

Centre No.					Paper Reference	Surname	Initial(s)
Candidate No.					6 1 0 6 / 0 2	Signature	

Paper Reference(s)

**6106/02 W2**

**Edexcel GCE**

**Biology**

**Biology (Human)**

**Advanced**

**Unit Test 6 Paper 02 (W2)**

**Tuesday 20 May 2008 – Afternoon**

**Time: 1 hour 20 minutes**

Examiner's use only

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Team Leader's use only

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Question Number	Leave Blank
1	
2	
Total	

#### **Materials required for examination**

Ruler

#### **Items included with question papers**

Nil

#### **Instructions to Candidates**

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.

The paper reference is shown above. Check that you have the correct question paper.

Answer BOTH questions in the spaces provided in this booklet.

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

Include diagrams in your answers where these are helpful.

#### **Information for Candidates**

The marks for individual questions and 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.



N 3 1 0 5 1 A 0 1 1 6

**Turn over**

**Answer BOTH questions.**

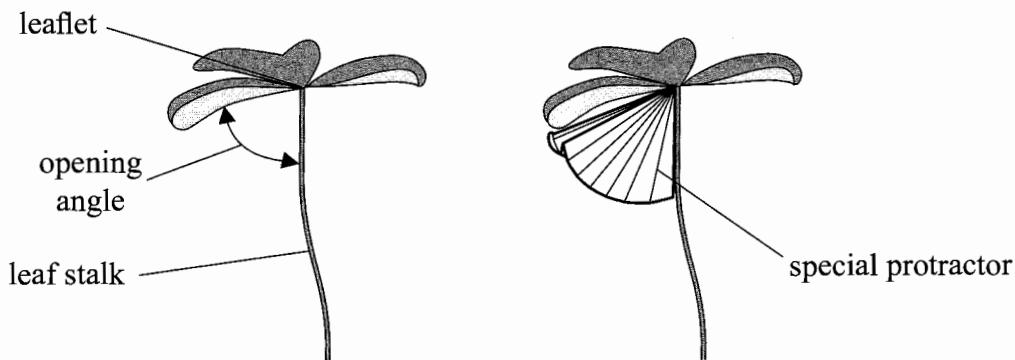
**Write your answers in the spaces provided.**

1. Wood sorrel is a common plant of woodland. Its leaves respond to decreasing light intensity by showing 'sleep' movements, in which leaflets fold towards the leaf stalk. Increasing light intensity causes these movements to be reversed.

A student investigated these movements by using plants from two different woodland habitats, one that was more shaded than the other.

He took ten samples from each of these habitats and placed their leaf stalk in tubes containing water. These were left in the dark until the leaflets were fully folded towards the stalk. He then exposed the samples to the same light intensity for twenty minutes.

After this time he measured the angle between the stalk and one of the leaflets for each of the twenty samples using a special protractor as shown in the diagram below. The opening angle was recorded in degrees and minutes. One degree is divided into 60 minutes.



*diagrams by permission of Fumi Naganishi, Tokyo Gakugei University*



A copy of the student's notebook, with the opening angles of wood sorrel from the two habitats, is shown below.

*Lightly shaded woodland - Opening angle*

70 degrees 45 minutes    65 degrees 20 minutes    68 degrees 30 minutes  
52 degrees 00 minutes    72 degrees 15 minutes    66 degrees 30 minutes  
71 degrees 45 minutes    66 degrees 40 minutes    75 degrees 10 minutes  
58 degrees 15 minutes

*Heavily shaded woodland - Opening angle*

75 degrees 45 minutes    80 degrees 30 minutes    68 degrees 10 minutes  
82 degrees 20 minutes    69 degrees 15 minutes    74 degrees 00 minutes  
79 degrees 00 minutes    78 degrees 30 minutes    81 degrees 45 minutes  
73 degrees 20 minutes

