Please check the examination details below before entering your candidate information

Candidate surname	Other names

Centre Number | Candidate Number

Pearson Edexcel International Advanced Level

Tuesday 29 October 2024

Morning (Time: 1 hour 20 minutes)

Paper reference **WBI16/01**

Biology

International 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.*

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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Pearson

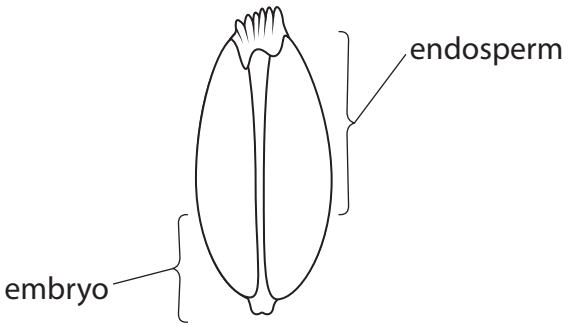
Answer ALL questions.

1 Gibberellin stimulates germinating wheat grains to synthesise amylase.

(a) State why germinating wheat grains need to produce amylase.

(1)

(b) The drawing shows a wheat grain and the locations of the endosperm and the embryo.



Describe an experiment to determine if gibberellin stimulates the synthesis of amylase by the endosperm or embryo of a wheat grain.

(6)

(c) Describe how gibberellin increases amylase synthesis.

(3)

(Total for Question 1 = 10 marks)

2 The photograph shows kenaf plants that grow in many African countries.

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

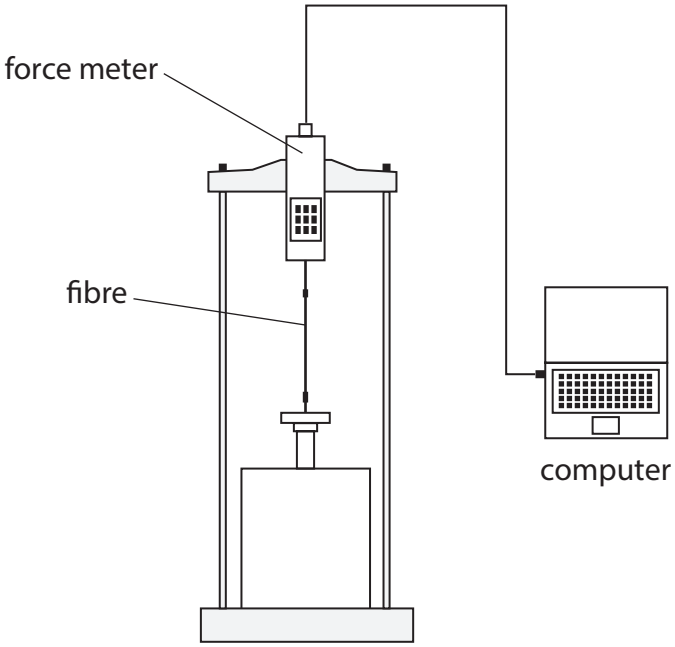
The plants are grown for food and as a source of fibres.

A scientist investigated the tensile strength of samples of fibres from kenaf plants.

Some of the samples of fibres were treated with hydrogen peroxide and other samples were untreated.

The force needed to break each fibre was measured.

The diagram shows the apparatus used.



The apparatus shows a force meter that pulls on the attached fibre. The force needed to break the fibre is recorded on the computer.

(a) Describe how the scientist could reduce **one** risk when using this apparatus.

(2)

Risk

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How the scientist could reduce this risk

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

Force needed to break a fibre treated with hydrogen peroxide / MPa	Force needed to break an untreated fibre / MPa
894	746
920	821
798	903
964	887
927	795
1021	852
mean 921	mean.....

Calculate the mean percentage increase in tensile strength of fibres treated with hydrogen peroxide compared to untreated fibres.

Give your answer to **three** significant figures.

(3)

.....%

(c) Some variables were controlled in this investigation.

(i) State **one** abiotic and **one** biotic variable, other than temperature, that could affect this investigation.

(2)

Abiotic variable

Biotic variable

(ii) Choose **one** of the variables you have identified in part (i).

State how this variable can be controlled.

(1)

Variable

Method of control

(d) Sclerenchyma fibres strengthen plant stems.

Describe the structure of a sclerenchyma fibre.

(2)

(Total for Question 2 = 10 marks)

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3 The photograph shows pea seeds with growing roots.

(Source: © Sangita Pal / Alamy Stock Photo)

Mitosis occurs in growing roots.

A scientist allowed pea seeds to start growing in different concentrations of oxygen.

Pea seeds were grown in oxygen concentrations of 5% and 20%.

After two days the root tips were removed.

The tips were stained and observed under a microscope.

The mitotic index for each root tip was determined.

