Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

7316657622

BIOLOGY **9700/34**

Paper 3 Advanced Practical Skills 2 **May/June 2020**

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 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	
Total	

This document has **16** pages. Blank pages are indicated.

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Before you proceed, read carefully through the **whole** of Question 1 and Question 2.

Plan the use of the **two hours** to make sure that you finish the whole of Question 1 and Question 2.

1 When potato cells are placed into different concentrations of sodium chloride solution, water moves between the sodium chloride solution and the potato cells.

You will investigate the effect of different concentrations of sodium chloride solution on potato tissue.

You will need to:

- prepare different concentrations of sodium chloride solution, **S**
- put potato tissue into the different concentrations of sodium chloride solution
- record the distance the potato tissue bends
- use your results to estimate the concentration of an unknown concentration of sodium chloride solution, **U**.

You are provided with the materials shown in Table 1.1.

Table 1.1

labelled	contents	hazard	volume / cm^3
P	7 pieces of potato tissue	none	–
S	10% sodium chloride solution	none	200
U	unknown concentration of sodium chloride	none	50
W	distilled water	none	200

It is recommended that you wear suitable eye protection.

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(a) You will need to prepare different concentrations of sodium chloride solution, using proportional dilution.

You will need to prepare 50 cm^3 of each concentration, using **S** and **W**.

Table 1.2 shows how to make up two of the concentrations of sodium chloride solution you will use.

Decide which other concentrations of sodium chloride solution you will use.

(i) Complete Table 1.2 to show how you will prepare the concentrations of sodium chloride solution you will use.

Table 1.2

percentage concentration of sodium chloride	volume of **S** / cm^3	volume of **W** / cm^3
10	50	0
0	0	50

[2]

1. Prepare the concentrations of sodium chloride solution as shown in Table 1.2, in the beakers provided. Mix well.
2. Label the Petri dishes with the concentrations of sodium chloride solution prepared in step 1.
3. Label another Petri dish **U**.
4. Put a piece of potato tissue into each of the Petri dishes you have labelled.

You will need to cover the piece of potato tissue in each Petri dish with the appropriate sodium chloride solution prepared in step 1, as shown in Fig. 1.1.

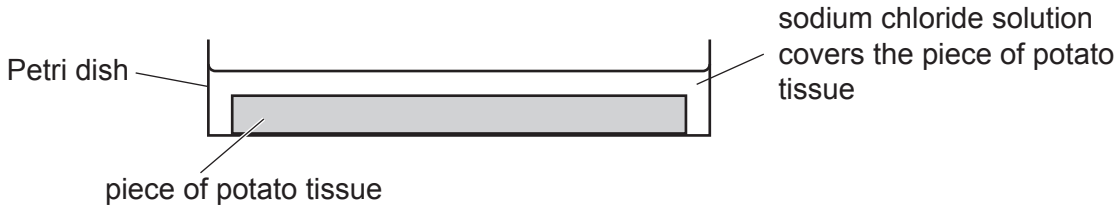


Fig. 1.1

(ii) Decide the volume of sodium chloride solution you will use to cover the piece of potato tissue.

State the volume of sodium chloride solution you will use.

volume ..... [1]

5. Put the volume of each concentration of sodium chloride solution you have decided in **(a)(ii)** into the appropriately labelled Petri dish.

6. Repeat step 5 using **U**.

7. Leave the pieces of potato tissue in the sodium chloride solutions for 20 minutes.

   While you are waiting, use your time to continue with Question 1.

   You will use graph paper to measure how far the pieces of potato tissue bend after being left for 20 minutes in the sodium chloride solutions.

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Fig. 1.2 shows how you will prepare the graph paper, as described in step 8 and step 9.

