

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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Pearson Edexcel International Advanced Level

Wednesday 24 May 2023

Morning (Time: 1 hour 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 out** 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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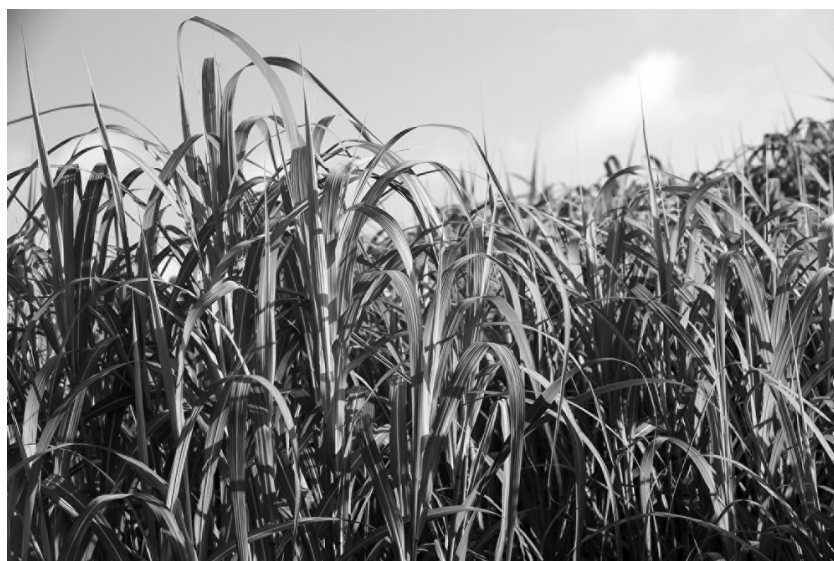


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Answer ALL questions.

Write your answers in the spaces provided.

- 1 The photograph shows elephant grass (*Pennisetum purpureum*).



(Source: © ASHLEY COOPER/SCIENCE PHOTO LIBRARY)

Elephant grass grows well in the nutrient-poor soils in dry areas in East Africa and is widely used as food for cattle. Its use as a source of fibres has been studied.

- (a) The strength of plant fibres is partly due to the arrangement of cellulose microfibrils in the cell walls of these fibres.

(i) Name **two** types of cell found in plant fibres.

(2)

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(ii) Fibres have cell walls with secondary thickening of lignin.

Describe **two** ways in which secondary thickening affects the properties of the cell.

(2)

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(b) Soaking plant fibres in sodium hydroxide causes them to swell and so increases their strength.

The effect of length of time of soaking on the strength of elephant grass fibres was investigated.

The breaking strength of the fibres after this soaking was determined to calculate the tensile strength, in Newtons per square millimetre (Nmm^{-2}).

(i) Name the independent variable in this investigation.

(1)

(ii) After soaking, the diameter of each fibre was measured.

Describe how fibre diameter could be measured accurately using a microscope.

(3)

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(iii) Give **two** reasons why fibre diameter was measured.

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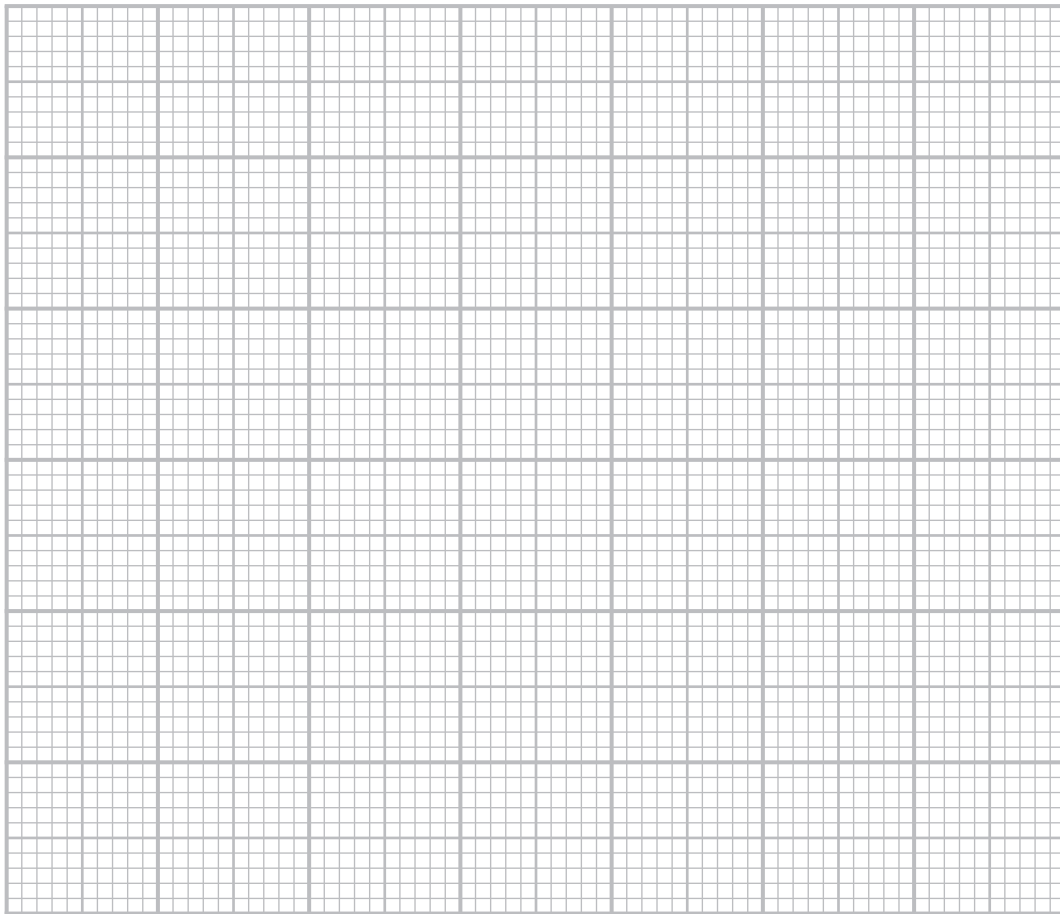


