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2935974110

BIOLOGY **0610/51**

Paper 5 Practical Test **October/November 2025**

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 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 [ ].

For Examiner's Use	
1	
2	
3	
Total	

This document has **16** pages. Any blank pages are indicated.

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[Turn over

1 You are going to investigate the effect of temperature on the movement of water in celery stalks using a coloured dye.

In plant stems such as a celery stalk, water moves in the xylem tissue within the vascular bundles.

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 You will use beakers **C** and **W** as water-baths in this investigation.

Raise your hand when you are ready for warm water to be added to beaker **W**.

Step 2 Carefully lower one of the small beakers of dye into beaker **C** and the other small beaker of dye into beaker **W**, as shown in Fig. 1.1.

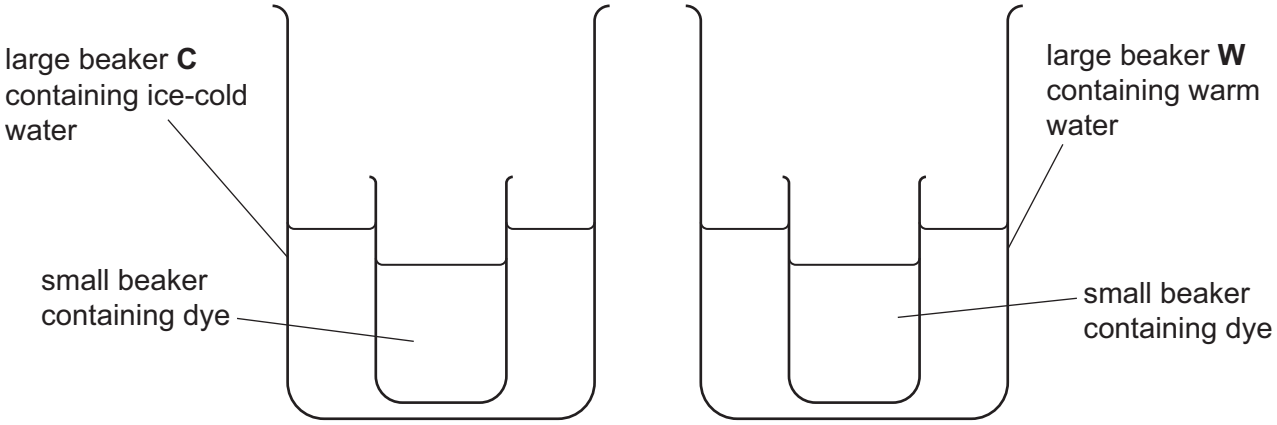


Fig. 1.1

Step 3 To let the dye equilibrate in the water-baths, wait for five minutes before you continue to step 4.

While you are waiting, measure the temperatures of the water in large beaker **C** and large beaker **W**.

Record these starting temperatures in Table 1.1 in **1(a)(i)**.

(a) (i) **Table 1.1**

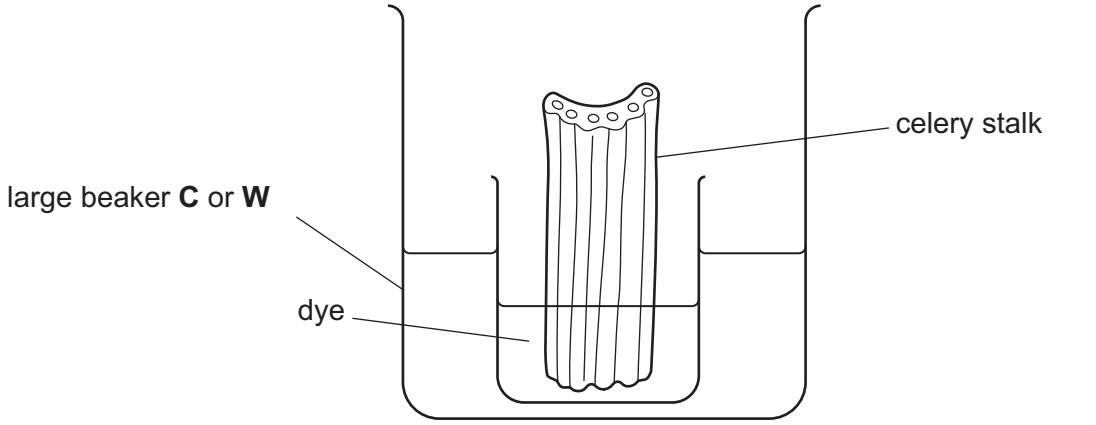
large beaker	starting temperature of the water / °C	final temperature of the water / °C
C	.....	.....
W	.....	.....

