CAMBRIDGE
International Education

Cambridge International AS & A Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

6412284173

BIOLOGY **9700/35**

Paper 3 Advanced Practical Skills 1 **May/June 2026**

2 hours

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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1 Cheese is made when the proteins in milk are denatured and solidify (clotting).

Citric acid causes clotting of proteins and can be added to milk to form cheese.

You will investigate the effect of different concentrations of citric acid on the clotting of milk.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume / cm^3
M	milk	none	20
C	0.25% citric acid solution	irritant	50
W	distilled water	none	100
L	lemon juice	irritant	10

If any solution comes into contact with your skin, wash it off immediately.

You should wear suitable eye protection.

You will need to make different concentrations of citric acid using **proportional** dilution of the 0.25% citric acid solution, **C**.

You will need to prepare 10 cm^3 of each concentration of citric acid you will use.

Table 1.2 shows how to prepare two of the concentrations you will use.

Decide which other concentrations of citric acid you will use.

(a) (i) Complete Table 1.2 for the other concentrations you will use.

Table 1.2

percentage concentration of citric acid	volume of C / cm^3	volume of W / cm^3
0.25	10.0	0.0
0.00	0.0	10.0

[3]

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Carry out step 1 to step 8.

step 1 In the beakers provided, prepare the concentrations of citric acid shown in Table 1.2.

step 2 Stir the milk, **M**. Using a 1cm^3 syringe, put **one** drop of milk **M** onto a clean glass slide and label it with the concentration 0.25, as shown in Figure 1.1.

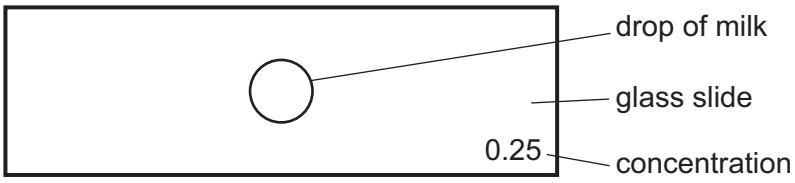

Figure 1.1

step 3 Repeat step 2 for the other concentrations of citric acid shown in Table 1.2.

step 4 Put **one** drop of the 0.25% citric acid solution onto the drop of milk labelled 0.25.

step 5 Repeat step 4 with the other concentrations of citric acid shown in Table 1.2.

step 6 For each concentration, use a clean glass rod to spread the drop out to a diameter of approximately 2 cm, as shown in Figure 1.2. This will mix the milk with the citric acid solution.

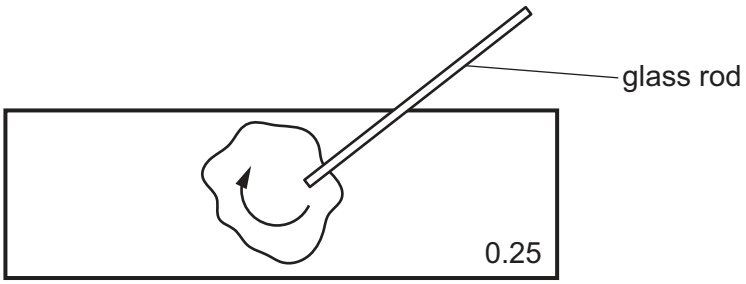

Figure 1.2

step 7 Put all of the glass slides onto the black paper.

step 8 Observe the glass slides to determine if clotting has taken place. As the milk clots, it forms white spots.
Using the number scale shown in Figure 1.3, decide the clotting intensity on each of the glass slides. You may see the same clotting intensity on more than one glass slide.

Record your results in **1(a)(ii)**.

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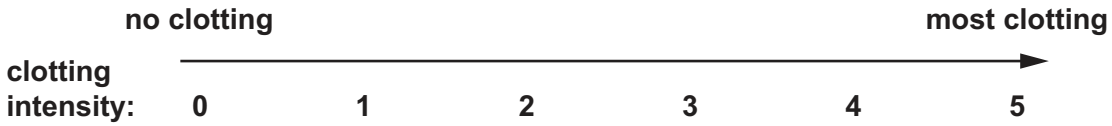

Figure 1.3

(ii) Record your results in an appropriate table.

