

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

Candidate Number

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Time 1 hour and 20 minutes

Paper
reference

WBI13/01

Biology

International Advanced Subsidiary / Advanced Level
UNIT 3: Practical Skills in Biology I

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.
- Good luck with your examination.

Turn over ►

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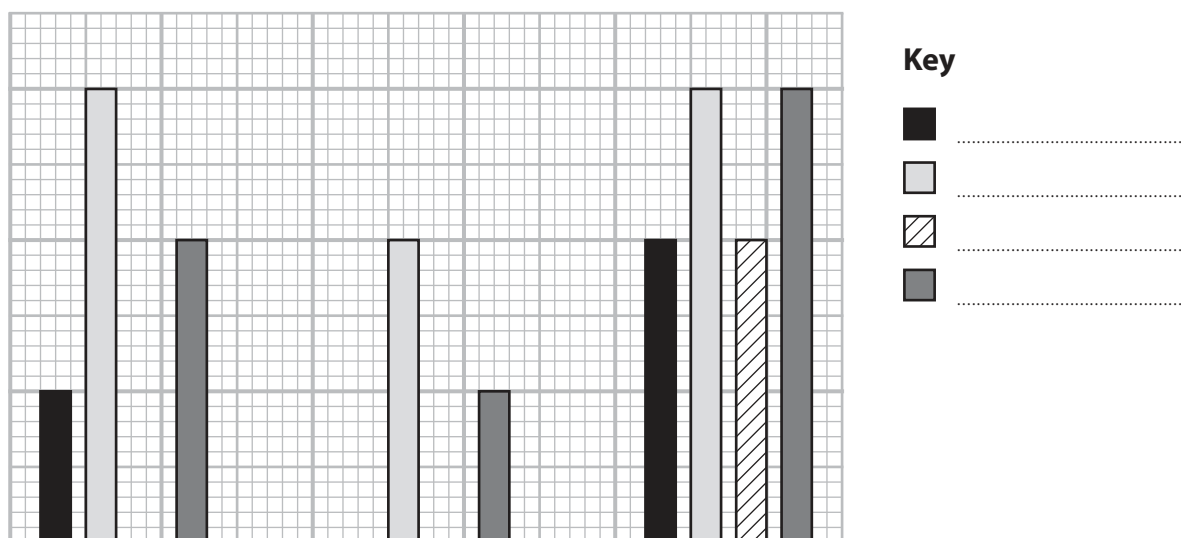
- (b) The antimicrobial properties of extracts from four species of plant (A, B, C and D) were investigated using three types of bacteria.

The antimicrobial effect was scored on a scale of 0 to 3, where 0 is no effect and 3 is a very large effect.

The table shows the results of this investigation.

Type of bacteria	Score for each species of plant			
	A	B	C	D
<i>B. subtilis</i>	1	3	0	2
<i>P. vulgaris</i>	0	2	0	1
<i>S. aureus</i>	2	3	2	3

The results were plotted as a bar chart.



- (i) Complete the bar chart by labelling the axes and key, using the information in the table.

(3)



2 Flowering plants produce seeds that can be stored in a seed bank. This is done to conserve the biodiversity of plants.

(a) (i) Describe how seeds are treated and then stored in a seed bank.

(3)

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(ii) State what is meant by the term **biodiversity**.

(2)

