Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

BIOLOGY **0610/62**

Paper 6 Alternative to Practical **October/November 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 Some students investigated the effect of hydrogen peroxide concentration on the activity of catalase.

Catalase is an enzyme found in yeast cells. The enzyme catalyses the breakdown of hydrogen peroxide to form water and oxygen. The reaction releases heat.

The students compared the activity of catalase in two different concentrations of hydrogen peroxide solution by measuring the change in temperature during the reaction. The students used a yeast suspension as a source of catalase.

The students used this method:

Step 1 Aluminium foil was wrapped around the outside of a test-tube. The test-tube was labelled **A**.

Step 2 Aluminium foil was wrapped around the outside of a second test-tube. This test-tube was labelled **B**.

Step 3 A syringe was used to put 10 cm^3 of hydrogen peroxide solution into test-tube **A**.

Step 4 The temperature of the hydrogen peroxide solution in test-tube **A** was measured and recorded as 20 °C at 0 minutes.

Step 5 The yeast suspension was stirred. 1 cm^3 of yeast suspension was then added to the hydrogen peroxide solution in test-tube **A** and the stop-clock was started.

Step 6 The temperature of the hydrogen peroxide solution in test-tube **A** was measured every minute for five minutes.

The measurements from step 6 are shown in Fig. 1.1.

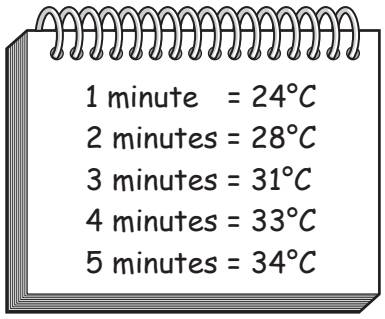

Fig. 1.1

Step 7 A syringe was used to put 5 cm^3 of hydrogen peroxide solution and 5 cm^3 of distilled water into test-tube **B**.

Step 8 Steps 4, 5 and 6 were repeated using test-tube **B**. These measurements are shown in Fig. 1.2.

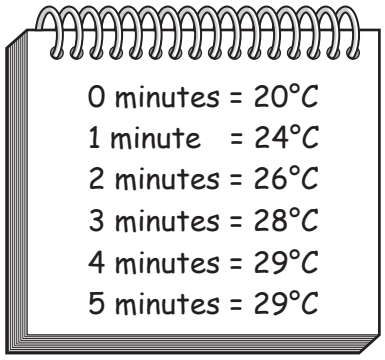

Fig. 1.2

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(a) (i) Prepare a table and record the results shown in step 4, Fig. 1.1 and Fig. 1.2.

View solution

[3]

(ii) Using the results, identify the highest temperature and the lowest temperature in each test-tube.

Use these values to calculate the maximum temperature **change** in each test-tube.

View solution

Space for working.

maximum temperature change in test-tube **A** ..... °C

maximum temperature change in test-tube **B** ..... °C

[2]

(iii) State a conclusion for the results.

View solution

.....

.....

..... [1]

(iv) State the variable that was measured (dependent variable) in this investigation. View solution

..... [1]

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(b) (i) The test-tubes were covered with foil in step 1 and step 2.

View solution

Predict and explain the effect on the results of **not** covering the test-tubes with foil.

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..... [2]

(ii) State **two** variables, other than covering both test-tubes with foil, that were kept constant in this investigation.

1 .....

2 .....

[2]

(c) (i) In a different experiment, students investigated the effect of pH on the breakdown of hydrogen peroxide by calculating the rate of oxygen production.

State the **two** measurements that the students would need to take to calculate the rate of oxygen production in cm^3 per minute.

1 .....

2 .....

[2]

The results of the investigation are shown in Table 1.1.

View solution

Table 1.1

pH	rate of oxygen production / cm^3 per minute			average rate of oxygen production / cm^3 per minute
	trial 1	trial 2	trial 3	
5	7	8	8	7.7
6	15	17	14	15.3
7	26	29	27	27.3
8	27	16	28	27.5
9	5	6	4	5.0

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(ii) The students decided that the result for trial 2 at pH 8 was anomalous.

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State what is meant by an anomalous result.

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..... [1]

(iii) Describe how the students calculated the average value for pH 8.

View solution

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..... [1]

(iv) Using the data in Table 1.1, plot a line graph on the grid to show the effect of pH on the average rate of oxygen production.

