

Paper Reference(s)

**6106/02 W2**

**Edexcel GCE**

**Biology**

**Biology (Human)**

**Advanced**

**Unit Test 6 Paper 02 W2**

**Tuesday 20 May 2003 – 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. Mayfly nymphs are immature insects that live in freshwater streams.

In a pilot study of their distribution, a student noticed that she could distinguish two types, because they possessed structural differences. One type, which she described as flattened mayfly nymphs, appeared to be more abundant in fast-moving water than in still water.

Using this observation, she formed the hypothesis that the number of flattened mayfly nymphs would increase as the speed of the current increased.

In order to test this idea, she counted the flattened mayfly nymphs at 13 sites on the same stretch of river. Each site had an area of  $1\text{m}^2$ . She repeated this at the same sites one week later.

At each site, the speed of the water was measured in metres per second. It was measured on the first occasion only, since the stream was running at the same level when sampling was undertaken on the second occasion.

The record of her fieldwork data is shown below.

Site number	First sample		Second sample	
	Number of flattened nymphs	Speed of water metres per second	Number of flattened nymphs	
1	14	0.80	12	
2	9	0.55	11	
3	11	0.40	7	
4	1	0.22	1	
5	0	0.25	0	
6	6	0.24	10	
7	8	0.35	14	
8	6	0.21	8	
9	3	0.20	1	
10	1	0.15	1	
11	0	0.10	0	
12	0	0.11	0	
13	1	0.13	1	

- (a) Prepare a table and organise the data in a suitable way to show the relationship between flow rate and the number of flattened mayfly nymphs. (4)
- (b) Use the data in your table to present the information in a suitable graphical form. (3)
- (c) State a suitable null hypothesis for this investigation. (1)
- (d) The student applied a correlation test to the data to find out whether they supported her hypothesis. The correlation coefficient was found to be 0.797.

The table below shows critical values for correlation coefficients at the  $p = 0.05$  and  $0.01$  levels.

Number of pairs of measurements	Critical value at $p = 0.05$	Critical value at $p = 0.01$
8	0.738	0.881
9	0.683	0.833
10	0.648	0.794
11	0.620	0.785
12	0.591	0.777
13	0.567	0.746
14	0.544	0.715
15	0.525	0.691

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

(3)

(Total 11 marks)

2. Plan an investigation, which you personally could carry out, to test the hypothesis that chewing gum containing nicotine could decrease reaction times in human subjects.

Your answer should be given under the following headings.

- (a) Plan of the investigation to be carried out. (10)
- (b) Recording of raw data measurements, presentation of results and methods of data analysis. (6)
- (c) Limitations of your 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**