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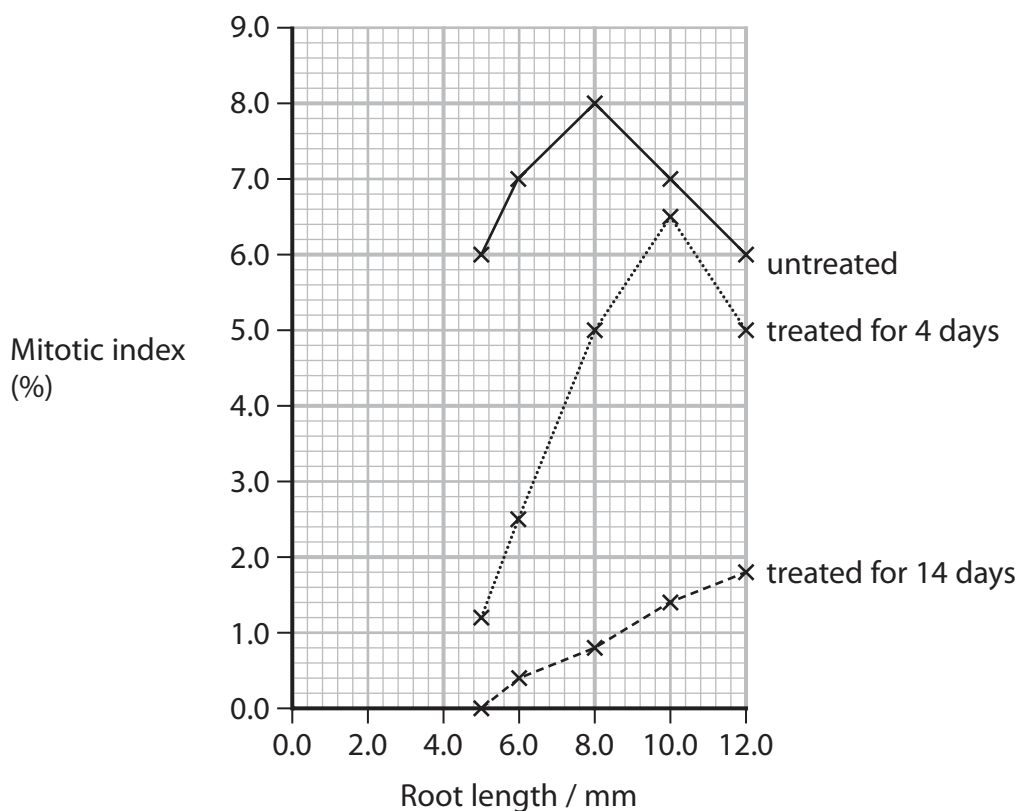
(ii) Seeds can be treated to artificially age them.

In an investigation, untreated and treated samples of seeds were germinated and the roots allowed to grow.

Roots of different lengths from the untreated seeds, seeds treated for 4 days and seeds treated for 14 days were selected.

The mitotic index of these roots was determined.

The graph shows the results of this investigation.



There were 14 cells undergoing mitosis in 8 mm roots from seeds treated for 4 days.

Calculate the total number of cells that were counted when the mitotic index was determined.

(3)

Total cells counted



(iii) Draw a table to show the data on the effect of root length on mitotic index in seeds treated for 14 days.

(3)

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(iv) Identify the conclusions that can be drawn from these data.

(3)

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(v) The graph does not show the standard deviations of the means for mitotic index.

Describe how the investigation could be modified to allow standard deviations to be obtained.

(2)

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(Total for Question 2 = 20 marks)

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3 Pollen grains germinate in a solution that contains sucrose and boric acid.

The effect of boric acid concentration on the percentage germination of pollen grains was studied.

(a) State the dependent variable in this study. (1)

