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Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
International
Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Tuesday 5 November 2019

Afternoon (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 Mung beans are grown in many countries as a source of food.

The photograph below shows mung bean seeds in the early stages of growth.



© Aravind Teki / Alamy Stock Photo

Magnification $\times 1$

The seeds contain a plant embryo and stored food.

The cells of the embryo begin to grow when the external conditions are favourable and water is available.

Enzymes break down the stored food and respiration produces ATP.

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(a) Describe an experiment, using growing mung bean seeds, to investigate the effect of temperature on the rate of respiration.

(5)

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(b) (i) Name **one** abiotic and **one** biotic variable, other than the independent variable, that could affect this experiment.

(2)

Abiotic variable .....

Biotic variable .....

(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 if it is not controlled.

(2)

Variable .....

How this variable is controlled.

.....

.....

.....

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

.....

.....

.....

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(c) Explain why a change in oxygen concentration could affect the rate of respiration in growing mung bean seeds.

(3)

(Total for Question 1 = 12 marks)

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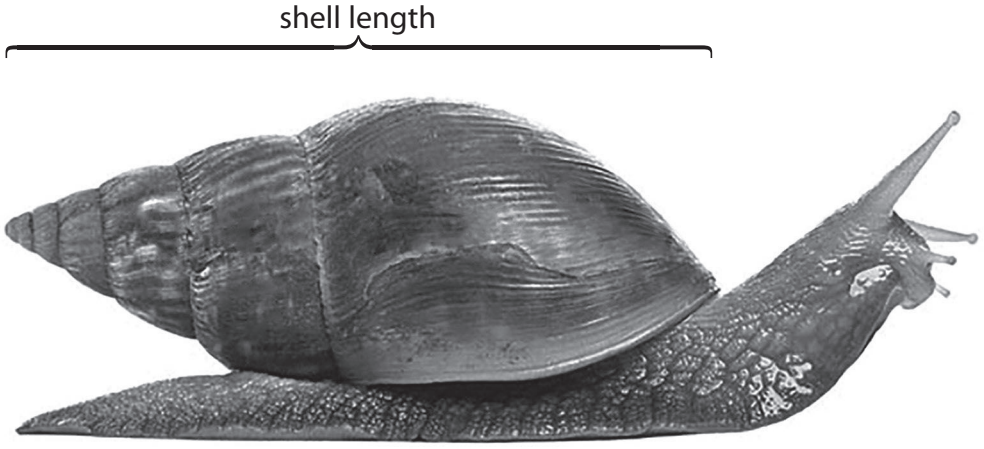
2 The photograph below shows a giant land snail, *Achatina fulica*.



© Life on white / Alamy Stock Photo

Magnification $\times 0.5$

These snails are native to East Africa.

They reproduce by laying eggs.

A student investigated the effect of two different diets on the growth of these snails.

Immediately after hatching, snails were divided into two groups, A and B.

Snails in group A were fed leaves only (diet A).

Snails in group B were fed leaves with added calcium (diet B).

After 28 weeks, 11 snails were selected from each group.

The length of each shell was measured.

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The results are shown below.

Diet A shell length		
15.6 cm	15.7 cm	17.3 cm
16.6 cm	16.0 cm	17.4 cm
13.9 cm	16.2 cm	13.4 cm
15.8 cm	15.3 cm	

Diet B shell length		
15.2 cm	14.9 cm	18.3 cm
18.4 cm	19.0. cm	21.5 cm
22.1 cm	21.2 cm	20.9 cm
21.7 cm	19.6 cm	

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

(2)

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(b) Prepare a suitable table to display the **raw data** for both diets.

Rank the data from lowest to highest value.

On your table, identify the **median** value for each set of data.

(3)

