Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
International
Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Monday 15 June 2020

Morning (Time: 1 hour 20 minutes) | Paper Reference **WBI16/01**

Biology

Advanced

Unit 6: Practical Skills in Biology II

You must have:
Scientific calculator, ruler, 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.*
- **Show all your working in calculations and include units where appropriate.**

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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 6 4 7 2 9 A 0 1 2 0

Pearson

Answer ALL questions.

Write your answers in the spaces provided.

1 The photographs show two species of potatoes: sweet potatoes and white potatoes.

(Source: © min hee park/Alamy Stock Photo)

sweet potatoes

tubers

(Source: © Pakula Piotr/Shutterstock)

white potatoes

The tissue in the tubers contains molecules that can be used to produce new plants.

(a) The tissues of the tubers contain starch molecules.

Explain why starch is an energy storage molecule.

(2)

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(b) Describe an experiment to compare the water potential of the tissue from these two types of tuber.

(5)

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

(2)

Abiotic variable .....

.....

Biotic variable .....

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

(2)

Variable

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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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(d) Explain the factors that may affect the water potential of potato cells.

(3)

(Total for Question 1 = 14 marks)

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2 The photograph shows a thistle plant.

(Source: © John Stacey)

This plant grows in grassland and is not eaten by cattle.

A student investigated the effect of treating thistle plants with a solution of insecticide. Other thistle plants were treated with water.

All the thistle plants used were selected, at random, from the same field.

After 56 days, the student measured the longest leaf of each thistle plant used in this investigation.

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

(1)

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(b) The table shows the results of this investigation.

Insecticide leaf length / cm	Water leaf length / cm
12.6 13.1 13.9 14.0 11.1 11.6 12.4 12.9 12.5 13.4 13.7 12.0 11.9 11.8 12.6	9.1 9.4 10.3 10.1 10.4 10.9 9.0 9.7 9.9 10.8 9.3 9.8 9.2 9.7 9.4

(i) Calculate the percentage difference between the shortest and longest leaves treated with insecticide.

(1)

Answer .....%

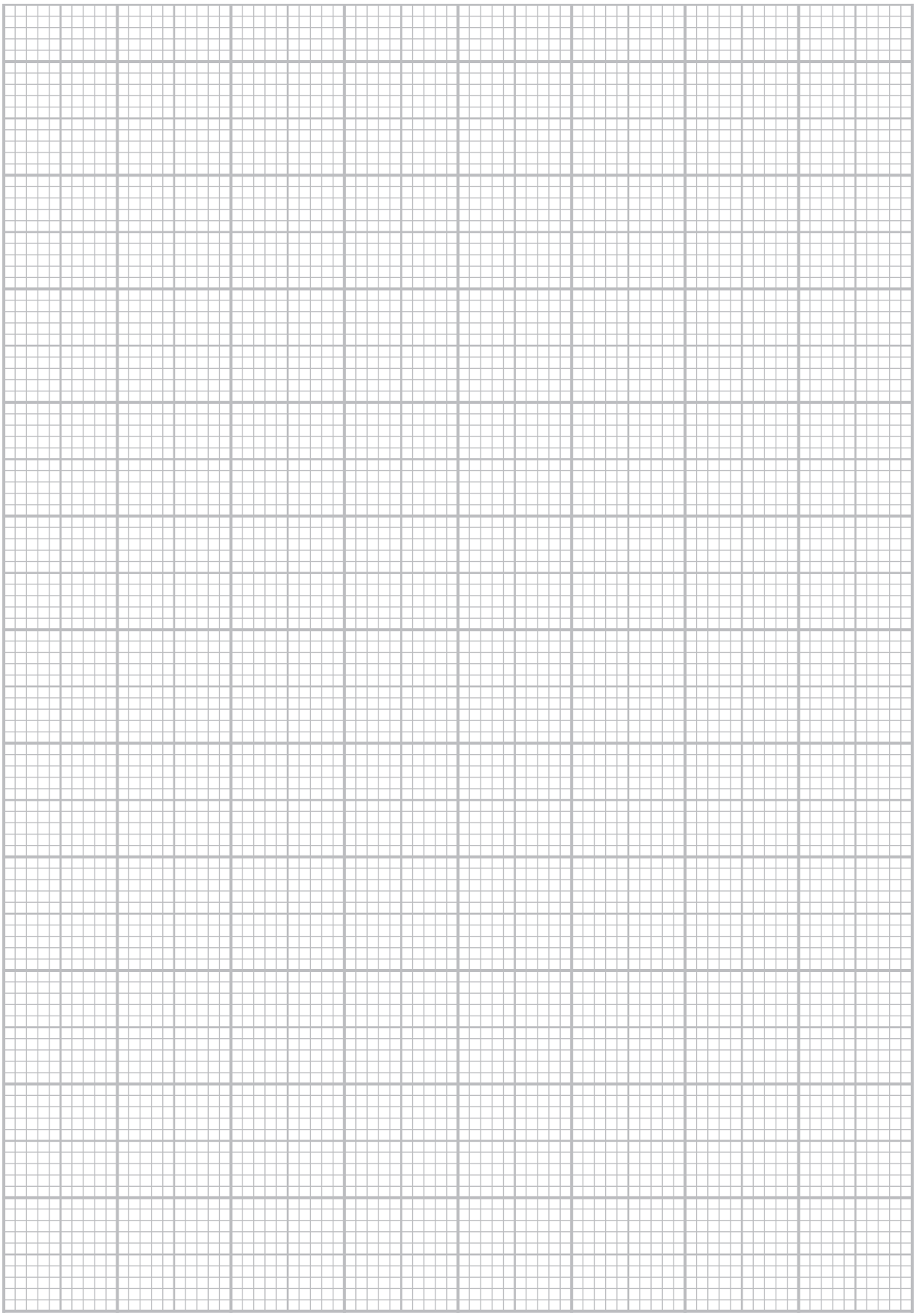
(ii) Calculate the mean length of the leaves for plants treated with insecticide and the mean length of the leaves for plants treated with water.