[1]

Step 4 Put one celery stalk into each small beaker of dye, as shown in Fig. 1.2.

Leave the celery stalks in the dye for **three** minutes.

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not to scale

Fig. 1.2

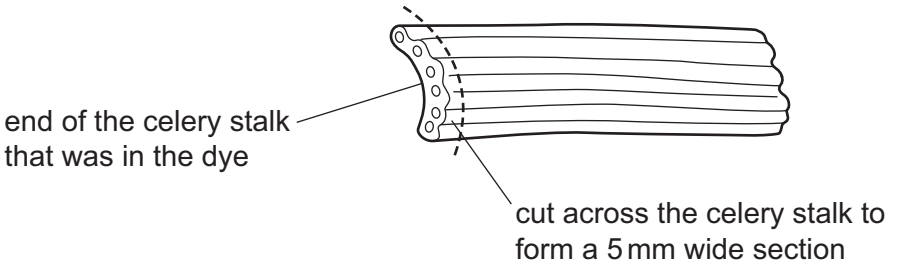
Step 5 While you are waiting, draw a line down the middle of the white tile, label one half **C** and the other half **W**.

Step 6 After three minutes, remove the celery stalk from the dye in beaker **C** and put it on the part of the white tile labelled **C**.

Remove the celery stalk from the dye in beaker **W** and place it on the part of the white tile labelled **W**.

Use a paper towel to remove any excess dye.

Step 7 On the part of the white tile labelled **C** cut a section across the celery stalk 5 mm from the end that was in the dye, as shown in Fig. 1.3.



not to scale

Fig. 1.3

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Step 8 Examine the xylem tissue of the cut section of celery stalk to see if the dye is visible.

Fig. 1.4 shows the position of the xylem tissue in a cut section of a celery stalk.

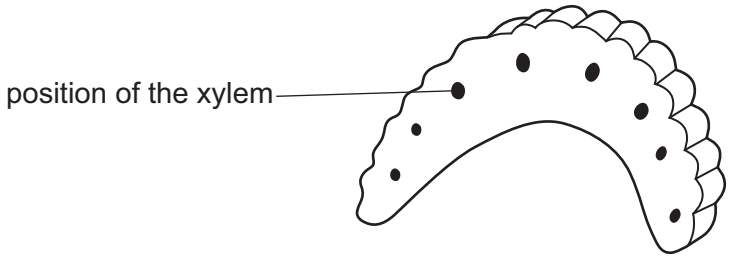


Fig. 1.4

Step 9 If the dye is still visible in the celery stalk cut another 5 mm wide section from the celery stalk.

Continue cutting 5 mm wide sections from the celery stalk until the dye is no longer visible.

Step 10 Count the number of sections you have cut that contain the dye.

Record this number in your table in **1(a)(ii)**.

Step 11 Repeat steps 7 to 10 with the other celery stalk on the part of the white tile labelled **W**.

Step 12 Measure the final temperatures of the water in large beaker **C** and large beaker **W** and record these temperatures in Table 1.1 in **1(a)(i).**

(ii) Prepare a table and record your results.

Include the number of sections cut and the total distance moved by the coloured dye in each celery stalk.

[5]

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(iii) Calculate the rate of movement of the dye in the celery stalk in beaker **W**.

Include the unit.

..... [2]

(iv) State a conclusion for this investigation.

