Write your name here

Surname		Other names

Edexcel GCE

Centre Number

Candidate Number

Biology
Advanced
Unit 6B: Practical Biology and Investigative Skills

Monday 14 January 2013 – Afternoon
Time: 1 hour 30 minutes

Paper Reference
6BI08/01

You must have:
Ruler, Calculator, HB Pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Write your answers in the spaces provided in this question paper
  – *there may be more space than you need*.

Information

- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.
- You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, including your use of grammar, punctuation and spelling.
- Any blank pages are indicated.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

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Answer ALL questions.

1   Many fruits contain vitamin C. Fruits can decay quickly when stored at room temperature. They are therefore sometimes stored in a refrigerator or freezer.

    (a) Describe an experiment to investigate the effect of storage temperature on the vitamin C content of one type of fruit.

    (5)

(b) (i) State **two** variables which need to be controlled in this investigation.

(2)

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(ii) Choose **one** of the variables from (b)(i) above. Suggest how this variable can be controlled. Describe what effect it could have on the results if it is not controlled.

(2)

Variable ....

How to control the variable ....

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Effect on the results if the variable is not controlled ....

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(c) Suggest why storing fruit at low temperature slows down decay.

(3)

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(Total for Question 1 = 12 marks)

2 A student decided to investigate the effect of listening to music on short-term memory.

She recorded how many numbers were correctly recalled from a grid containing 25 random numbers. She tested 15 members of her class (students **A** to **O**) with no music. She repeated the test three times for each student and calculated the mean for each student.

She repeated the tests with the same 15 students, while they listened to some loud music.

A copy of her mean results for each student is shown below:

No Music:
A 10.3, **B** 9.7, **C** 10.0, **D** 11.7, **E** 11.7, **F** 11.3, **G** 10.7, **H** 10.3,
I 12.3, **J** 11.3, **K** 10.7, **L** 10.3, **M** 11.3, **N** 11.0, **O** 11.0

With Music:
A 9.0, **B** 10.3, **C** 10.7, **D** 10.3, **E** 9.7, **F** 11.0, **G** 9.3, **H** 10.7,
I 10.3, **J** 9.7, **K** 10.0, **L** 10.3, **M** 9.7, **N** 11.0, **O** 9.7

(a) Write a suitable null hypothesis for this investigation.

(1)

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(b) Prepare a suitable table to display the data obtained and calculate the overall mean for the numbers recalled by these 15 students, both with music and with no music.

(4)

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(c) On the graph paper below, draw a suitable graph to show the effect of listening to music on the overall mean for the numbers recalled by these students. Include on your graph an indication of the variability in the overall means.