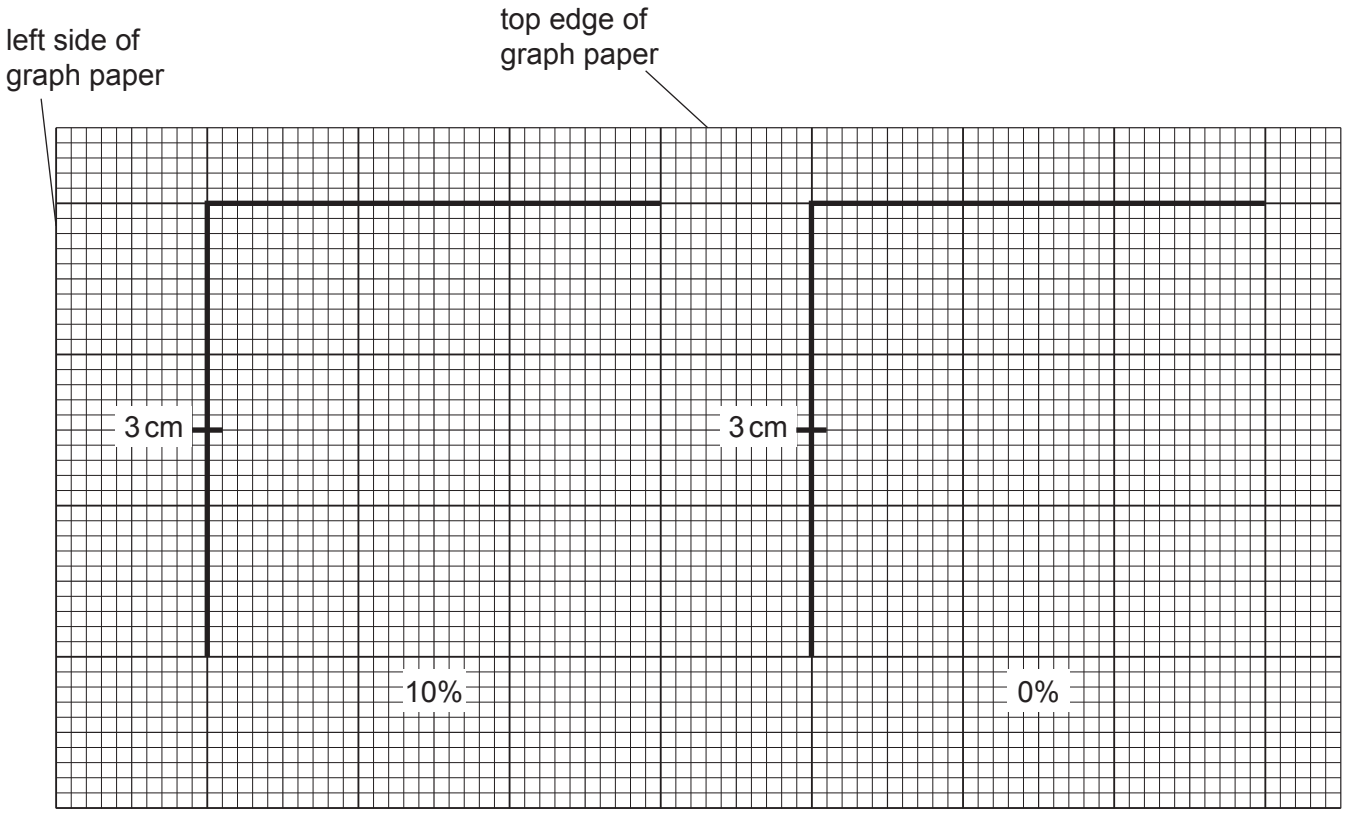


Fig. 1.2

8. On the graph paper provided, draw two lines at right angles to each other, as shown in Fig. 1.2. Each line should be approximately 6 cm long.
   Draw a mark on the vertical line 3 cm below where the vertical line meets the horizontal line, as shown in Fig. 1.2.

9. On the same piece of graph paper repeat step 8 for each of the other concentrations of sodium chloride solution and for **U**.

10. After 20 minutes (step 7) remove the piece of potato tissue from the 10% sodium chloride solution and put it onto a paper towel to remove the excess liquid.

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11. Put the piece of potato tissue on the vertical line of the graph paper, as shown in Fig. 1.3.