(c) Some of the results of this investigation are shown in the table.

Soaking time / hours	Tensile strength / Nmm^{-2}
0	38
3	60
6	86
12	88
18	90
24	90

(i) Plot a suitable graph to show the effect of soaking time on tensile strength. Join the points with straight lines.

(4)



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(ii) Describe the results of this investigation.

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(Total for Question 1 = 17 marks)

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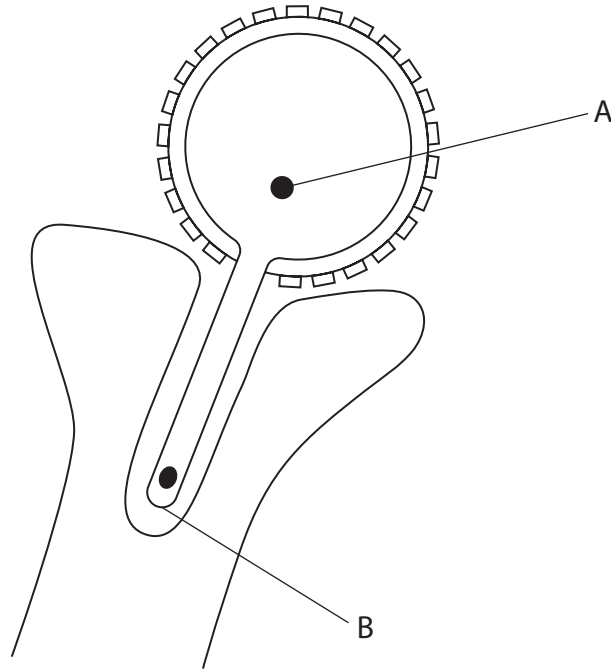
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2 Scientists use pollen grains to artificially pollinate certain crop plants.

Collecting pollen by hand is very time consuming.
However, bees collect large amounts of pollen in their daily activity.

Pollen traps can be used to remove pollen when the bees return to their hive.
The viability of the pollen collected by these two methods was investigated.

(a) The diagram shows a germinating pollen grain.



Give a function for each of the structures labelled A and B.

(2)

A

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B

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(b) The percentage germination of the pollen grains was used to determine the viability of the pollen.
Describe a procedure to compare the percentage germination of pollen collected by the two methods used in this investigation.