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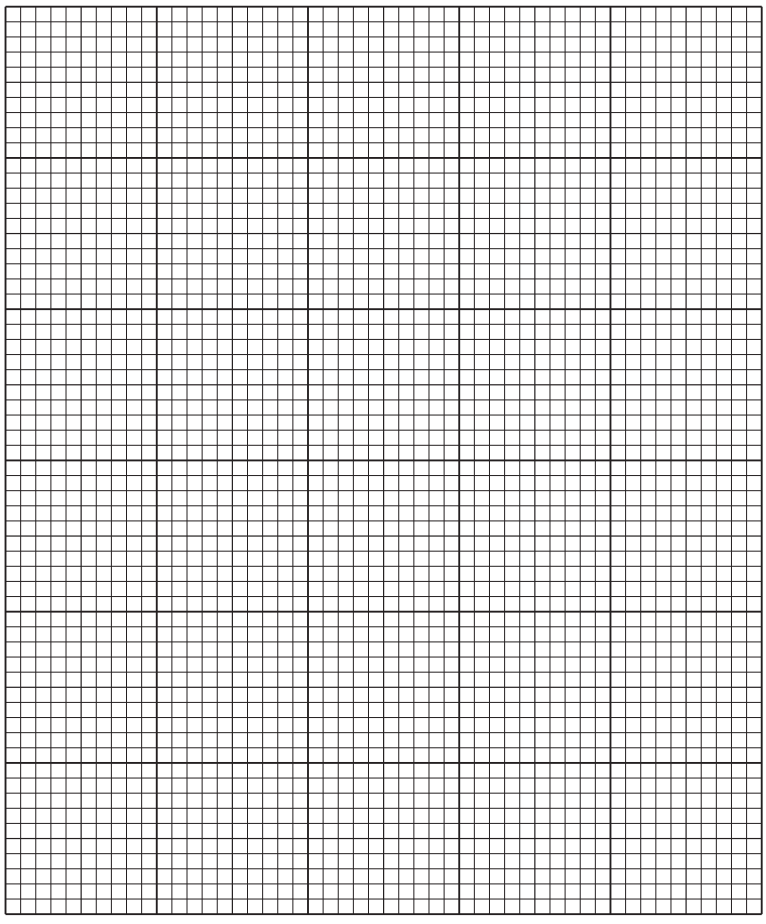

[4]

(v) Describe the effect of pH on the average rate of oxygen production.

View solution

Use the data from your graph to support your answer.

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..... [2]

(vi) The students wanted to obtain a more accurate value for the pH at which the average rate of oxygen production was highest.

View solution

Suggest what further investigative work the students should do.

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..... [2]

[Total: 23]

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2 Fig. 2.1 is a photomicrograph of a cross-section of a stalk of celery, *Apium graveolens*.

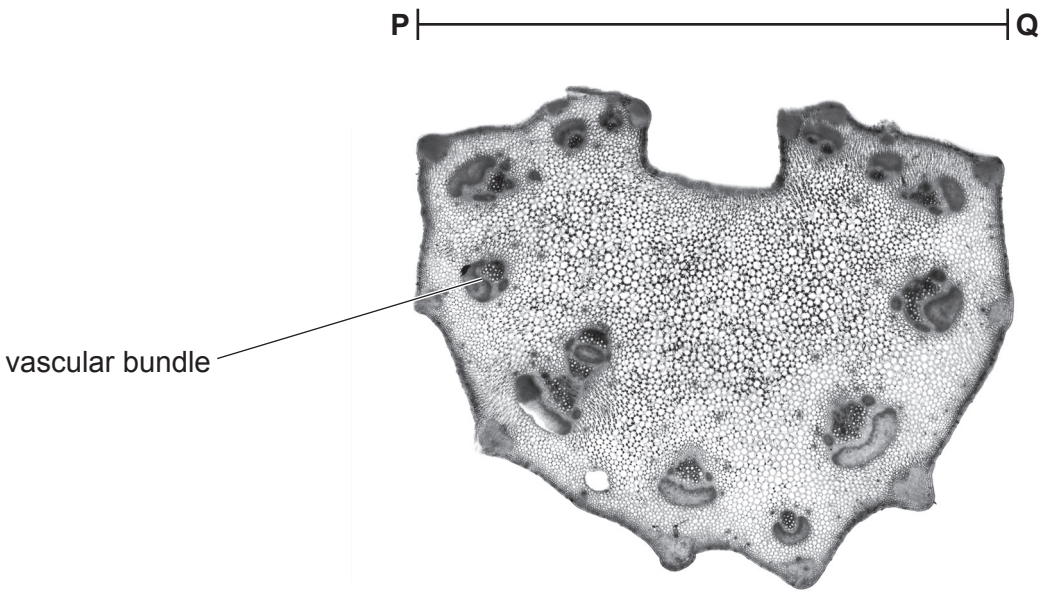

Fig. 2.1

(a) (i) Draw a large diagram of the celery stalk in Fig. 2.1.

Show the positions of the vascular bundles on your drawing but do not draw individual cells.

Label **one** vascular bundle on your drawing.

View solution

[5]

(ii) Line **PQ** on Fig. 2.1 represents the width of the celery stalk cross-section.

View solution

The actual width of the cross-section is 27 mm.

Measure the length of line **PQ** on Fig. 2.1.

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

Calculate the magnification of the photomicrograph using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ}}{\text{actual width of the celery stalk cross-section}}$$

Give your answer as a whole number.

Space for working.

.....

[3]

(b) The movement of water up a celery stalk can be investigated by placing a celery stalk in a solution of dye. Fig. 2.2 shows a celery stalk in a glass containing dye.

View solution



Fig. 2.2

Plan an investigation to determine the effect of air temperature on the movement of dye up a celery stalk.

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..... [6]

(c) Describe a method that can be used to find out if samples of plant tissue contain reducing sugars.

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..... [3]

[Total: 17]

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