed cattle.

The diagram below shows a cotton thistle plant with its rosette of leaves radiating out from a central shoot.



The female adult stage of the crown weevil lays its eggs on the underside of the cotton thistle leaves. The larvae (grubs) that emerge from these eggs burrow through the leaves to the centre of each rosette. Here they feed on the bases of the leaves or on young shoots.

A student decided to test the idea that as the number of weevils is increased the number of seeds produced by the thistle is reduced.

Plan a laboratory-based investigation, which you could personally carry out, to test this hypothesis.

Your answer should give details under the following headings.

- (a) Plan of the investigation to be carried out. (12)
- (b) Recording of raw data measurements, presentation of results and methods of data analysis. (4)
- (c) Limitations of your proposed method and an indication of further work that could be undertaken. (5)

(Total 21 marks)

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**TOTAL FOR PAPER: 32 MARKS**

**END**