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CAMBRIDGE
International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3831665090

BIOLOGY **0610/61**

Paper 6 Alternative to Practical **May/June 2026**

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. Do **not** use correction fluid or tape.
- 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 **16** pages. Any blank pages are indicated.

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1 Cells from the root of a beet plant contain a red pigment.

A student investigated the effect of surface area on the diffusion of pigment out of cylinders of beetroot tissue.

The student was provided with four identical cylinders of beetroot tissue that had been cut to 4 cm in length, and a beaker of hot water at 60 °C.

The student used this method:

step 1 Label four test-tubes **1**, **2**, **4** and **8**.

step 2 Put one of the beetroot cylinders into test-tube **1**.

step 3 Put 10 cm^3 of hot water into test-tube **1** and put a bung in the top of the test-tube.

step 4 Start the stop-clock. Shake the test-tube for two minutes.

step 5 After two minutes, stop the stop-clock.

step 6 Remove and discard the beetroot cylinder from test-tube **1** so that only the liquid remains in the test-tube.

step 7 Use the scalpel and ruler to cut a second beetroot cylinder into two pieces of equal length, as shown in Figure 1.1.

Put both of the pieces of beetroot into test-tube **2**.

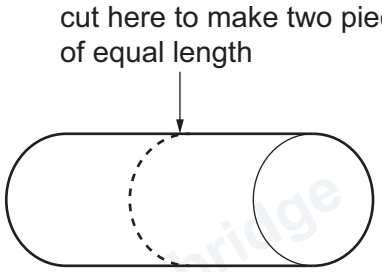

Figure 1.1

step 8 Put 10 cm^3 of hot water into test-tube **2** and put a bung in the top of the test-tube.

step 9 Start the stop-clock. Shake test-tube **2** until the colour of the liquid in test-tube **2** is the same colour as the liquid in test-tube **1**.

Stop the stop-clock and record the time.

step 10 Cut the third beetroot cylinder into four pieces of equal length. Put the four pieces of beetroot into test-tube **4**.

step 11 Repeat steps 8 and 9 with test-tube **4**.

step 12 Cut the fourth beetroot cylinder into eight pieces of equal length. Put the eight pieces of beetroot into test-tube **8**.

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step 13 Repeat steps 8 and 9 with test-tube **8**.

step 14 Measure the final temperature of the hot water in the beaker and record this measurement.

(a) (i) Figure 1.2 shows part of the thermometer from step 14. Record the temperature shown on the thermometer in the space provided.

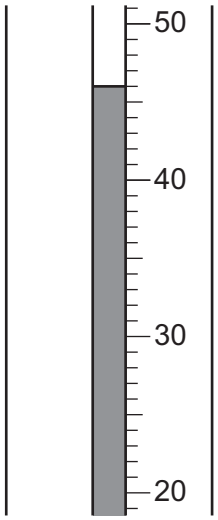

Figure 1.2

..... °C [1]

Figure 1.3 shows the time taken for the liquid in each test-tube to become the same colour as the liquid in test-tube 1.



test-tube **2** test-tube **4** test-tube **8**

Figure 1.3

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(ii) Prepare a table and record the results shown in Figure 1.3.

Convert the times on the stop-clocks to seconds.

[4]

(iii) State a conclusion for the results.

.....

.....

..... [1]

(iv) State the independent and dependent variables in this investigation.

independent variable .....

.....

dependent variable .....

.....

[2]

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(v) The temperature of the hot water decreased during the investigation.

Suggest **one** way of improving the method to reduce this source of error.

.....

.....

..... [1]

(vi) State **two** possible sources of error for the method used in step 9.

1 .....

.....

.....

2 .....

.....

.....

[2]

(vii) Using a scalpel to cut the beetroot cylinders was a safety hazard.

State **one** safety precaution that would reduce the risk of an injury.

.....

