Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 2022**

1 hour

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Any blank pages are indicated.

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1 Rice contains starch. Amylase is an enzyme that catalyses the breakdown of starch to form reducing sugars.

A student investigated the effect of amylase on cooked rice.

The student used this method:

Step 1 Two small beakers were prepared; each beaker contained 20 g of cooked white rice. One beaker was labelled **W** and one beaker was labelled **A**.

Step 2 Both of the beakers were put into a 40 °C water-bath.

Step 3 A measuring cylinder was used to add 20 cm^3 of distilled water to the rice in beaker **W**.

Step 4 The same measuring cylinder was then used to add 20 cm^3 of a 1% amylase solution to the rice in beaker **A**.

Step 5 The beakers were left in the water-bath for 10 minutes.

Step 6 One test-tube was labelled **W10** and a second test-tube was labelled **A10**.

Step 7 After 10 minutes, a glass rod was used to stir the contents of beaker **W**.

Step 8 A clean pipette was used to remove 2 cm^3 of the liquid surrounding the rice in beaker **W**. The 2 cm^3 of liquid was put into test-tube **W10**.

Step 9 Steps 7 and 8 were repeated with beaker **A** and test-tube **A10**.

Step 10 A syringe was used to add 2 cm^3 of Benedict's solution to each of test-tubes **W10** and **A10**.

Step 11 Test-tubes **W10** and **A10** were put into an **80 °C** water-bath for five minutes.

Step 12 After five minutes, the colours of the contents of test-tubes **W10** and **A10** were observed.

The student's observations are shown in Fig. 1.1.



Fig. 1.1

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(a) (i) Prepare a table to record the results shown in Fig. 1.1.

View solution

[2]

(ii) State a conclusion for the results shown in Fig. 1.1.

.....

.....

..... [1]

(iii) State **two** variables that were kept constant in this investigation.

1 .....

2 .....

[2]

(iv) State the purpose of adding distilled water to the beaker of cooked rice labelled **W**.

.....

.....

..... [1]

(v) It was important that step 3 was carried out before step 4.

Predict the effect on the results if step 4 was carried out before step 3.

.....

.....

..... [1]

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(vi) The temperature of the 40 °C water-bath was not maintained and decreased during the investigation.

State **one** piece of equipment that could be used to maintain the temperature at 40 °C.

..... [1]

(b) State how you could show that cooked rice contains starch.

View solution

.....

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..... [2]

(c) Some students investigated the effect of temperature on the rate of amylase activity. They measured the mass of reducing sugars produced in five minutes, at different temperatures.

The results of this investigation are shown in Fig. 1.2.

