Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCE

Biology

Advanced

Unit 6B: Practical Biology and Investigative Skills

Tuesday 18 May 2010 – Morning
Time: 1 hour 30 minutes

Paper Reference
6BI08/1

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.
- Answer the questions in the spaces provided
  – *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.*

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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Turn over ▶

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Answer ALL questions

1 A student carried out an investigation into the variables affecting the permeability of beetroot cell membranes. Pieces of beetroot were placed into tubes containing distilled water. The student then used a colorimeter to measure the intensity of red colouration in the distilled water.

(a) (i) Suggest **one** factor that affects the permeability of the beetroot cell membrane.

Write a hypothesis for this investigation that the student could test.

(2)

Factor .....

Hypothesis .....

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(ii) Use your biological knowledge and understanding to explain and justify this hypothesis.

(3)

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(b) (i) State **two** factors that need to be controlled in this investigation.

(2)

1 .....

2 .....

(ii) Suggest how **one** of the factors you have stated in (b)(i) could be controlled. If this factor had not been controlled, what effect would it have on the results?

(2)

How the factor is controlled .....

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Effect on the results if this factor is not controlled .....

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(c) Describe how you could reduce systematic errors in the measurements of the dependent variable in this investigation.

(2)

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(Total for Question 1 = 11 marks)

2 Red blood cells (erythrocytes) transport oxygen from the alveolar surface in the lungs to the respiring tissues.
A group of nine athletes (A to I) wanted to see if training for two weeks at a mountain camp, 2000 m above sea level, had an effect on the number of red blood cells in their blood.
Samples of blood were taken from each of the athletes at their normal training camp at sea level. Blood samples were taken again after two weeks of training at the mountain camp.

A copy of the raw data collected is given below:

Number of red blood cells $x10^{12}$ per dm^3 blood before mountain training

A 5.0
B 5.1
C 4.9
D 5.3
E 5.4
F 5.0
G 4.8
H 5.1
I 5.5

Number of red blood cells $x10^{12}$ per dm^3 blood after mountain training

A 4.9
B 5.3
C 5.7
D 5.5
E 5.6
F 5.4
G 5.3
H 5.6
I 5.1

(a) Write a null hypothesis for this investigation.

(1)

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(b) Calculate the difference in the number of red blood cells before and after the mountain training for each athlete. Prepare a table to display the raw data and your calculated values.

(4)

(c) Identify an anomalous result in the data from the athletes.

(2)

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Give **one** reason for your answer.

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(d) Calculate the mean number of red blood cells per dm^3 of blood for the group of athletes before and after mountain training.