Draw a suitable table to display the **raw data** and your calculated **mean** for each treatment.

(3)

(c) Plot a suitable graph to compare the results of this investigation.

(3)



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(d) (i) The student analysed the data with a *t* test, using the formula

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{(S_1)^2}{n_1} + \frac{(S_2)^2}{n_2}}}$$

where:

$\bar{x}$ is the mean value for each treatment

n is the number of thistle plants in each treatment

$(S_1)^2 = 0.750$ and $(S_2)^2 = 0.357$

Calculate the value of *t*.

(3)

Answer .....

(ii) The table shows the critical values of t for different degrees of freedom.

The number of degrees of freedom = $(n_1 - 1) + (n_2 - 1)$

Degrees of freedom	$P = 0.05$	$P = 0.01$
15	2.131	2.947
16	2.120	2.921
17	2.110	2.898
18	2.101	2.878
19	2.093	2.861
20	2.086	2.845
21	2.080	2.831
22	2.074	2.819
23	2.069	2.807
24	2.064	2.797
25	2.060	2.787
26	2.056	2.779
27	2.052	2.771
28	2.048	2.763
29	2.045	2.756
30	2.042	2.750

Deduce the conclusion that can be drawn from this investigation.

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

(2)

(e) Explain **two** ways in which this investigation could be improved.

(2)

1 .....

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2 .....

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(Total for Question 2 = 15 marks)

3 The photograph shows one species of the genus *Cabomba*, an aquatic plant.

(Source: © Dorling Kindersley ltd/Alamy Stock Photo)

Cabomba grows in streams and ponds in many parts of the world.

It adds oxygen to the water.

A student observed that there were fewer *Cabomba* plants growing in the shaded parts of a pond.

The student formed the following hypothesis.

The greater the light intensity the faster the rate of photosynthesis in *Cabomba* plants.

Plan an investigation to test this hypothesis.

(a) State **one** safety issue you would need to take into account.

(1)

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

(3)

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(c) Devise a detailed method, including an explanation of how you would control and monitor important variables.

(10)

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(d) Describe how your results should be recorded, presented and analysed in order to draw conclusions from your investigation.

(4)

(e) Suggest **three** limitations of your proposed method.

(3)

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2 .....

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(Total for Question 3 = 21 marks)

TOTAL FOR PAPER = 50 MARKS

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