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BIOLOGY **0610/51**

Paper 5 Practical Test **May/June 2026**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

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 [ ].

For Examiner's Use	
1	
2	
3	
Total	

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

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

You are going to investigate the effect of surface area on the diffusion of pigment out of cylinders of beetroot tissue.

Read all the instructions but DO NOT DO THEM until you have drawn a table for your results in the space provided in 1(a)(ii).

You should use the safety equipment provided while you are doing the practical work.

step 1 Label five test-tubes **1**, **2**, **4**, **8** and **S**. Put the test-tubes in the test-tube rack.

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

step 3 Raise your hand when you are ready for hot water to be added to the beaker labelled **hot-water**. Measure the temperature of the hot water in the beaker.

(a) (i) Record the measurements from step 3 and step 15 in Table 1.1.

View solution

Table 1.1

starting temperature of the hot water / °C	final temperature of the hot water / °C

[1]

step 4 Put 10 cm^3 of hot water into test-tube **1** and put a bung in the top of the test-tube.

step 5 Start the stop-clock. Shake the test-tube once every 20 seconds for two minutes.

step 6 After two minutes, stop the stop-clock.

step 7 Remove the bung and pour the liquid from test-tube **1** into test-tube **S**. The beetroot cylinder should remain in test-tube **1**. Put test-tube **1** and test-tube **S** back into the test-tube rack. Record a time in seconds of **120** for test-tube **1** in your table in **1(a)(ii)**.

step 8 Use the scalpel and ruler to cut one of the other beetroot cylinders into two pieces of equal length, as shown in Figure 1.1.

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

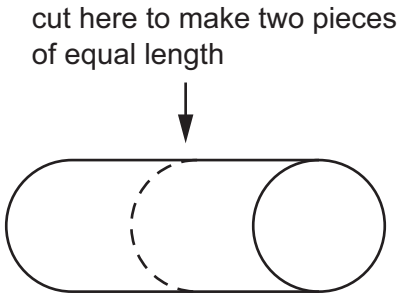

Figure 1.1

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step 9 Put 10 cm^3 of **hot water** into test-tube **2** and put the bung in the top of test-tube **2**.

step 10 Start the stop-clock. Shake test-tube **2** once after 20 seconds and compare the colour of the liquid in test-tube **2** to the colour of the liquid in test-tube **S**.

If the colour of the liquid in test-tube **2** is the same or darker than the colour of the liquid in test-tube **S** stop the stop-clock and record this time in seconds in your table in **1(a)(ii)**.

If the colour of the liquid in test-tube **2** is lighter than the colour of the liquid in test-tube **S** continue shaking and comparing every 20 seconds until the liquid is the same or darker than the colour of the liquid in test-tube **S**.

If the colour of the liquid in test-tube **2** is still lighter than the colour of the liquid in test-tube **S** after **3 minutes**, stop the stop-clock and record the time as **>180** in your table in **1(a)(ii)**.

You may find it easier to observe the colour of the liquid in the test-tubes if you hold the white card behind the test-tubes.

step 11 Cut one of the remaining beetroot cylinders into four pieces of equal length. Put the four pieces of beetroot into test-tube **4**.

step 12 Repeat steps 9 and 10 with test-tube **4**.

step 13 Cut the remaining beetroot cylinder into eight pieces of equal length. Put the eight pieces of beetroot into test-tube **8**.

step 14 Repeat steps 9 and 10 with test-tube **8**.

step 15 Measure the final temperature of the hot water in the beaker and record this measurement in Table 1.1.

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(ii) Prepare a table and record your results.

View solution

[4]

(iii) State a conclusion for your results.

View solution

.....

.....

..... [1]

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

View solution

independent variable .....

.....

dependent variable .....

.....

[2]

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(v) The temperature of the water in the beaker labelled **hot water** may have decreased during the investigation.

View solution

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 10.

View solution

1 .....

.....

.....

2 .....

.....

.....

[2]

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

View solution

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

.....

.....

..... [1]

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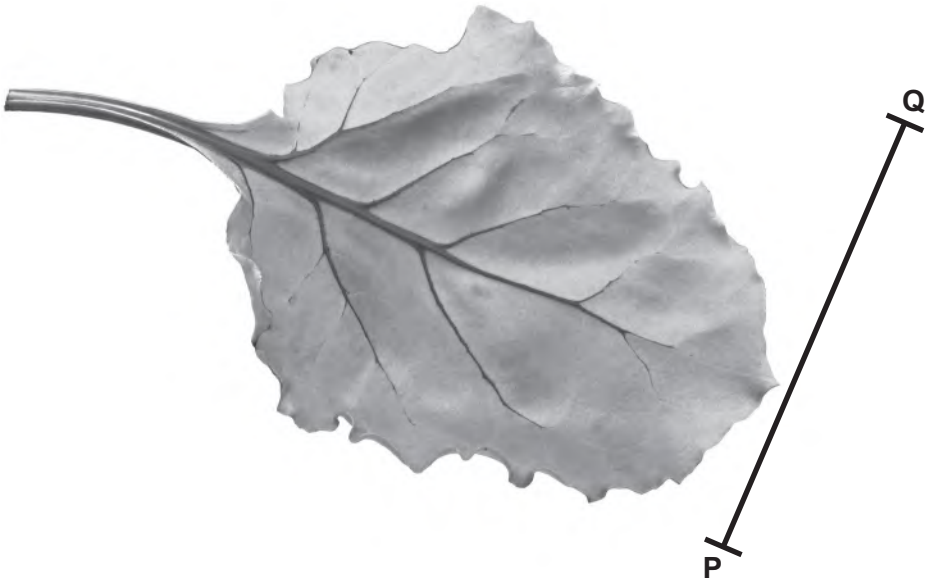
(b) Figure 1.2 is a photograph of a leaf from a beet plant, *Beta vulgaris*.

View solution



magnification ×0.82

Figure 1.2

(i) Draw a large diagram of the beet leaf shown in Figure 1.2.

[4]

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(ii) Line **PQ** on Figure 1.2 represents the maximum width of the beet leaf.

View solution

Measure the length of line **PQ** on Figure 1.2.

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

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

$$\text{magnification} = \frac{\text{length of line } \mathbf{PQ} \text{ in Figure 1.2}}{\text{actual width of the beet leaf}}$$

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]

View solution

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

View solution

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

..... [1]

View solution

(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]

View solution

(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]

View solution

(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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