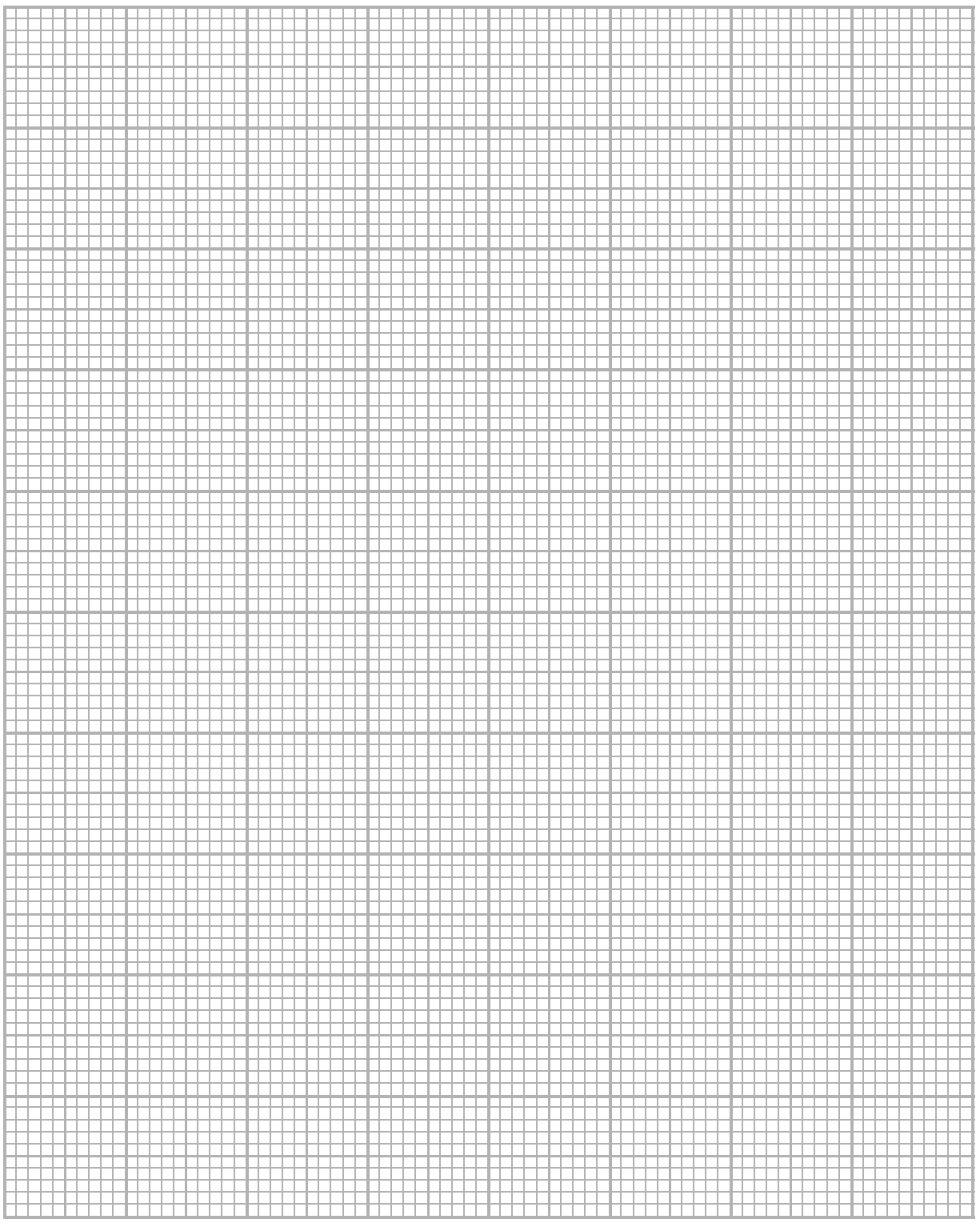
(2)

Mean number of red blood cells before training .....

Mean number of red blood cells after two weeks training at 2000 m .....

(e) Present the calculated mean red blood cell counts in a suitable graphical form.

(3)



(f) A *t*-test was applied to the data to test the null hypothesis.
The calculated value of *t* was 2.24.
The table below shows the critical values of *t* with 16 degrees of freedom, at different significance levels.

Significance level (p)	0.20	0.10	0.05	0.01	0.001
Critical value of *t*	1.34	1.75	2.12	2.92	4.02

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

(3)

(Total for Question 2 = 15 marks)

3 Competition between crop plants can significantly affect crop yield. Competition between seedlings is an important factor to consider when sowing seeds of crop plants. Many gardeners complain that parsnips are difficult to grow.

If the seeds are sown too far apart, few will grow into adult plants and the crop will be poor. If they are sown too close together, few plants will emerge from the soil and the crop again is poor.

Magnification ×0.2

Plan an investigation to test this observation.

Your answer should give details under the following headings.

(a) An outline of a suitable sampling technique for this investigation and whether there are any safety and ethical issues you would need to consider.

(3)

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

(4)

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

(10)

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

(4)

(e) The limitations of your proposed method.

(3)

(Total for Question 3 = 24 marks)

TOTAL FOR PAPER = 50 MARKS

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