View solution

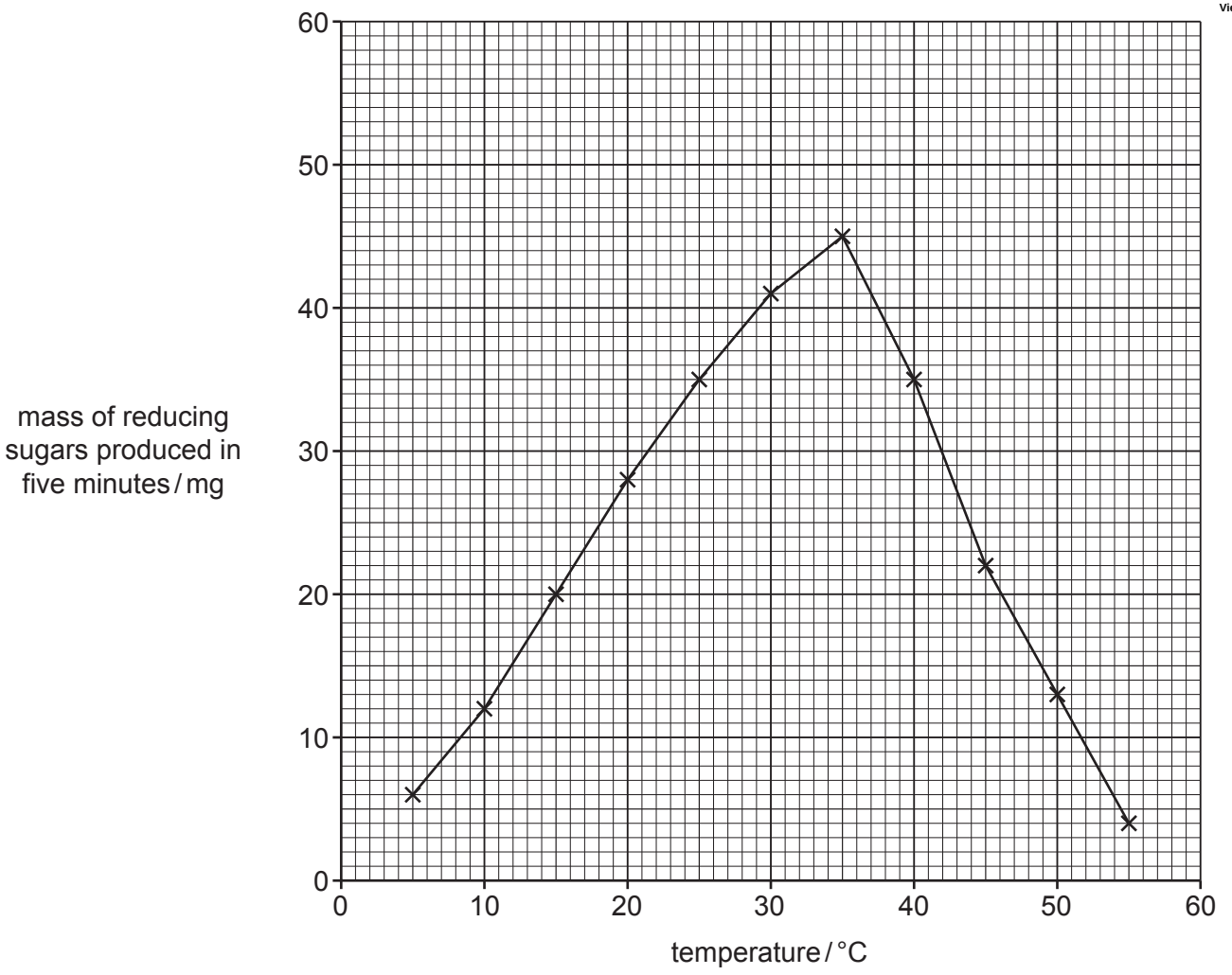

Fig. 1.2

(i) Describe the effect of temperature on the activity of amylase shown in the graph in Fig. 1.2.

.....

.....

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.....

..... [2]

(ii) Use the graph to estimate the **rate** of amylase activity, in mg per minute, at a temperature of 42 °C.

View solution

Space for working.

..... mg per minute
[2]

(iii) The students wanted to obtain a more accurate value for the temperature at which amylase works best.

View solution

Suggest further investigative work that the students should carry out.

.....

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..... [2]

(d) Plan an investigation to determine the effect of pH on the activity of amylase.

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..... [6]

[Total: 22]

View solution

2 Fig. 2.1 is a photomicrograph of a section through part of a marram grass leaf, *Ammophila arenaria*.



Fig. 2.1

(a) (i) Draw a large diagram of the section of marram grass leaf shown in Fig. 2.1.

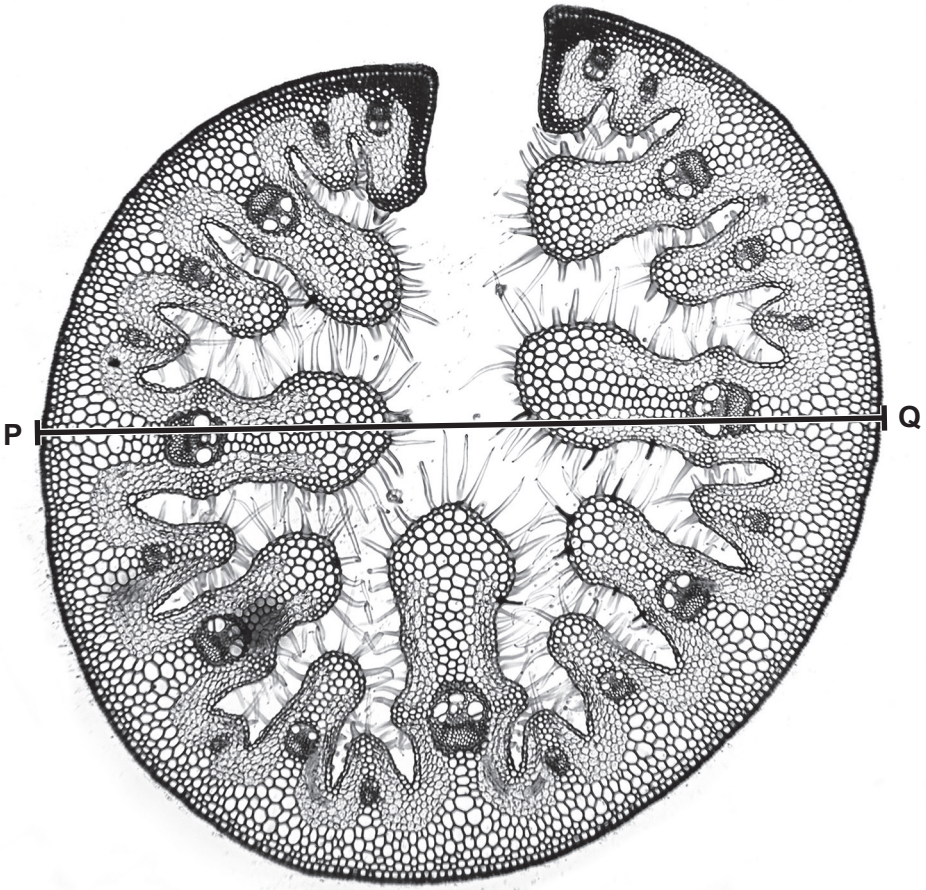
Do **not** draw individual cells.

View solution

[4]

(ii) Fig. 2.2 shows a cross-section of a whole marram grass leaf.

