

Please check the examination details below before entering your candidate information

Candidate surname		Other names	
Pearson Edexcel International Advanced Level		Centre Number 	Candidate Number
Wednesday 23 January 2019			
Morning (Time: 1 hour 30 minutes)		Paper Reference WBI06/01	
Biology Advanced Unit 6: Practical Biology and Investigative Skills			
You must have: Calculator, HB pencil, ruler			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.
- Candidates may use a calculator.

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** Zinc is an essential mineral for the growth of plants.

The photograph below shows a young maize plant, *Zea mays*, growing in soil with a deficiency of zinc.



Magnification $\times 1$

The maize plants growing in this soil develop yellow stripes along each leaf and the stems are short.

The stems are short because there is a reduced distance between each leaf.

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- (5)

[illegible]

- (2)



- (ii) Choose **one** of the variables you have identified in (b)(i). Explain how this variable could be controlled. Describe what effect it could have on the results of this experiment if it is not controlled.

(2)

Variable

How this variable is controlled

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Effect it could have on the results if it is not controlled

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- (c) The leaves develop yellow stripes because zinc is needed for the formation of chlorophyll. Suggest why zinc deficiency limits the growth of maize plants.

(3)

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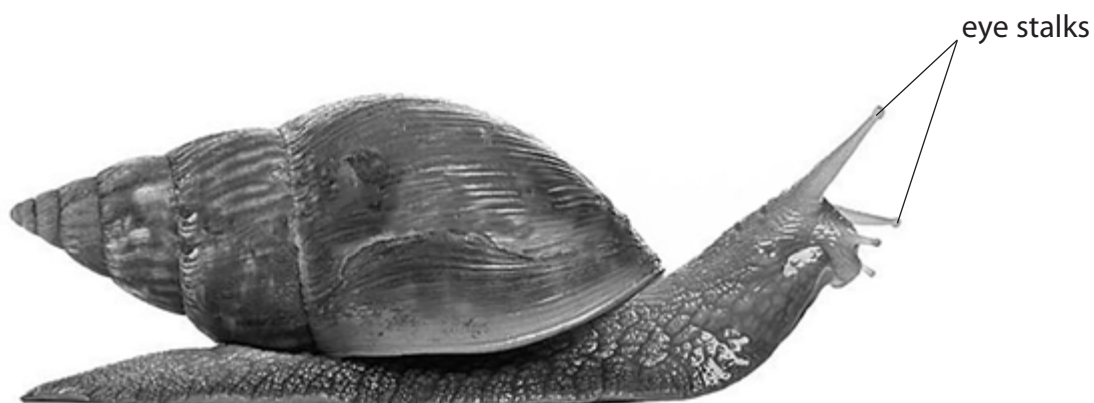
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(Total for Question 1 = 12 marks)



- 2 The photograph below shows a giant African land snail, *Achatina fulica*.



Magnification $\times 1$

A student investigated the response of this snail to touch.

When the head of the snail was touched between the eye stalks, the snail responded by withdrawing into its shell.

The student recorded the time for the snail to re-emerge from its shell and extend its eye stalks.

The snail was touched 11 times. The time for the snail to re-emerge was recorded after each touch.

The investigation was repeated with two more snails.

Some of the results of this investigation are shown below.

Snail A

<i>First touch</i>	<i>74 seconds</i>
<i>Third touch</i>	<i>55 seconds</i>
<i>Fifth touch</i>	<i>34 seconds</i>
<i>Seventh touch</i>	<i>38 seconds</i>
<i>Ninth touch</i>	<i>10 seconds</i>
<i>Eleventh touch</i>	<i>5 seconds</i>

Snail B

<i>First touch</i>	<i>74 seconds</i>
<i>Third touch</i>	<i>55 seconds</i>
<i>Fifth touch</i>	<i>34 seconds</i>
<i>Seventh touch</i>	<i>38 seconds</i>
<i>Ninth touch</i>	<i>10 seconds</i>
<i>Eleventh touch</i>	<i>4 seconds</i>

Snail C

<i>First touch</i>	<i>62 seconds</i>
<i>Third touch</i>	<i>47 seconds</i>
<i>Fifth touch</i>	<i>30 seconds</i>
<i>Seventh touch</i>	<i>30 seconds</i>
<i>Ninth touch</i>	<i>16 seconds</i>
<i>Eleventh touch</i>	<i>10 seconds</i>



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

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(b) Calculate the mean time for re-emergence for each touch.

Prepare a table to display the **raw data** and your calculated **mean** for each touch.