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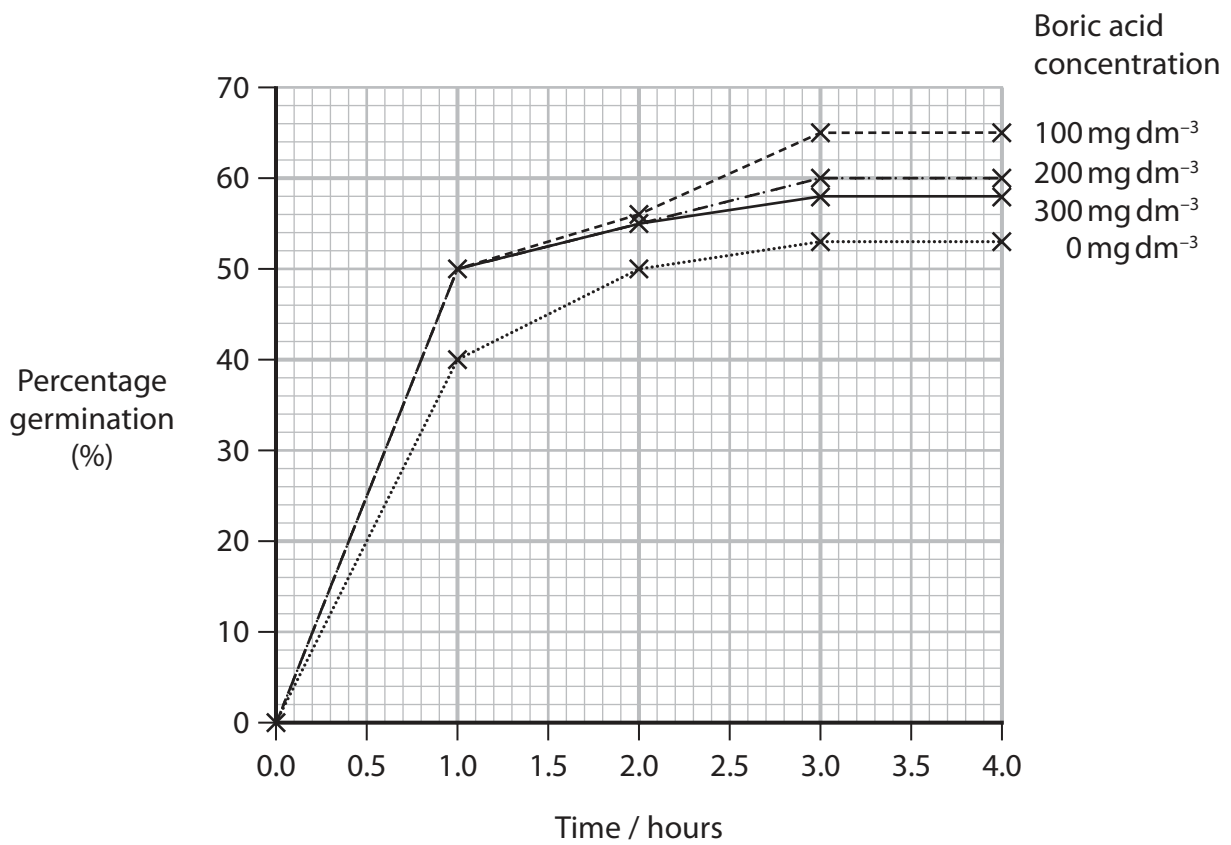
(b) In this study, the solutions used were maintained at pH 6.

Explain why this pH was maintained. (2)

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(c) The graph shows the results of this study.



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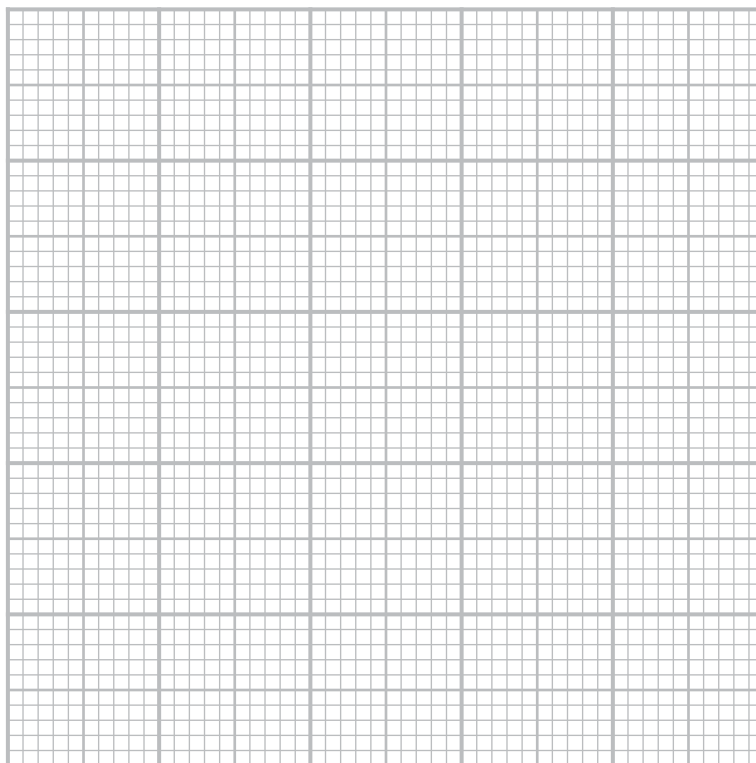
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- (i) Draw a graph to show how boric acid concentration affects germination at 4 hours.

Join the points with straight lines.

(5)



- (ii) Describe the effect of boric acid concentration on pollen grain germination at 4 hours.