N.B. One degree is divided into 60 minutes



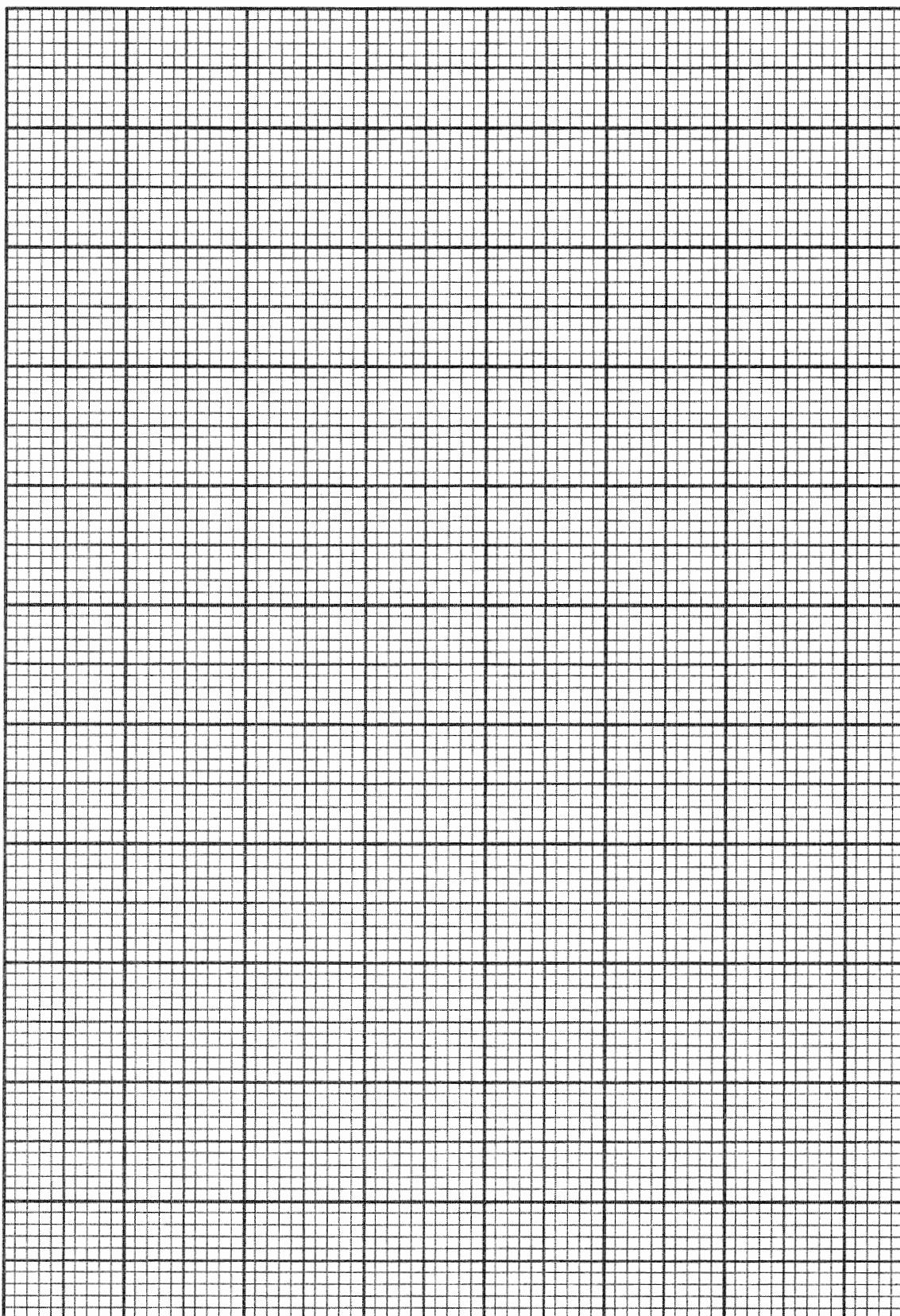
N 3 1 0 5 1 A 0 3 1 6

- (a) Calculate the opening angles in decimal format (e.g.  $70^\circ 45$  mins =  $70.75^\circ$ ) and prepare a table to show these angles, together with the mean opening angle of leaflets, for each of the two habitats.

(3)



- (b) Use the information in your table to present the data in a suitable graphical form.



(2)



- (c) State a suitable null hypothesis for this investigation.

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(1)

- (d) A  $t$ -test was applied to these data to determine whether the means of each group were significantly different.

A  $t$ -value of 3.62 was calculated.

The table below shows critical values for  $t$  with 18 degrees of freedom for various levels of significance.

Significance level (%)	20	10	5	2	1
Critical value of $t$	1.33	1.73	2.10	2.55	2.88

What conclusion can be drawn from this investigation? Use the information provided in the table to explain your answer.

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(2)



- (e) Describe **three** limitations of this method that could affect the reliability of the results.
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**Q1**

**(Total 11 marks)**



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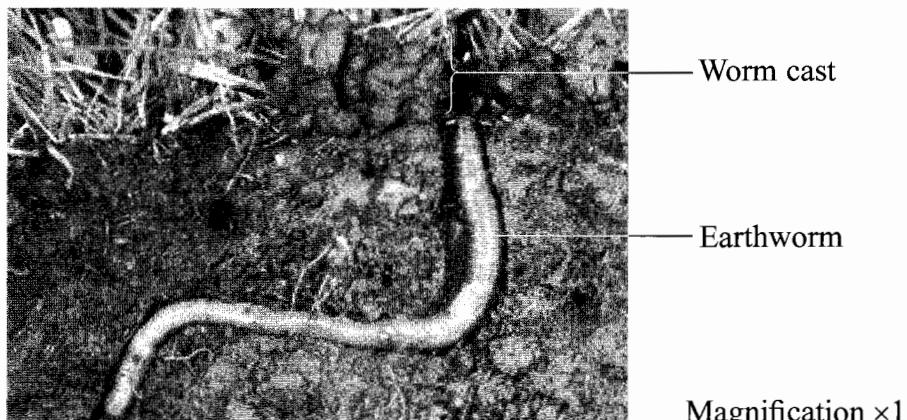


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2. Earthworms are animals important in maintaining soil quality. If their numbers fall, soil aeration and water penetration may be severely reduced.

Farmers usually prepare ground for growing crops by turning over the soil using a ‘traditional’ plough, but earthworm numbers fall when such a method is used. A farmer decided to try out a new technique using a ‘chisel’ plough, where the soil is not turned over.

Some species of earthworms produce faeces in the form of ‘casts’ on the surface of the soil and the mass of casts in an area can be used to assess the number of earthworms present.



Design an investigation the farmer can use to test the hypothesis that there are more earthworms found in soil subjected to ‘chisel’ ploughing compared with soil subjected to ‘traditional’ ploughing. Your suggested study should have little impact on the environment and the earthworms.

Your answer should give details under the following headings.

- (a) Plan of the investigation to be carried out.

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(b) Recording of raw data measurements, presentation of results and data analysis.

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(6)



(c) Limitations of your method and an indication of further work that could be undertaken.

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Q2

(Total 21 marks)

**TOTAL FOR PAPER: 32 MARKS****END**

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