CAMBRIDGE
International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5063811033

BIOLOGY **5090/31**

Paper 3 Practical Test **May/June 2026**

1 hour 30 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	
Total	

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

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In order to plan the best use of your time, read through all the questions on this paper carefully before starting work.

1 You are going to investigate the vitamin C content of a fruit juice using DCPIP.

DCPIP is a dark blue solution that becomes completely colourless when vitamin C is added to it.

When the percentage concentration of a vitamin C solution is high, fewer drops of that solution are needed to completely decolourise the DCPIP.

You are provided with:

- dark blue DCPIP solution
- four different vitamin C solutions of known percentage concentrations
- fruit juice **X** with an unknown vitamin C concentration
- a spotting tile
- six teat pipettes.

(a) You will add drops of each percentage concentration of vitamin C solution to DCPIP until the DCPIP turns completely colourless. Use the following procedure and use a clean teat pipette each time.

- Add 2 drops of DCPIP to each of 5 of the wells on the spotting tile.
- Add drops of 0.25% vitamin C solution to the DCPIP in the first well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.

number .....

- Add drops of 0.50% vitamin C solution to the DCPIP in the second well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.

number .....

- Add drops of 0.75% vitamin C solution to the DCPIP in the third well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.

number .....

- Add drops of 1.00% vitamin C solution to the DCPIP in the fourth well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.

number .....

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(i) Draw a table in which to record your results.

Complete the table with your results.

[4]

(ii) Use a clean teat pipette to add drops of fruit juice **X** to the DCPIP in the fifth well until the DCPIP turns completely colourless. Count the drops as you add them and record this number.

number ..... [1]

(iii) Use the results recorded in your table to estimate the percentage concentration of vitamin C in fruit juice **X** and explain how you made your estimate.

percentage concentration of vitamin C in fruit juice **X** .....

explanation .....

.....

.....

[2]

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(b) (i) Describe **one** possible source of error in this investigation.

.....

..... [1]

(ii) Suggest a suitable control for this investigation.

.....

..... [1]

(c) Some students want to find the percentage concentration of vitamin C in a different fruit juice, **Y**, using DCPIP and a different method of measuring.

Using a clean syringe, 0.5 cm^3 of DCPIP is added to each of 5 test-tubes.

1.0% concentration of vitamin C solution is added to one test-tube until the DCPIP turns completely colourless. The volume of 1.0% vitamin C solution added is recorded.

0.8% concentration of vitamin C solution is added to the second test-tube until the DCPIP turns completely colourless. The volume of 0.8% vitamin C solution added is recorded.

The process is repeated using the final 3 test-tubes with 0.6%, 0.4% and 0.2% concentrations of vitamin C solutions.

The students repeat the whole procedure several times and calculate the mean result for each percentage concentration as shown in Table 1.1.

Table 1.1

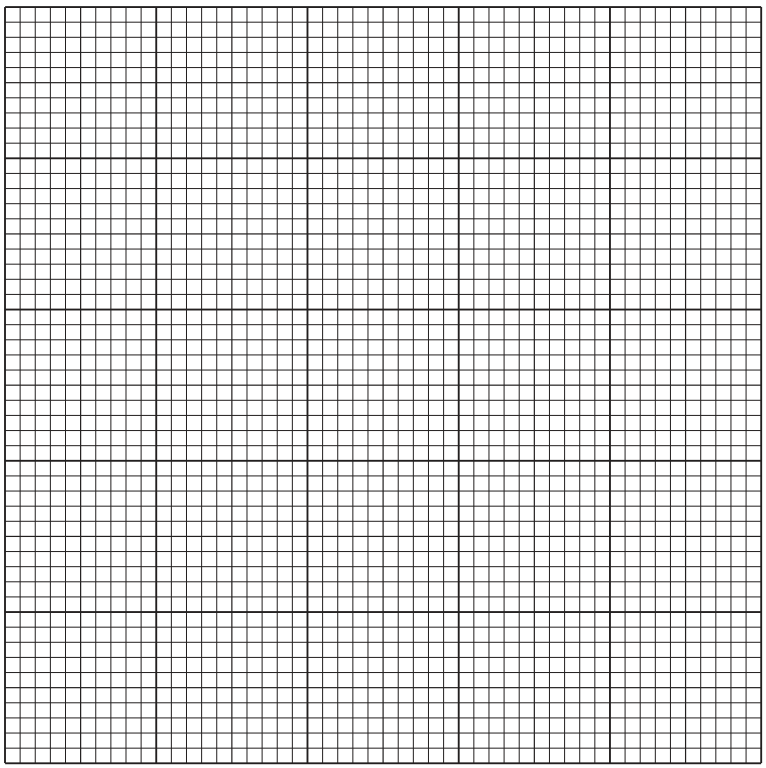
percentage concentration of vitamin C solution	**mean volume of vitamin C solution needed to turn DCPIP completely colourless / cm^3**
1.0	9
0.8	13
0.6	17
0.4	20
0.2	25

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(i) On the grid, construct a line graph of the data in Table 1.1.