[5]

(iii) Describe the trend in your results.

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..... [1]

(iv) Suggest **one** possible source of error in step 8.

.....

.....

..... [1]

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The procedure can be used to estimate the concentration of citric acid in a sample of lemon juice, **L**.

Carry out step 9 to step 13.

step 9 Using a clean 1cm^3 syringe, put **one** drop of milk **M** onto a clean glass slide and label it **L**.

step 10 Put **one** drop of **L** onto the drop of milk labelled **L**.

step 11 Use a clean glass rod to spread the drop out to a diameter of approximately 2 cm.

step 12 Put the glass slide onto the black paper.

step 13 Observe the glass slide to determine if clotting has taken place and decide the clotting intensity. Record your result in **1(a)(v)**.

(v) Record the clotting intensity for **L**.

clotting intensity = ... [1]

(vi) Use your results in **1(a)(ii)** and **1(a)(v)** to estimate the concentration of citric acid in lemon juice, **L**.

concentration of citric acid in **L** = ... % [1]

(vii) A student decided to determine the **mass** of clotted milk formed when using 0.25% citric acid.

Outline how you would modify the procedure to determine the mass of clotted milk formed with 0.25% citric acid.

.....

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..... [3]

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(b) Some cheeses are made by incubating milk with microorganisms that produce acid.

Scientists incubated milk with microorganisms and measured the pH of the milk for 960 minutes. The investigation was carried out with milk incubated at 22 °C and milk incubated at 30 °C.

Table 1.3 shows the results.

Table 1.3

time / minutes	pH of incubated milk	
	at 22 °C	at 30 °C
0	6.5	6.5
240	6.4	6.1
480	5.9	5.5
720	5.5	5.3
960	5.3	5.2

(i) Plot a graph of the data shown in Table 1.3 on the grid in Figure 1.4.

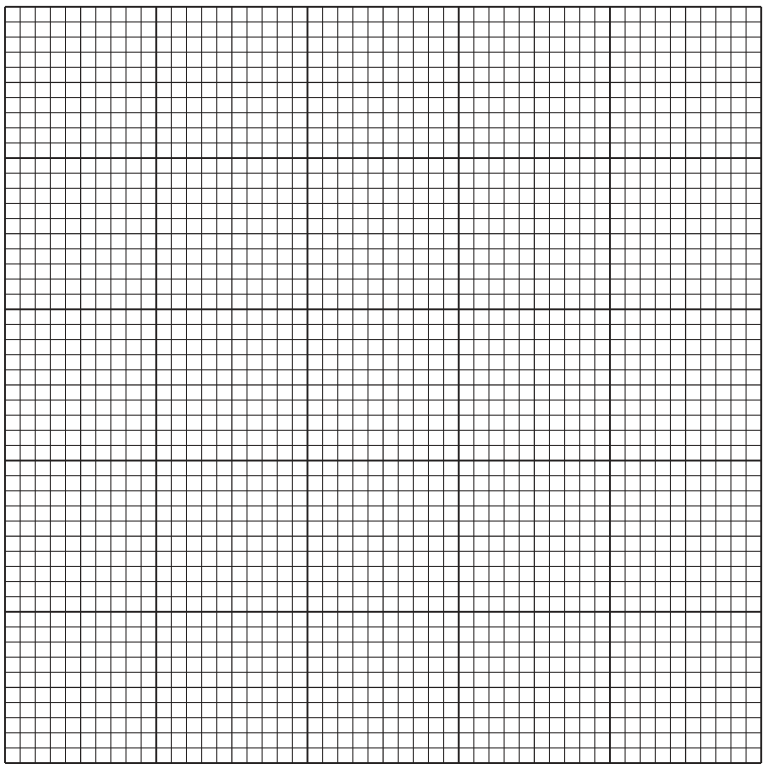

Figure 1.4

[4]

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(ii) The scientists noticed that the milk incubated at 30 °C started to clot after 300 minutes.