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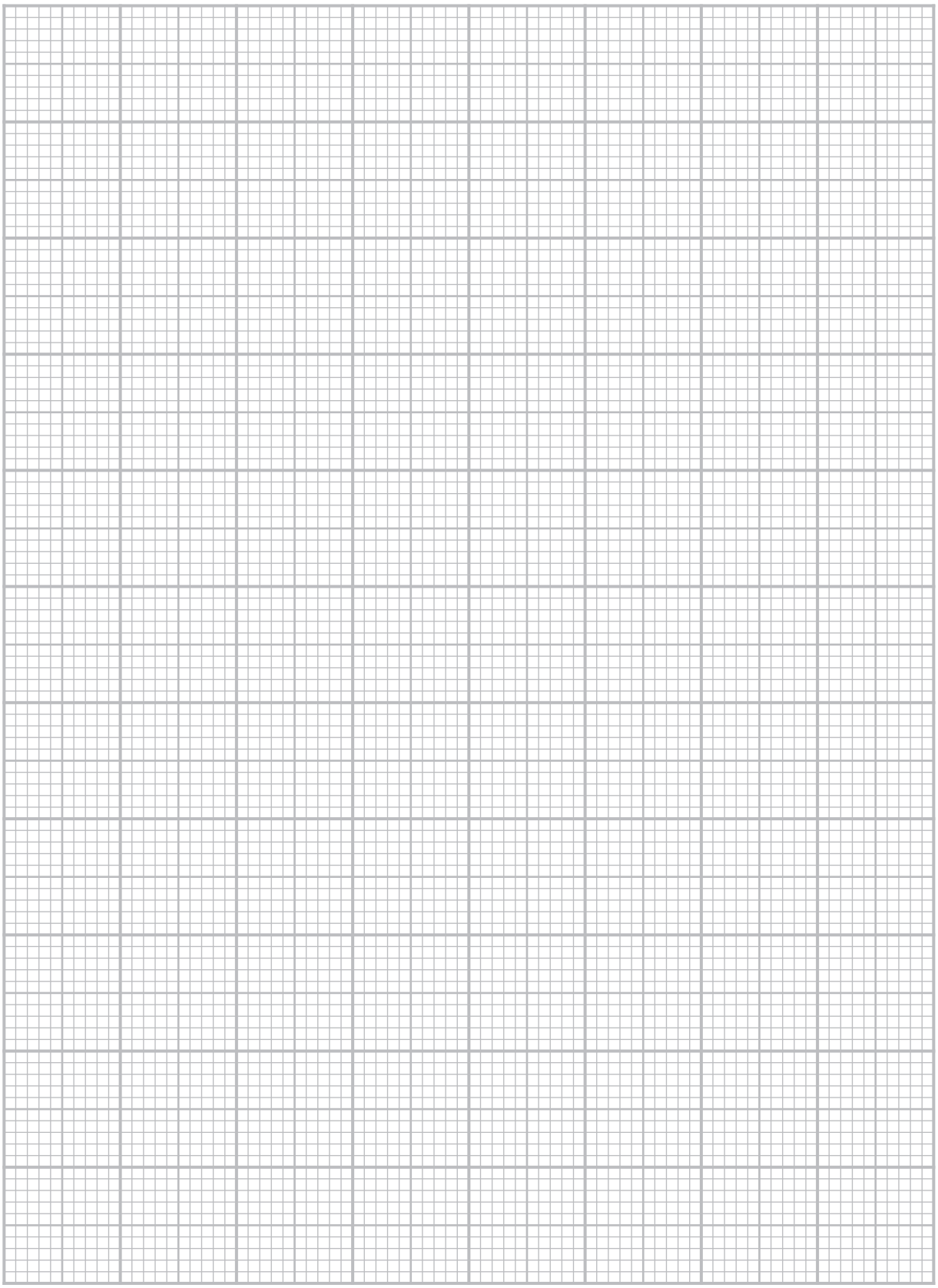
(c) On the graph paper below, draw a suitable graph to show the median shell length for each diet.

Include an indication of the variability of the data.

(3)



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(d) The student used a Mann-Whitney U test to analyse the data. This statistical test determines if the difference between the medians of the two sets of data is significant.

The calculation produced a U value of 18.0.

For the difference to be significant, the U value has to be equal to, or less than, the critical value shown in the table below.

The table shows the critical values for the Mann-Whitney U test at $p = 0.05$, for different sample sizes.

n_1 and n_2 are the number of samples in each set of data.

Sample size n_1	**Sample size n_2**						
	7	**8**	**9**	**10**	**11**	**12**	**13**
7	8	10	12	14	16	18	20
8	10	13	15	17	19	22	24
9	12	15	17	20	23	26	28
10	14	17	20	23	26	29	33
11	16	19	23	26	30	33	37
12	18	22	26	29	33	37	41
13	20	24	28	33	37	41	45

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.

(4)

(Total for Question 2 = 16 marks)

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3 The photograph below shows ridges and furrows in a field habitat. This field is used to grow grass and clover plants.



© Chrispo / Shutterstock

The land rises from the bottom of each furrow to the top of each ridge.

The photograph below shows a clover plant with flowers.



© Jolanta Dąbrowska/Alamy

Magnification ×1

A student noticed that some of the furrows in this field had clover plants with more flowers than the clover plants on the ridges.

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The student formed the following hypothesis.

The more water present in the soil, the greater the number of flowers on each clover plant.

Plan an investigation you could carry out in a field habitat to test 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.

(2)

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

(3)

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

(10)

[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)

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(e) The limitations of your proposed method.

(3)

(Total for Question 3 = 22 marks)

TOTAL FOR PAPER = 50 MARKS

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