Join your plotted points with ruled, straight lines.



[4]

(ii) The students then add fruit juice **Y** to 0.5 cm^3 of DCPIP in a test-tube until the DCPIP turns completely colourless. They repeat this several times. The mean volume of fruit juice **Y** needed to turn 0.5 cm^3 of DCPIP completely colourless was 14 cm^3.

Use your graph to estimate the vitamin C concentration in fruit juice **Y**.

Show your working on your graph.

percentage concentration of vitamin C in fruit juice **Y** ..... [2]

(iii) Suggest how the students can improve this whole investigation to produce a more precise value for the concentration of vitamin C in fruit juice **Y**.

.....

.....

.....

..... [2]

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(iv) Scurvy is a disease caused by a lack of vitamin C.

Compare the concentration of vitamin C in fruit juice **X** with the concentration of vitamin C in fruit juice **Y**.

State and explain which fruit juice would be best to prevent scurvy.

.....

..... [1]

(d) (i) Lemon juice contains vitamin C. The vitamin C in lemon juice is destroyed at high temperatures.

A student has some lemon juice that is 20 °C. They find that the minimum volume of lemon juice at 20 °C that is required to turn DCPIP completely colourless is 10 cm^3.

The student heats the lemon juice to a high temperature and allows it to cool. When more than 10 cm^3 of this lemon juice is added to DCPIP, the DCPIP remains blue. This shows that the vitamin C in the lemon juice has been destroyed at a high temperature.

Plan an investigation using the method in **1(c)** to find the lowest temperature at which vitamin C in lemon juice is destroyed.

.....

.....

.....

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..... [6]

(ii) State the independent variable in this investigation.

..... [1]

[Total: 25]

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2 **(a)** Figure 2.1 is a photomicrograph of onion cells.

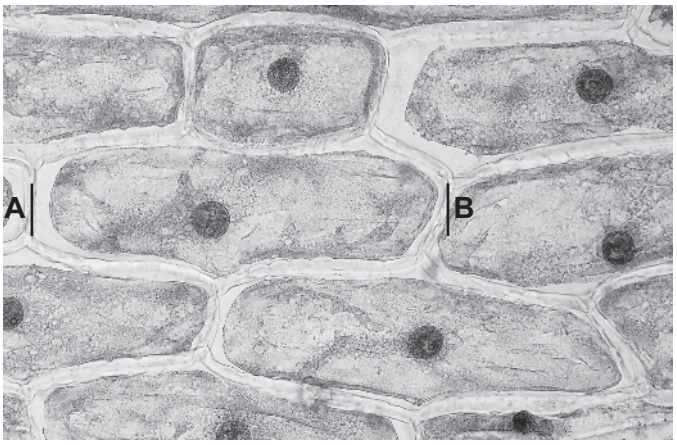


Figure 2.1

(i) On Figure 2.1, draw a line to a cell wall and label it **W**. [1]

(ii) In the space, make a large drawing of the **three whole** cells as they appear in Figure 2.1.

[5]

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(b) (i) **On Figure 2.1**, draw a straight line to join **A** and **B**.

On your drawing, draw a straight line in the same position and label it **A–B**. [1]

(ii) Measure and record the lengths of these **two** lines.

length of line **A–B** on Figure 2.1 .....

length of line **A–B** on your drawing .....
[2]

(iii) Calculate the magnification of your drawing compared to Figure 2.1.

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

Space for working.

magnification × ..... [3]

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(c) Figure 2.2 is a photomicrograph of some cheek cells.

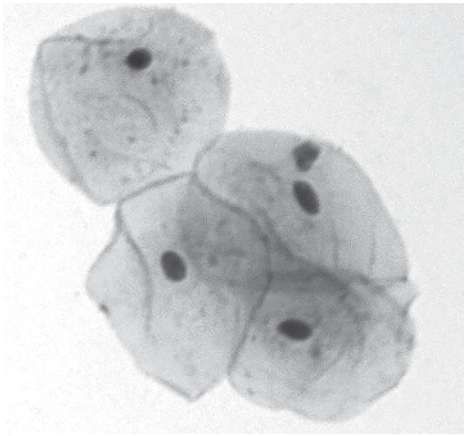


Figure 2.2

Describe **two** visible differences and **one** similarity between the onion cells in Figure 2.1 and the cheek cells in Figure 2.2. The figures are not to the same scale.

difference 1 .....

.....

difference 2 .....

.....

similarity .....

.....

[3]

[Total: 15]

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