(2)

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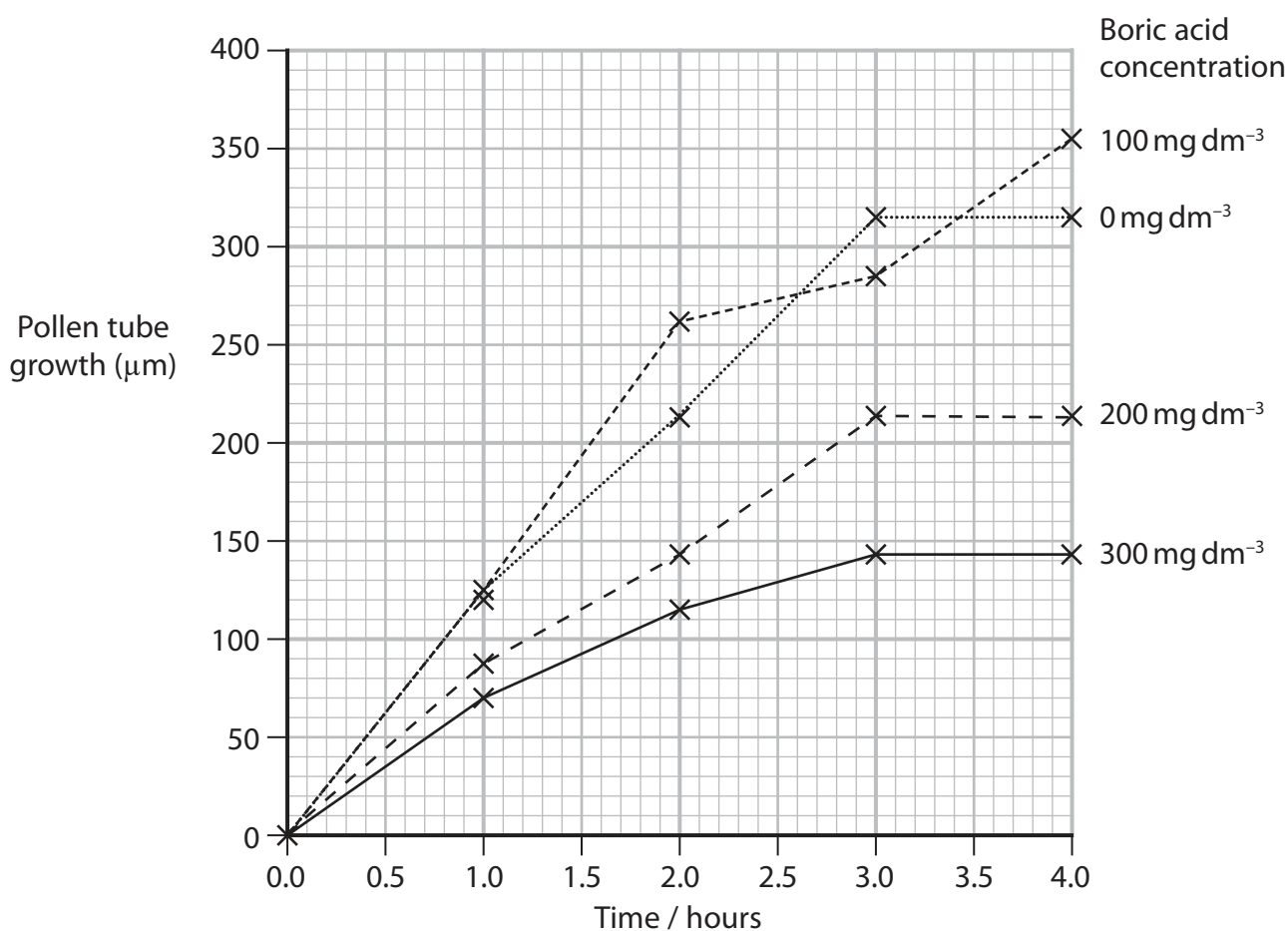
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- (d) In another study, the effect of boric acid concentration on pollen tube growth was investigated.

The graph shows the results of this study.



- (i) During the first two hours, the rate of pollen tube growth at a boric acid concentration of 100 mg dm^{-3} is $130.5 \text{ } \mu\text{m hour}^{-1}$.

Calculate the percentage increase in the rate of pollen tube growth between the rate at 0 mg dm^{-3} and the rate at 100 mg dm^{-3} , during the first two hours.

(2)

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