.....

.....

..... [1]

(v) This investigation was only done once.

Explain why it is better to repeat an investigation.

.....

.....

..... [1]

(b) Identify **two** variables that were kept constant in this investigation.

1 .....

2 .....

[2]

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(c) (i) The data you have recorded in Table 1.1 may indicate that there is a source of error with the method used in this investigation.

Identify the possible error and describe an improvement to the method to reduce the effect of this error.

error .....

.....

improvement .....

.....

.....

[2]

(ii) In step 9, it is difficult to determine precisely the final position of the dye in the xylem.

Suggest an improvement to the method that would reduce this source of error.

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.....

..... [1]

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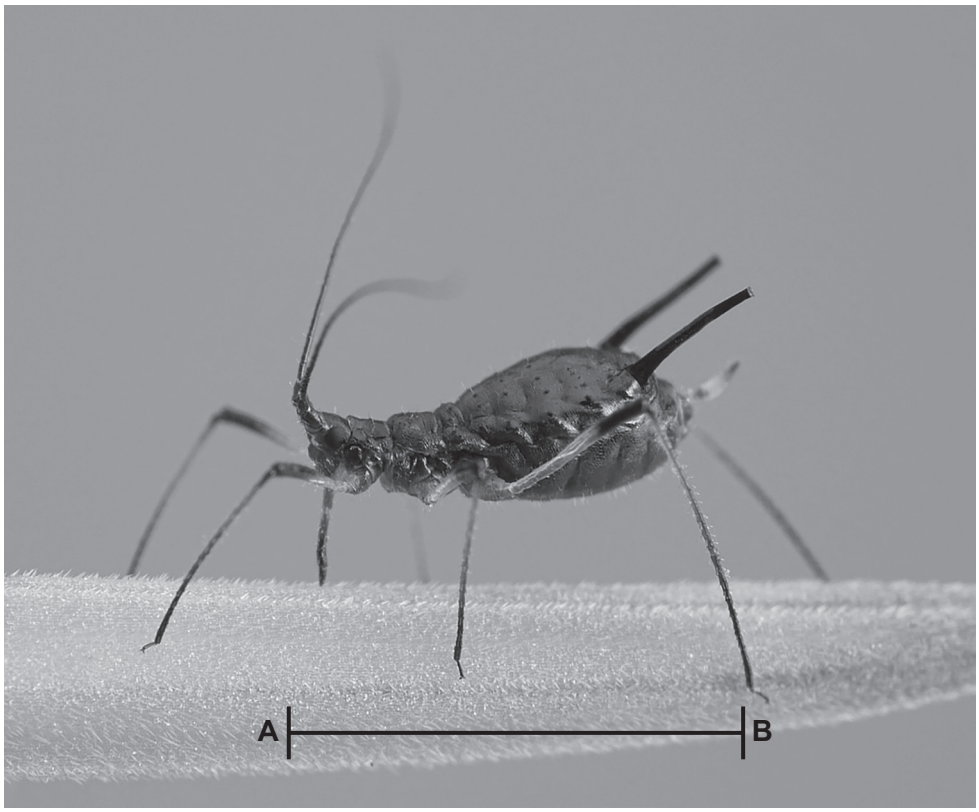
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(d) Celery plants can be damaged by insect pests feeding on them. This can reduce the growth of the celery plants.

A black aphid and the larvae of a leaf miner fly are both insect pests that damage celery plants.

Fig. 1.5 is a photograph of a black aphid.



magnification ×35

Fig. 1.5

Fig. 1.6 is a photograph of a leaf miner fly.



magnification ×11

Fig. 1.6

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(i) Line **AB** represents the body length of the black aphid.

Measure the length of line **AB** in Fig. 1.5.

length of line **AB** ..... mm

Calculate the actual body length of the black aphid using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line AB in Fig. 1.5}}{\text{actual body length of the black aphid}}$$

Give your answer to **one** significant figure.

Space for working.