(3)



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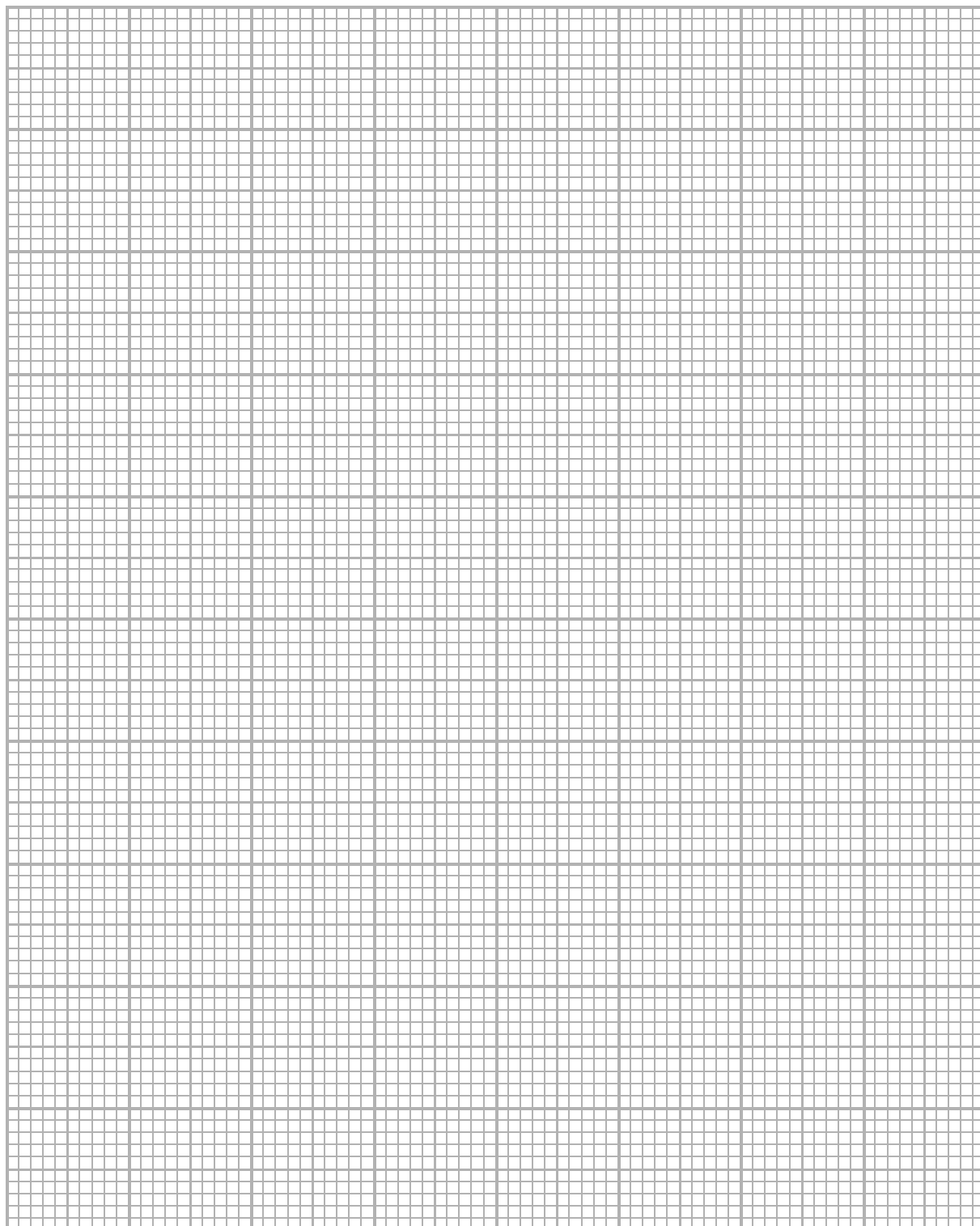
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- (c) On the graph paper below, draw a bar graph to show the mean time for re-emergence for each touch.

Include an indication of the variability of the data.

(3)



(d) The student applied a rank correlation test to the data.

The student obtained a rank correlation, r , of -0.935 .

The significance values for this rank correlation are shown in the table.

Significance level (p)	0.1	0.05	0.01	0.005
Critical value of r	0.338	0.427	0.582	0.632

What conclusion can be drawn from this investigation?

Use your graph and the information in the table to explain your answer.

(4)



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

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(Total for Question 2 = 16 marks)



- 3 When scientists genetically modify a plant to contain a useful gene, they usually produce clones of the plant for further testing and evaluation.

Plant tissue culture can be used to grow a large number of clones from small pieces of plant tissue.

Plant growth regulators, such as auxin (IAA), are used to control the growth of plant tissue.

A student formed the following hypothesis.

The greater the concentration of plant growth regulator, the faster the rate of growth of the plant tissue.

Plan an investigation that you could carry out to support or reject this hypothesis.

Your answer should give details under the following headings.

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

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- (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.]



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P 5 4 6 8 4 A 0 1 5 2 0

- (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.

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(Total for Question 3 = 22 marks)

TOTAL FOR PAPER = 50 MARKS

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