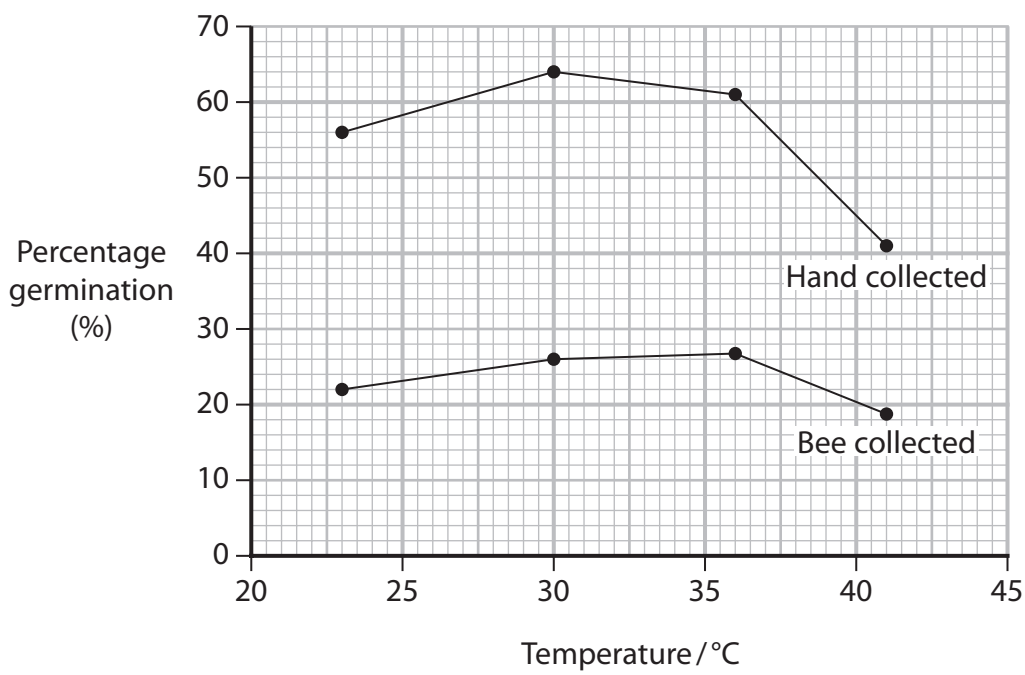
(5)

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(c) (i) The effect of temperature on percentage germination of pollen collected by both methods was investigated.

The results are shown in the graph.



Comment on the results of this investigation.

(4)

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(ii) Describe how the investigation could be modified to allow the significance of the difference between the percentage germination for bee collected pollen and hand collected pollen to be determined at 30°C.

(4)

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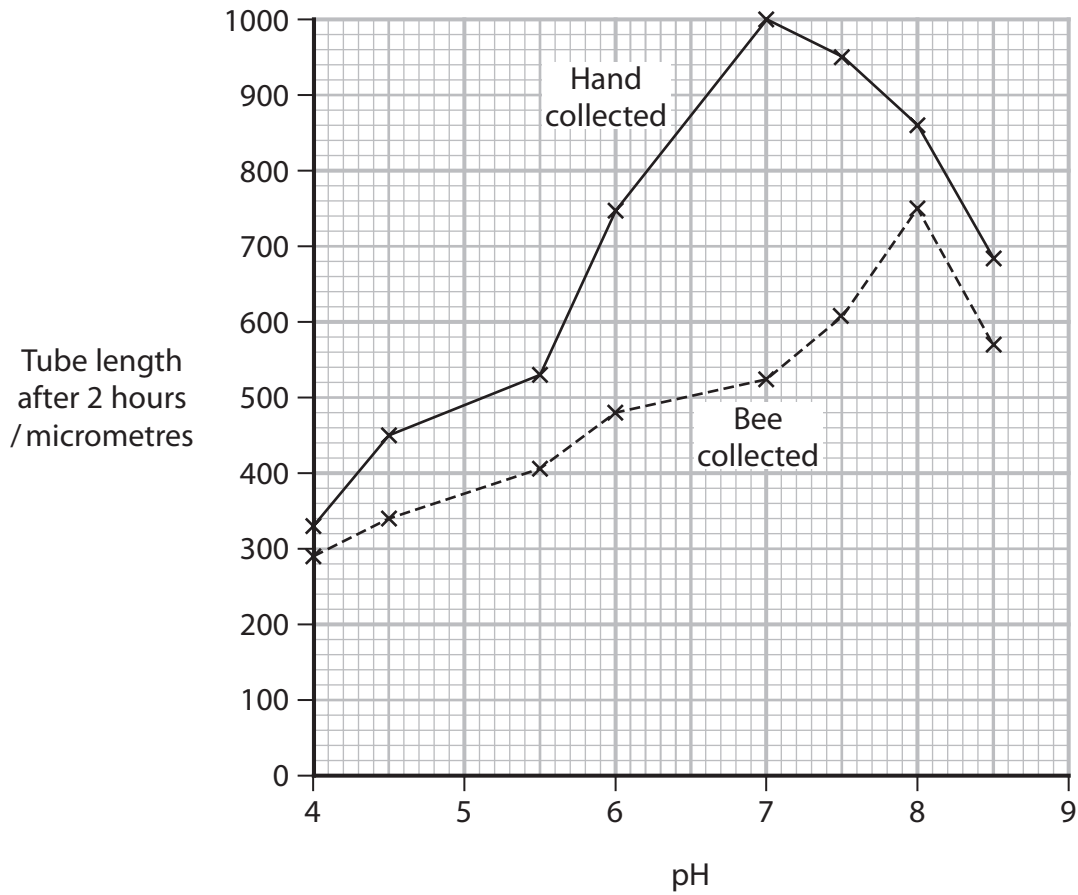
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(d) The effect of pH on pollen tube growth of pollen collected by these two methods was also investigated.