..... mm
[3]

(ii) State **three** ways that the leaf miner fly shown in Fig. 1.6 differs from the black aphid shown in Fig. 1.5.

1 .....

.....

2 .....

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3 .....

.....
[3]

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(e) Fig. 1.7 is a photograph of a celery leaf.



Fig. 1.7

Draw a large diagram of the celery leaf shown in Fig. 1.7.

[4]

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(f) Carbon dioxide moves into celery leaves for photosynthesis.

State the name of an indicator which could be used to test for the presence of carbon dioxide gas.

..... [1]

[Total: 26]

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2 **(a)** In people with certain lung diseases the enzyme elastase is more active. Elastase is a protein.

State the name of the reagent that is used to test for protein.

..... [1]

(b) Scientists investigated the relationship between height and the vital capacity of the lungs in people.

The vital capacity is the maximum volume of air that can be expelled from the lungs after taking the deepest possible breath.

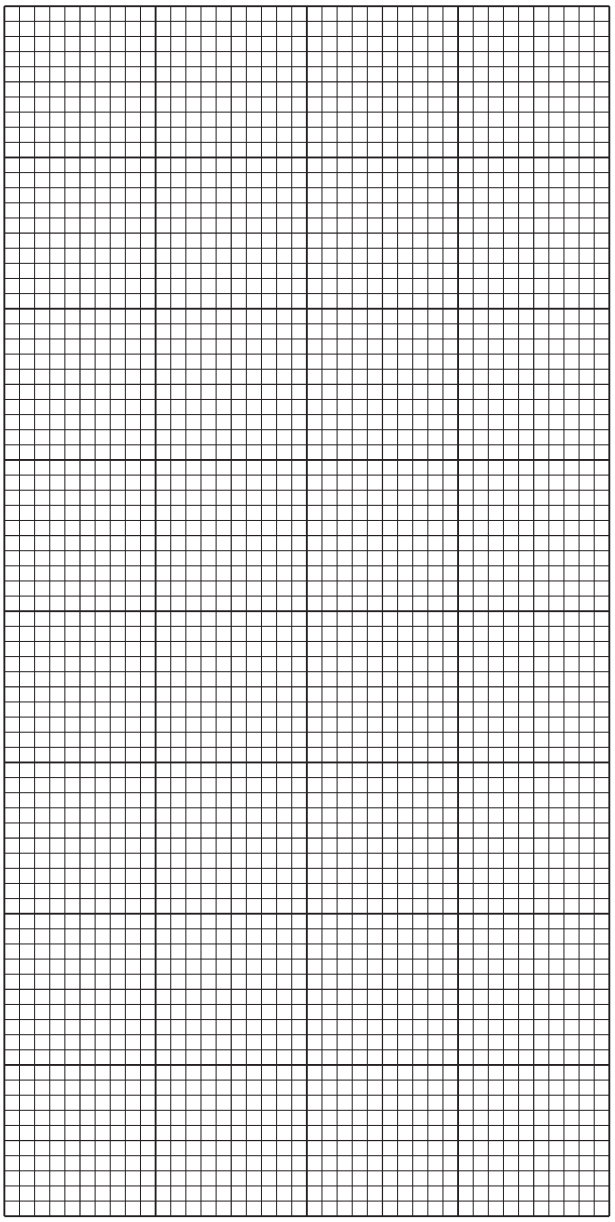
Table 2.1 shows the results of the investigation.

Table 2.1

height of the person / cm	vital capacity / dm^3
130	1.9
140	2.2
150	2.9
160	3.4
170	4.1
180	5.1
190	6.2
200	7.2

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



[4]

(ii) Describe the relationship shown in your graph between height and vital capacity.

.....

.....

..... [1]

(iii) Use your graph to estimate the vital capacity of a person who has a height of 175 cm.

Indicate **on your graph** how you obtained your estimate.

..... dm^3
[2]

[Total: 8]

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3 Amylase is an enzyme that catalyses the breakdown of starch to form reducing sugars.

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

Use iodine solution in your method.

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