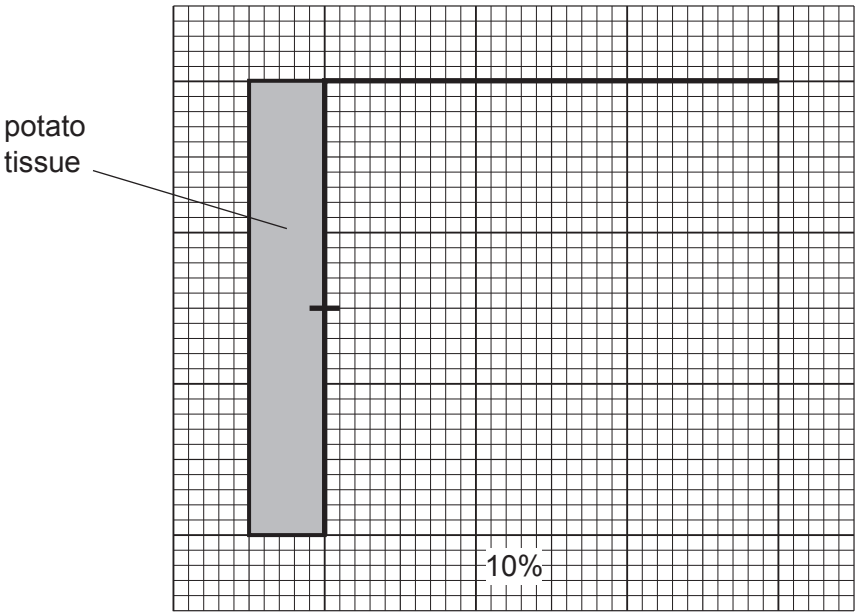


Fig. 1.3

12. Put your finger on the middle of the potato tissue at the 3 cm mark and press firmly, as shown in Fig. 1.4.

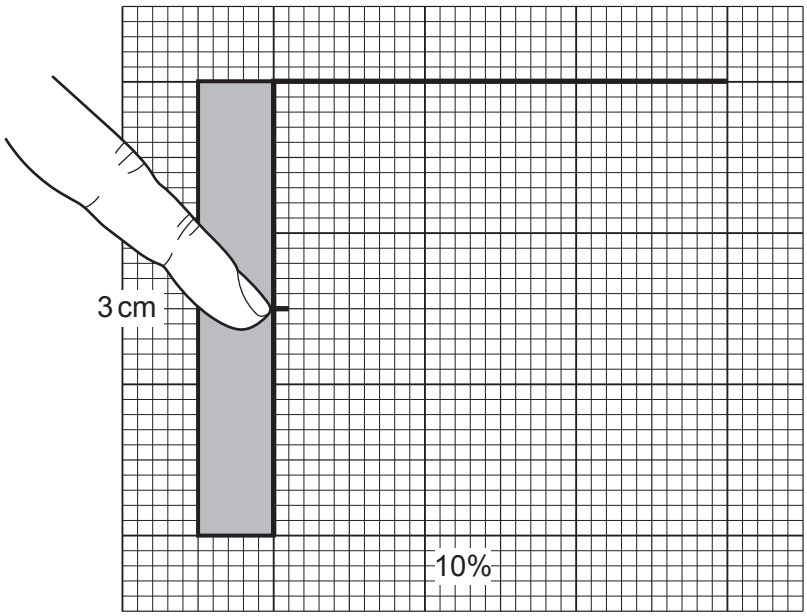


Fig. 1.4

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13. Hold the potato tissue firmly in this position. Move the top of the potato tissue, as shown in Fig. 1.5, until there is some resistance.