(3)
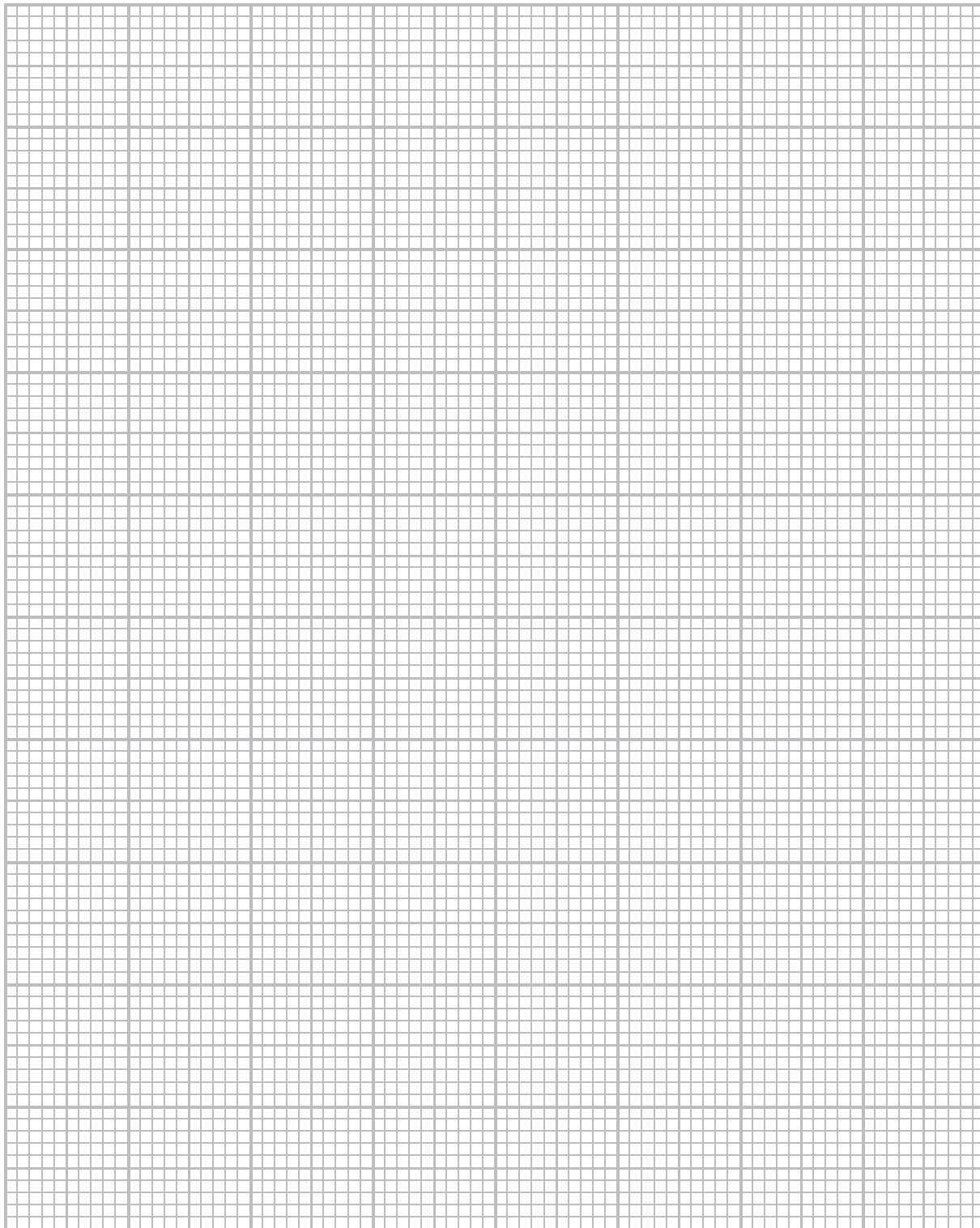
(d) The student applied a *t*-test to explore the significance of her results.

She obtained a result of *t* = 3.30 from her calculation.

The table below shows some critical values for *t*-test calculations.

Degrees of freedom	Significance level (p)	
	0.05	**0.01**
14	2.14	2.98
15	2.13	2.94
16	2.12	2.92
17	2.11	2.90
18	2.10	2.88
19	2.09	2.86
20	2.09	2.85
21	2.08	2.83
22	2.07	2.82
23	2.07	2.81
24	2.06	2.80
25	2.06	2.80
30	2.04	2.75
∞	1.96	2.58

What conclusion can be drawn from this investigation?

Use the information provided in the table and in the graph you have drawn, together with your knowledge and understanding to **explain** your answer.

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(e) Suggest why it may not be reasonable to draw a valid conclusion from the results of this investigation.

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(Total for Question 2 = 16 marks)

3 A company is in the process of developing a new stain-removing washing liquid. They want to include a protease enzyme to digest the proteins that are responsible for some stains on clothes.

Plan an investigation to discover the optimum concentration of protease to use in this new stain-removing washing liquid.

Your answer should give details under the following headings.

(a) A consideration of whether there are any safety or ethical issues.

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(b) Suggestions for preliminary work that you might undertake to ensure your proposed method would provide meaningful data.

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(c) A detailed method, including an explanation of how important variables are to be controlled or monitored.

(10)

[Up to 2 marks are available in this section for the quality of written communication.]

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(d) A clear explanation of how your data are to be recorded, presented and analysed in order to draw conclusions from your investigation.

(4)

P 3 9 8 8 3 A 0 1 6 2 0

(e) The limitations of your proposed method.

(3)

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(Total for Question 3 = 22 marks)

TOTAL FOR PAPER = 50 MARKS

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