The results

Mitotic index in 20% oxygen after two days
5.8 5.7 5.1 6.0 6.1 6.2 5.4 5.4 5.6

Mitotic index in 5% oxygen after two days
3.6 3.8 4.3 3.9 4.4 4.2 4.1 3.9 3.8

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

(1)

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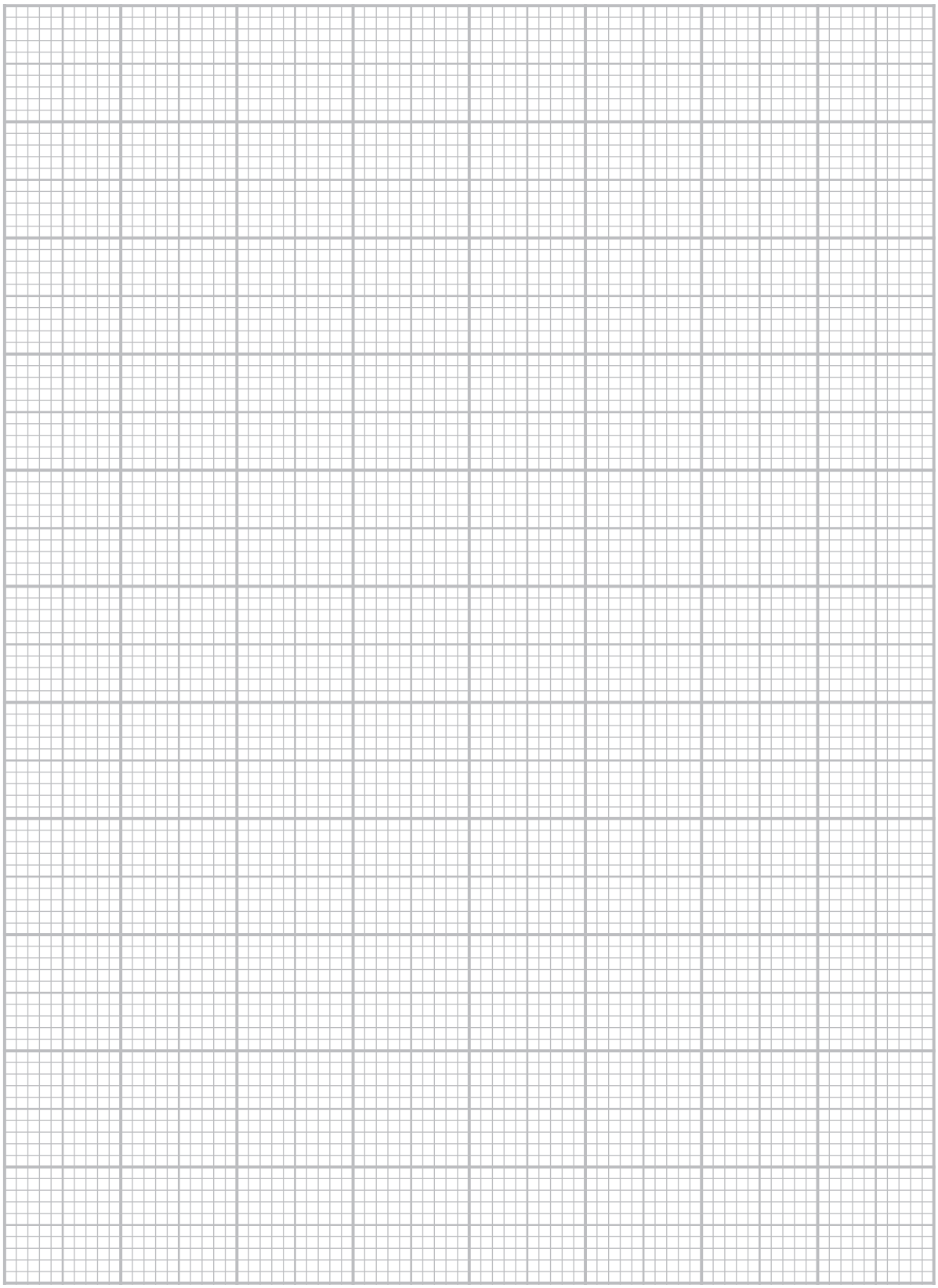
(b) Draw a suitable table to display the **data** and your calculated **means**.

(3)

(c) Draw a suitable graph to show the mean mitotic index after two days in 20% oxygen and the mean mitotic index after two days in 5% oxygen.

Include an indication of the variability of the data.

(3)



(d) The scientist analysed the data with a *t* test using the formula:

$$t = \frac{(\bar{x}_A - \bar{x}_B)}{\sqrt{\frac{(S_A)^2}{n_A} + \frac{(S_B)^2}{n_B}}}$$

where:

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

n is the number of samples for each treatment

$(S_A)^2 = 0.1325$ and $(S_B)^2 = 0.0700$

(i) Calculate the value of *t*.

(2)

Answer .....

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

The number of degrees of freedom = $(n_A - 1) + (n_B - 1)$

Degrees of freedom	p = 0.05	p = 0.01
9	2.26	3.25
10	2.23	3.17
11	2.20	3.11
12	2.18	3.06
13	2.16	3.01
14	2.15	2.97
15	2.13	2.94
16	2.12	2.92
17	2.11	2.90
18	2.10	2.88

Describe the conclusions that can be drawn from this investigation.

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

(3)

(e) Describe how the scientist could extend this investigation to collect more data to either support or reject the hypothesis.

(2)

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(Total for Question 3 = 14 marks)

4 The photograph shows the pondweed *Elodea canadensis*.

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

This plant grows in ponds and rivers throughout North America.

A student read that pondweed grows fastest near the water surface.

The student formed the following hypothesis:

The further away from the water surface the lower the rate of photosynthesis as less light can be absorbed by the pondweed.

Plan a **laboratory** investigation that can be carried out to find evidence to support or reject this hypothesis.

Your answer should give details under the following headings.

(a) Describe the preliminary practical work that you might undertake to ensure your proposed method would provide quantitative results.

(2)

(b) Devise a detailed method, including how you would control and monitor important variables.

(9)

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

(3)

(d) Suggest **two** limitations of your proposed method.

(2)

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(Total for Question 4 = 16 marks)

TOTAL FOR PAPER = 50 MARKS

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