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..... [1]

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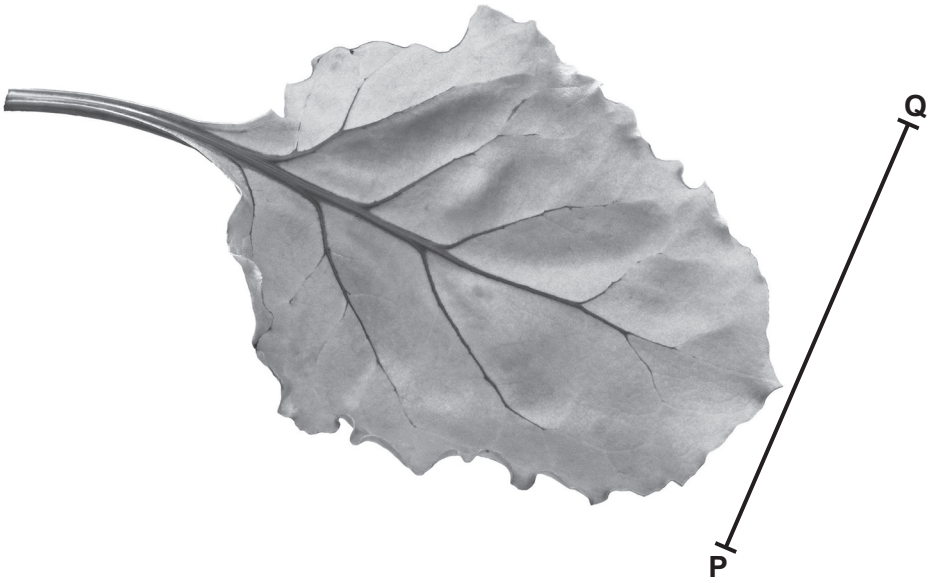
(b) Figure 1.4 is a photograph of a leaf from a beet plant, *Beta vulgaris*.



magnification ×0.82

Figure 1.4

(i) Draw a large diagram of the beet leaf shown in Figure 1.4.

[4]

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(ii) Line **PQ** on Figure 1.4 represents the maximum width of the beet leaf.

Measure the length of line **PQ** on Figure 1.4.

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

Calculate the actual width of the beet leaf using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Figure 1.4}}{\text{actual width of the beet leaf}}$$

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

Space for working.

..... mm
[3]

[Total: 19]

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2 Plan an investigation to determine the effect of temperature on the rate of respiration in yeast.

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..... [6]

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3 **(a)** Potatoes are good sources of starch and vitamin C.

(i) State the name of the solution you would use to test a food sample for vitamin C.

..... [1]

(ii) A sample of potato can be tested to show that it contains starch by adding iodine solution.

State the expected result of a positive test.

..... [1]

(b) Scientists investigated the effect of the mass of fertiliser used on potato crop yield.

The scientists planted seed potatoes in six different fields.

They planted the same variety of seed potato in each field, and the same number of seed potatoes were planted per m^2.

At the end of the growing period, the yields of the potato crop harvested in each field were measured.

(i) State **two** variables the scientists kept constant in this investigation.

1 .....

.....

2 .....

.....

[2]

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The results of the investigation are shown in Table 3.1.

Table 3.1

mass of fertiliser used /kg per hectare	potato crop yield /tonnes per hectare
60	32.5
115	40.0
170	43.5
230	45.0
285	44.5
340	44.0

(ii) Plot a line graph on the grid of the data in Table 3.1.



[4]

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(iii) Describe the effect on the potato crop yield of increasing the mass of fertiliser used.

.....

.....

..... [1]

(iv) Use your graph to estimate the potato crop yield when 90 kg of fertiliser per hectare was used.

Show **on the graph** how you obtained your estimate.

..... tonnes per hectare [2]

(v) Using the data in Table 3.1, calculate the percentage change in the potato crop yield when the mass of fertiliser used was increased from 60 kg per hectare to 285 kg per hectare.

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

Space for working.

..... % [3]

(c) Fertilisers contain nitrates which are used by plants to make proteins.

State the name of the solution used to test for protein.

..... [1]

[Total: 15]

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