The results are shown in the graph.



(i) Calculate the percentage difference in pollen tube length between the optimum pH for hand collected pollen and the optimum pH for bee collected pollen.

Give your answer to three significant figures.

(3)

Answer%

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(ii) Suggest **one** reason for the differences in tube growth of the pollen collected by these two methods.

(1)

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(Total for Question 2 = 19 marks)

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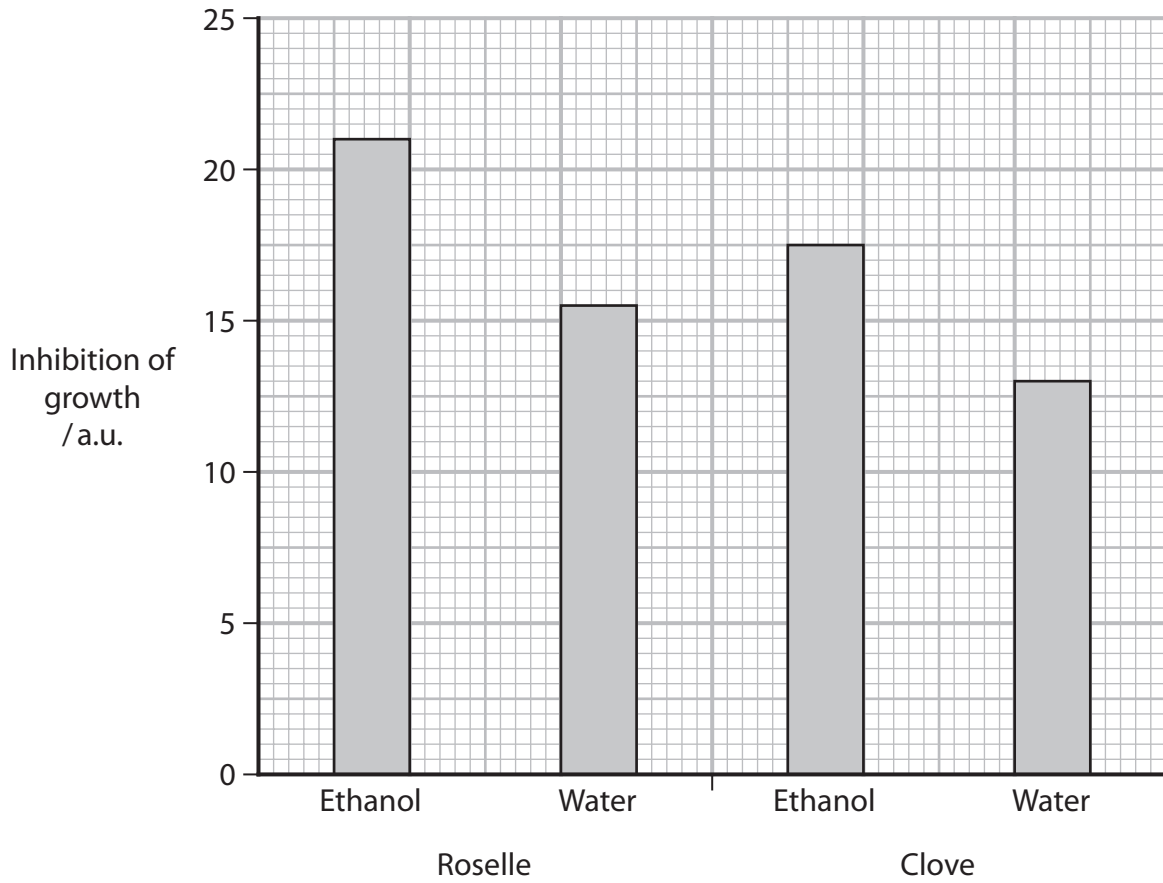
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3 Scientists study the possibilities of antimicrobial properties in plants.

The effects of extracts of roselle plants and clove plants on the inhibition of the growth of the bacterium *E. coli* were studied. Extracts were made in water and in ethanol.

The results are shown in the graph.



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(b) Draw a table to show the data in the graph.

(c) (i) Calculate the ratio of the inhibition for the ethanol extracts of roselle and clove.

(1)

Answer

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(ii) Describe **two** conclusions that can be drawn from the results of this investigation.

(2)

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(d) In another study, the effect of these extracts on the internal pH of the cells of *E. coli* was investigated.

The internal pH of *E. coli* was reduced by each of the extracts.

Suggest why these extracts have an antimicrobial effect on the bacteria.

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(Total for Question 3 = 14 marks)

TOTAL FOR PAPER = 50 MARKS

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