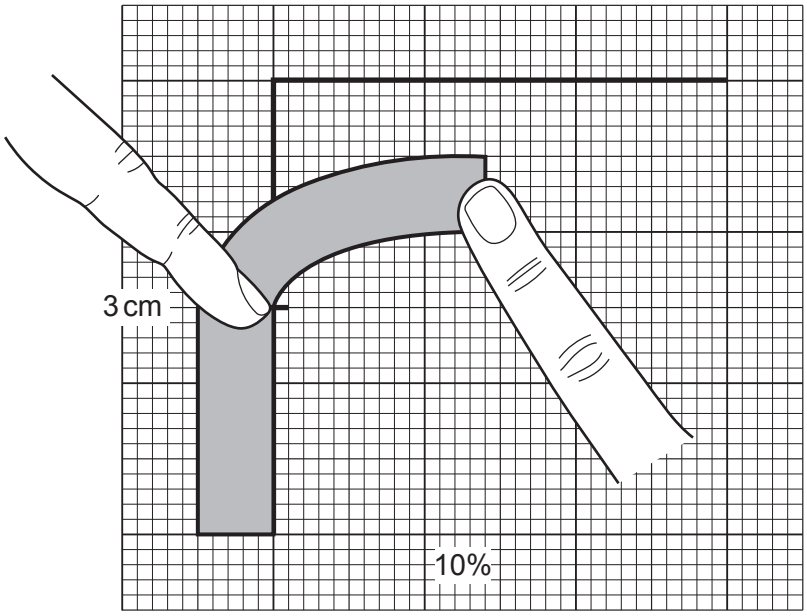


Fig. 1.5

14. Mark the position of the top of the potato tissue on the graph paper, as shown in Fig. 1.6.

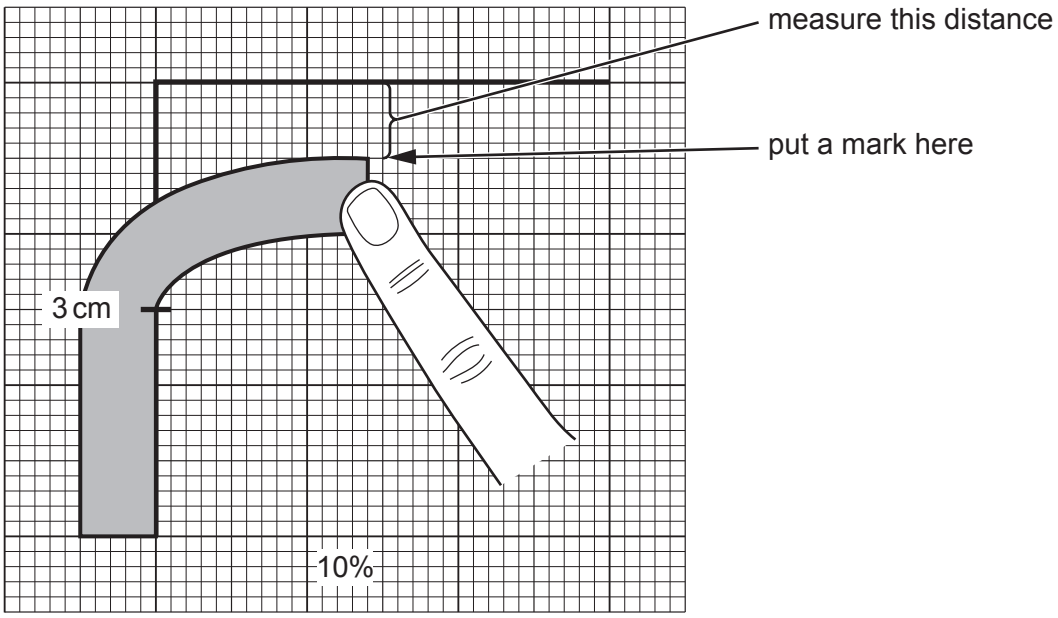


Fig. 1.6

15. Remove the potato tissue and put it in the container labelled **For waste.**

16. Measure the distance between the mark and the horizontal line on the graph paper, as shown in Fig. 1.6.

17. Record your result in **(a)(iii)**.

18. Repeat step 10 to step 17 using the potato tissue from the other concentrations of sodium chloride solution.

19. Repeat step 10 to step 16 using the potato tissue from **U**. Record your result for **U** in **(a)(iv)**.

(iii) Record your results in an appropriate table.

[5]

(iv) State the result for **U**. Use your results in **(a)(iii)** to estimate the concentration of sodium chloride in **U**.

result for **U** .....

estimate ..... % [1]

(v) Explain, in terms of water potential, the difference between the result for 10% sodium chloride solution and the result for 0% sodium chloride solution.

.....

.....

.....

.....

.....

.....

..... [2]

(vi) State the dependent variable.

..... [1]

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(vii) Suggest how you could make improvements to the procedure so that a more accurate estimate of the concentration of sodium chloride in **U** can be obtained.

.....

.....

.....

.....

.....

.....

.....

.....

..... [3]

(viii) A systematic error may occur when a piece of apparatus with a scale is used.

State **one** piece of apparatus used in this investigation that may have a systematic error.

.....

Suggest whether this affected your results **and** give a reason for your answer.

.....

.....

..... [1]

(b) A scientist carried out an investigation into the effect of temperature on the number of molecules of a substance diffusing through a cell membrane in a set time.

The results are shown in Table 1.3.

Table 1.3

temperature / °C	number of molecules per mm^2
5	2
15	4
40	9
63	18
92	30

(i) Plot a graph of the data in Table 1.3 on the grid in Fig. 1.7.

Use a sharp pencil for drawing graphs.

