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

Tuesday 13 May 2014 – Morning
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.
- 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.*
- 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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P 4 2 9 2 5 A 0 1 1 6

PEARSON

Answer ALL questions.

1 Snails can respond to a variety of stimuli, including touch. When a snail experiences an unfamiliar stimulus, it will withdraw into its shell.

After repeated exposure to the same stimulus, the snail will stop responding to the stimulus. This behaviour is called habituation.

A Snail – Magnification × 2

(a) Describe how you could investigate the habituation of a snail to a stimulus.

(5)

(b) (i) State **two** variables, other than the stimulus, which could affect the investigation.

(2)

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(ii) Choose **one** of these variables. Suggest how this variable could be controlled.

Describe the effect the variable 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 how calcium ions are involved in habituation in snails.

(4)

(Total for Question 1 = 13 marks)

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2 Forced expiratory volume (FEV_1) is the maximum volume of air that can be forcibly expired from a person's lungs in one second.

Nigel decided to investigate whether the height of a person is related to FEV_1.

He selected 8 students of different heights. For each student he measured the FEV_1 three times. The results of this investigation are shown below.

Height 178 cm, FEV_1 2.99 dm^3, 3.42 dm^3 and 2.89 dm^3
Height 174 cm, FEV_1 4.45 dm^3, 4.24 dm^3 and 4.11 dm^3
Height 177 cm, FEV_1 3.09 dm^3, 4.05 dm^3 and 5.43 dm^3
Height 181 cm, FEV_1 4.00 dm^3, 4.36 dm^3 and 4.47 dm^3
Height 183 cm, FEV_1 4.48 dm^3, 4.88 dm^3 and 4.75 dm^3
Height 170 cm, FEV_1 3.25 dm^3, 3.46 dm^3 and 3.01 dm^3
Height 171 cm, FEV_1 3.52 dm^3, 3.15 dm^3 and 3.48 dm^3
Height 176 cm, FEV_1 3.55 dm^3, 3.45 dm^3 and 3.76 dm^3

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

(2)

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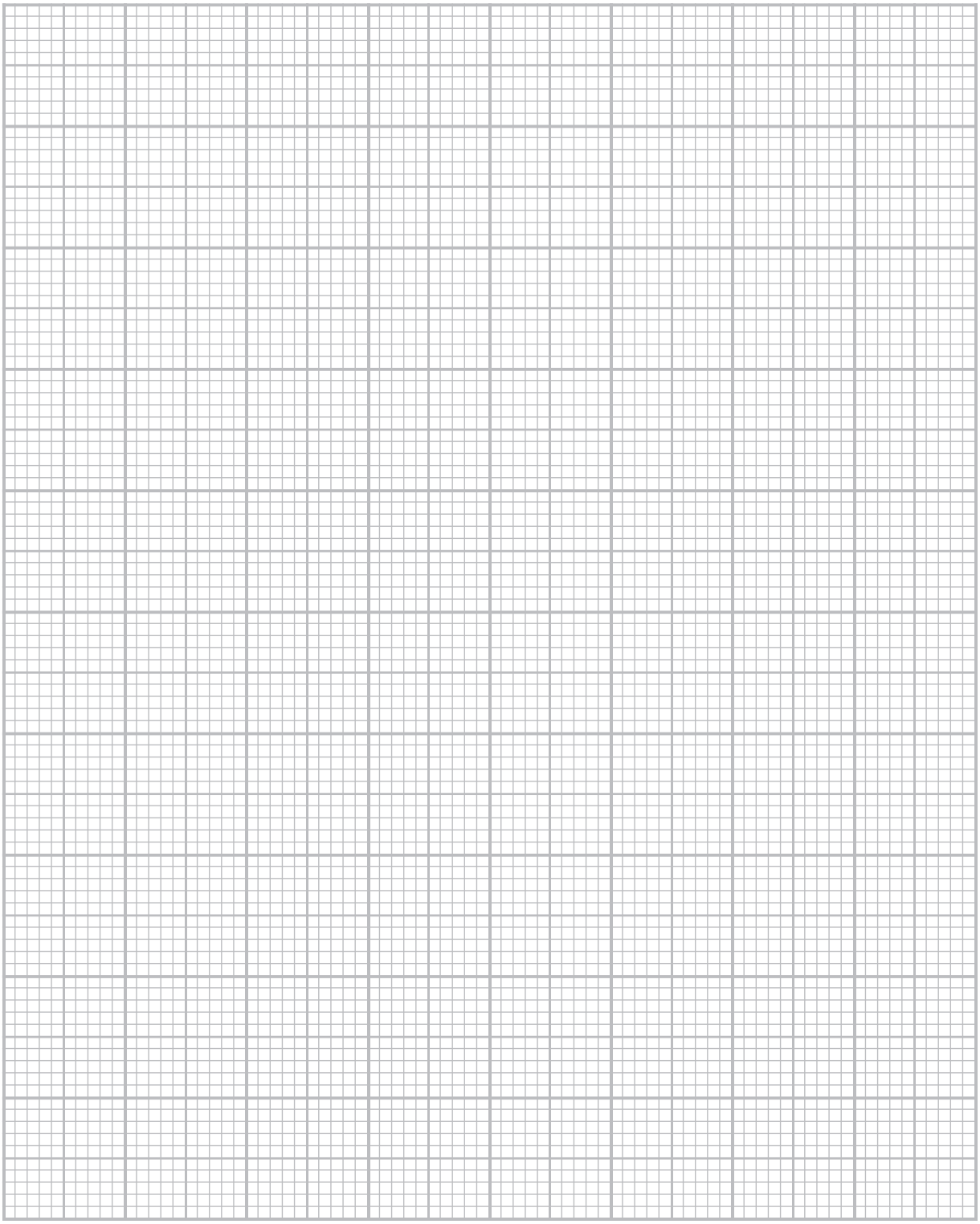
(b) Calculate the mean FEV_1 for each student. Display the data for the height and the mean FEV_1 for each student in a suitable table.

(3)

(c) On the graph paper below draw a suitable graph to show the relationship between height and mean FEV_1.

Include on your graph an indication of the variability in the data.

(3)



(d) Nigel used a statistical test to investigate the significance of the relationship between the height of an individual and FEV_1. His calculation gave a value of 0.65.

The table below shows some values for this statistical test at three significance levels of 0.1, 0.05 and 0.01.

Number of students tested	Significance level (p)		
	0.1	**0.05**	**0.01**
4	0.90	0.95	0.99
5	0.81	0.88	0.96
6	0.73	0.81	0.92
7	0.67	0.75	0.87
8	0.62	0.71	0.83
9	0.58	0.67	0.80
10	0.55	0.63	0.77

Use the information provided in this table and in your graph to draw conclusions from this investigation.

(4)

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

(3)

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(Total for Question 2 = 15 marks)

3 Rice plants are damaged by leafhopper nymphs. The wolf spider *Lycosa pseudoannulata* is an important predator of leafhopper nymphs.

Wolf spiders hunt their prey and do not use webs.

It has been suggested that wolf spiders could be used to control leafhopper numbers in rice fields. Large numbers of wolf spiders can be bred in the laboratory.

Wolf spider

Magnification ×1

Leafhopper nymph

Magnification ×10

Plan an investigation to determine the effectiveness of wolf spiders, bred in the laboratory, in the control of leafhopper nymphs in rice fields.

Your answer should give details under the following headings.

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

(2)

(b) A description of appropriate preliminary practical 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)

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

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

(4)

(e) The limitations of your proposed study.

(3)

(Total for Question 3 = 22 marks)

TOTAL FOR PAPER = 50 MARKS

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