Write your name here

Surname	Other names

Pearson Edexcel
International
Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Biology

Advanced

Unit 6: Practical Biology and Investigative Skills

Sample Assessment Material
Time: 1 hour 30 minutes

Paper Reference
WBI06/01

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.

Turn over ▶

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PEARSON

Answer ALL questions.

1 John thought that there was a difference in breathing when lying down compared with when sitting on a chair.

He decided to test this, using traces from a spirometer.

(a) Describe how he could use data from spirometer traces to compare breathing when lying down and when sitting on a chair.

(4)

(b) (i) State **two** variables which need to be controlled to provide valid spirometer traces.

(2)

.....

.....

.....

.....

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

(2)

Variable .....

How to control the variable .....

.....

.....

.....

Effect on the data from the spirometer traces if this variable is not controlled.

.....

.....

.....

.....

(c) Suggest how breathing is controlled by the nervous system in response to changing position from lying down to sitting on a chair.

(4)

(Total for Question 1 = 12 marks)

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2 Earthworms are animals that improve the quality of soil needed for plant growth.

Farmers often plough the soil before planting crops in a field.

A farmer wanted to investigate the effect of ploughing on the presence of earthworms. He used different methods to plough two fields (field A and field B), next to each other. These fields were then left for one month.

The farmer then randomly placed quadrats (0.5 m × 0.5 m) in field A. In each quadrat he poured a weak detergent solution onto the soil. He then counted the number of earthworms that came to the surface in each quadrat.

He repeated this process in field B.

A copy of the farmer's raw results is shown below:

Field A: 10, 4, 13, 9, 9, 3, 8, 5, 4

Field B: 15, 6, 12, 0, 3, 8, 9, 10, 7, 4, 6

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

(2)

.....

.....

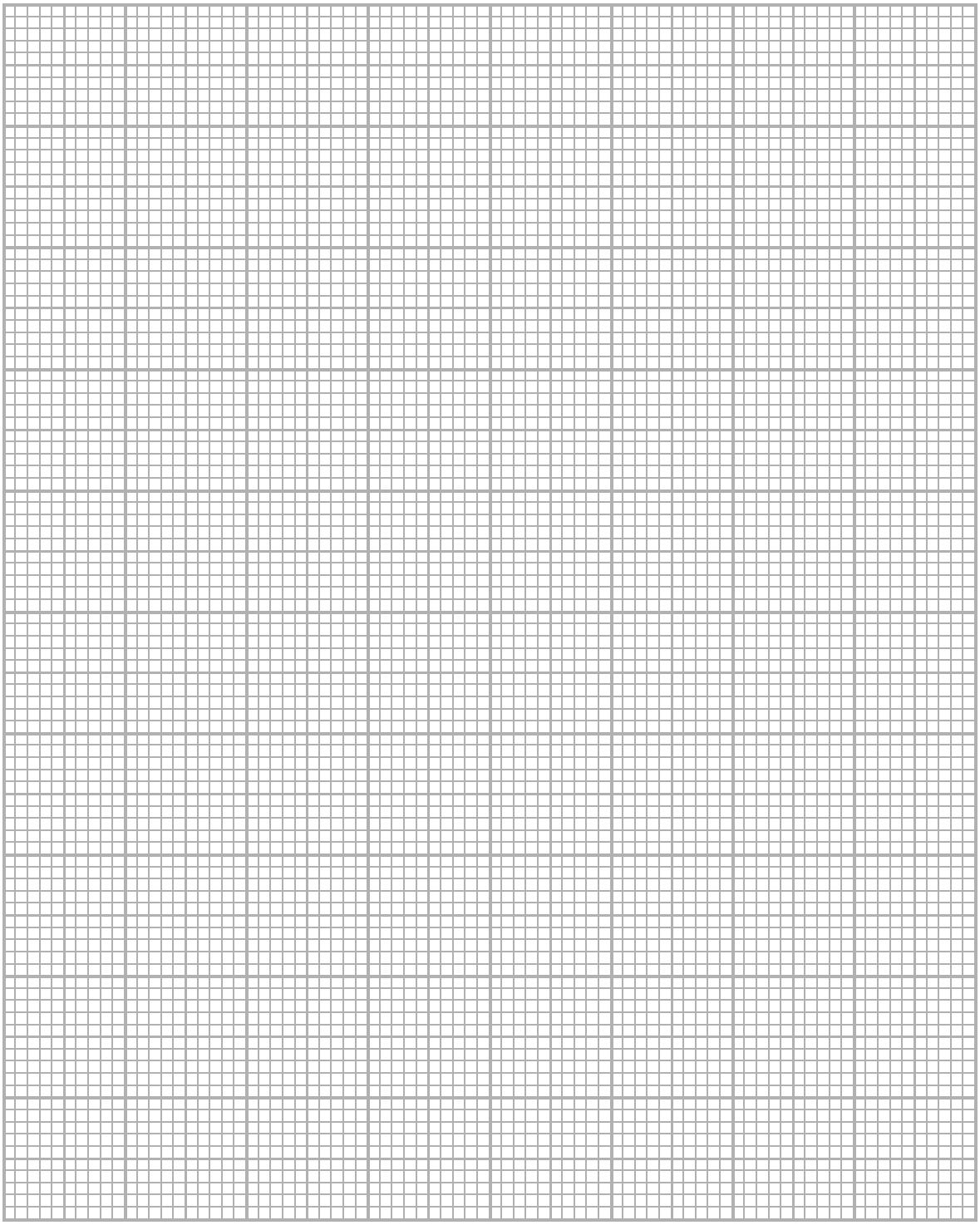
.....

(b) Prepare a suitable table to rank the data obtained. Identify the median number of earthworms from the quadrats in each field.

(4)

(c) On the graph paper below, draw a suitable graph to show the effect of different methods of ploughing on the median number of earthworms from the quadrats in each field. Include on your graph an indication of the variability in the data.

(3)



(d) The farmer decides to apply the Mann-Whitney U test to the data. This statistical test determines if the difference between the medians is significant.

The calculations produced two U values for this set of data. In order to support a difference between the two medians, the smaller U value must be the same as, or less than, the critical value.

He obtained a result of U = 50 from the calculation (the smaller value).

The table below shows the critical values for the Mann-Whitney U test at the $p = 0.05$ level.

	Sample size n_2					
Sample size n_1	**7**	**9**	**11**	**13**	**15**	**17**
7	8	12	16	20	24	28
9	12	17	23	28	34	39
11	16	23	30	37	44	51
13	20	28	37	45	54	63
15	24	34	44	54	64	75
17	28	39	51	63	75	87

What conclusions can be drawn from this investigation? Use the information provided in the table above and in the graph you have drawn.

(4)

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

(3)

(Total for Question 2 = 16 marks)

3 Plants can be grown in glasshouses, using hydroponics. Hydroponics is a method of growing plants that replaces soil with solutions containing mineral ions.

Plan an investigation to find the optimum concentration of magnesium ions in the mineral ion solution used to grow the plants.

Your answer should give details under the following headings.

(a) A consideration of whether there are any safety or ethical issues you would need to consider.

(2)

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

(3)

(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.]

(d) A clear explanation of how your data are 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 = 22 marks)

TOTAL FOR PAPER = 50 MARKS