View solution



magnification ×120

Fig. 2.2

Measure the length of line **PQ** on Fig. 2.2.

length of line **PQ** ..... mm

Calculate the actual diameter of the marram grass leaf using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ on Fig. 2.2}}{\text{actual diameter of the marram grass leaf}}$$

Give your answer to **one** decimal place.

Space for working.

..... mm
[3]

(b) Scientists investigated the effect of different concentrations of sodium chloride solution on the germination and growth of marram grass.

Marram grass seeds were germinated in Petri dishes on filter paper which had been soaked in one of the different sodium chloride solutions. Each Petri dish contained 15 seeds and the investigation was repeated four times.

View solution

After 20 days, the lengths of the seedling roots were measured with a ruler.

(i) State the variable that was changed (independent variable) and the variable that was measured (dependent variable) in this investigation.

independent variable .....

.....

dependent variable .....

.....

[2]

(ii) State **two** ways the scientists designed the investigation to produce valid and reliable results.

1 .....

.....

2 .....

.....

[2]

View solution

(c) The results of the investigation described in **2(b)** are shown in Table 2.1.

View solution

Table 2.1

concentration of sodium chloride solution / g per dm^3	average root length / mm
0	33
2	22
4	19
6	13
8	2
10	1

(i) Using the information in Table 2.1, calculate the percentage decrease in the average root length when the concentration of sodium chloride was changed from 4 g per dm^3 to 6 g per dm^3.

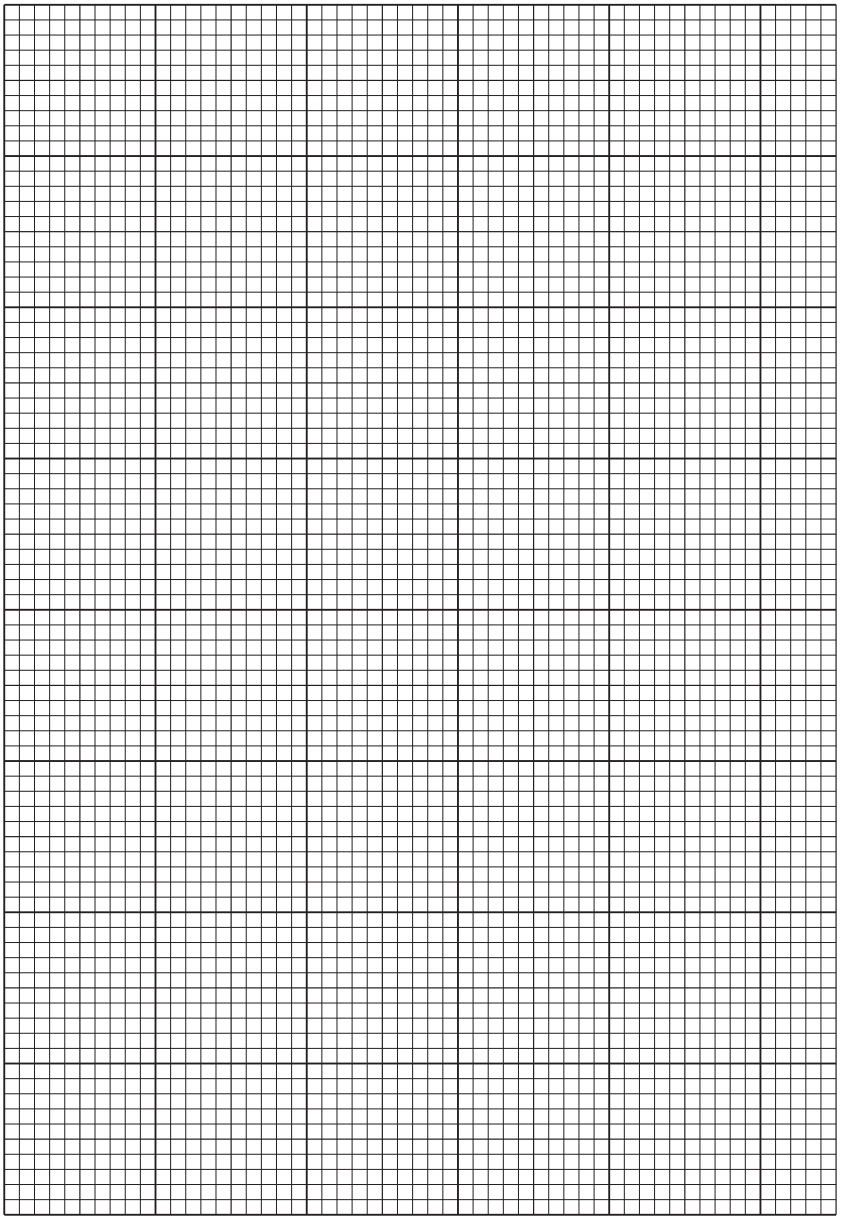
Give your answer to **three** significant figures.

Space for working.

..... %
[3]

(ii) Plot a line graph on the grid of the data in Table 2.1.

View solution



[4]

[Total: 18]

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