Estimate the pH of the milk when it started to clot.

Show on your graph how you obtained your estimate.

pH of milk = ... [2]

(iii) Use the pH of the milk in **1(b)(ii)** to estimate the time at which the milk kept at 22 °C started to clot.

time = ... minutes [1]

[Total: 22]

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2 **N1** is a slide of a stained transverse section through a plant stem.

(a) **(i)** Draw a large plan diagram of the whole stem section on **N1**. Use a sharp pencil.

Use **one** ruled label line and label to identify the xylem tissue.

[5]

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(ii) Observe the xylem vessel elements in the section of the stem on **N1**.

Select a line of **four** adjacent xylem vessel elements.

- Make a large drawing of this line of **four** xylem vessel elements.
- Use **one** ruled label line and label to identify the wall of **one** xylem vessel element.

[5]

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(b) Figure 2.1 is a photomicrograph of a transverse section of a stem from a different type of plant.

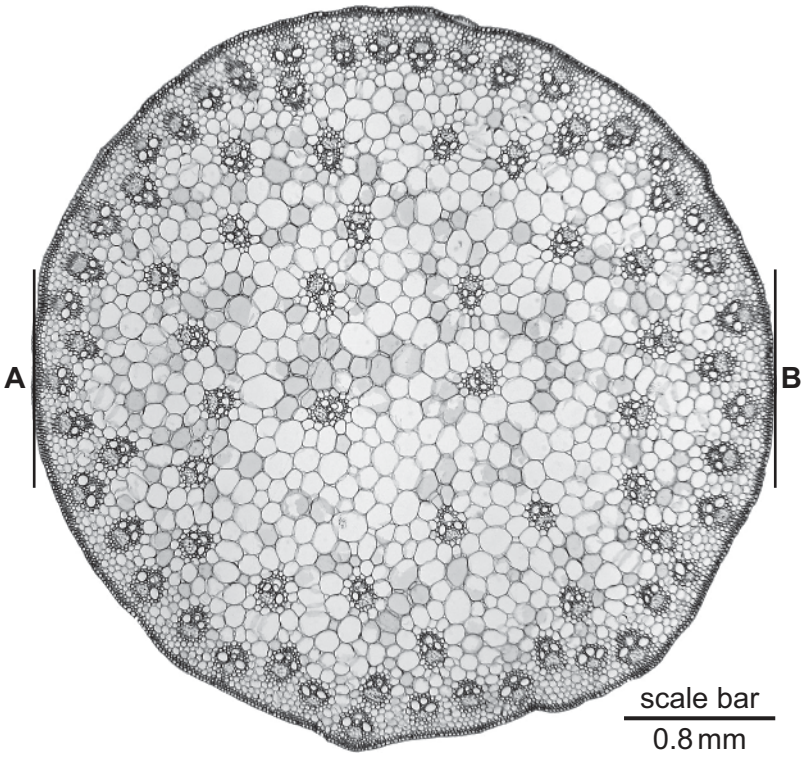

Figure 2.1

(i) Use the scale bar on Figure 2.1 to calculate the actual diameter of the stem from line **A** to line **B**.

Show your working.

Include the unit in your answer.

actual diameter = ... [3]

(ii) Use your answer in **2(b)(i)** to calculate the actual area of the stem section in Figure 2.1.

Use the formula: area of circle = πr^2
π = 3.14
r = radius

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

actual area of stem section = ... mm^2 [2]

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(iii) Identify **three** observable differences, other than colour, between the stem section on **N1** and the stem section in Figure 2.1.

Record these **three** observable differences in Table 2.1.

Table 2.1

feature	N1	Figure 2.1

[3]

[Total: 18]

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