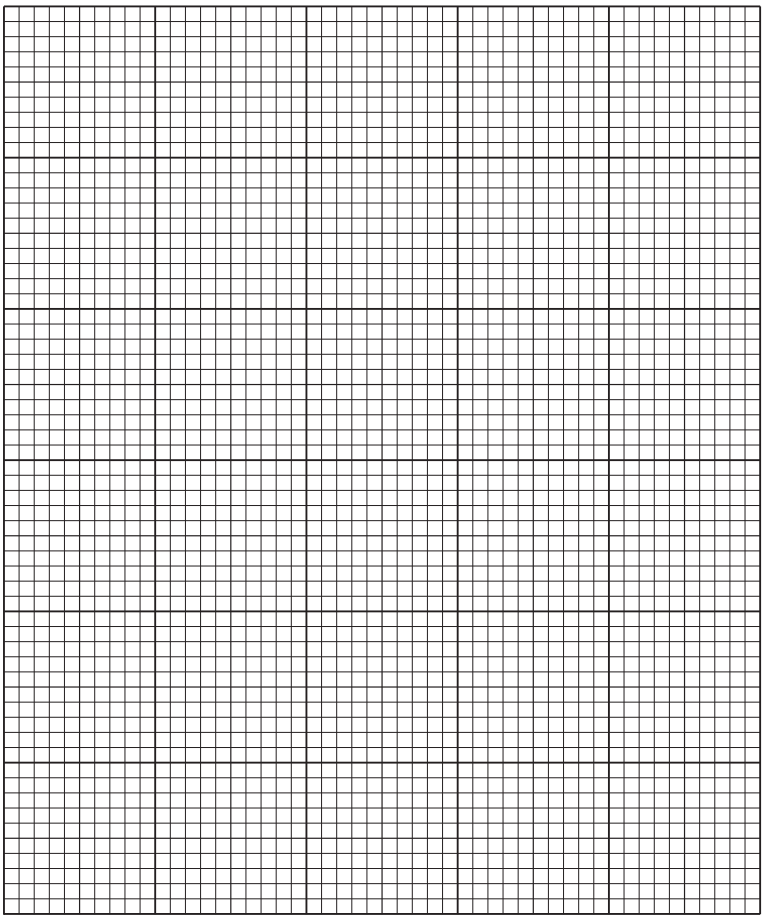


Fig. 1.7 [4]

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(ii) Describe and explain the trend in your graph.

description .....

.....

.....

explanation .....

.....

.....

[2]

[Total: 22]

Question 2 starts on page 12

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

You are not expected to be familiar with this specimen.

Use a sharp pencil for drawing.

You are expected to draw the correct shape and proportions of the different tissues.

(a) **(i)** Draw a large plan diagram of the whole section of the leaf on **N1**.

On your diagram:

- ignore the trichomes (hair-like structures)
- use **one** ruled label line and label to identify the epidermis.

[5]

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(ii) Observe the epidermis with trichomes of the leaf on **N1**.

Select **three** adjacent, touching, epidermal cells where only one cell has a trichome attached.

Make a large drawing of these three epidermal cells **and** the attached trichome.

Use **one** ruled label line and label to identify a cell wall of **one** cell.

[5]

(b) Fig. 2.1 is a photomicrograph of a stained transverse section through a leaf of a different type of plant.

You are not expected to be familiar with this specimen.

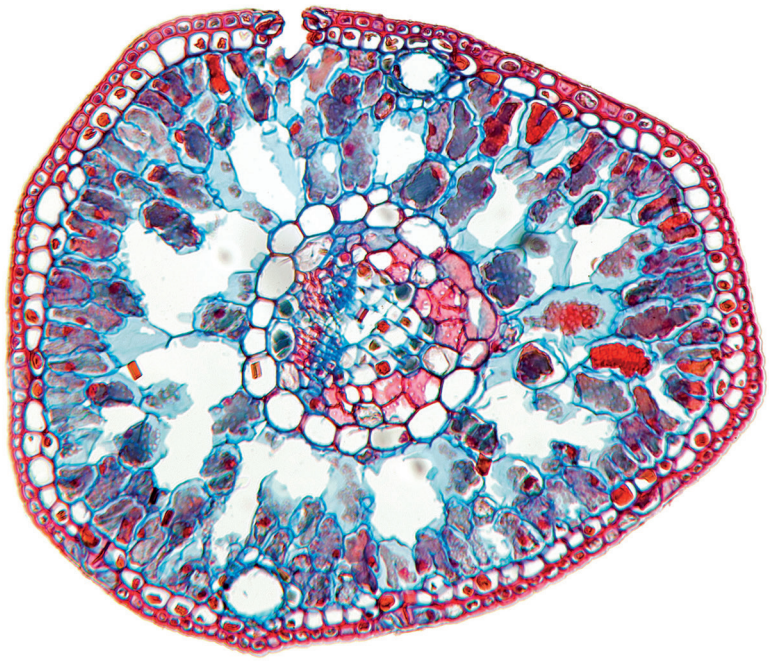


Fig. 2.1

Prepare an appropriate table so that it is suitable for you to record the observable differences between the leaf on **N1** and the leaf in Fig. 2.1.

Record the observable differences in your table.

[4]

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(c) Fig. 2.2 is a photomicrograph of the same leaf section as in Fig. 2.1.

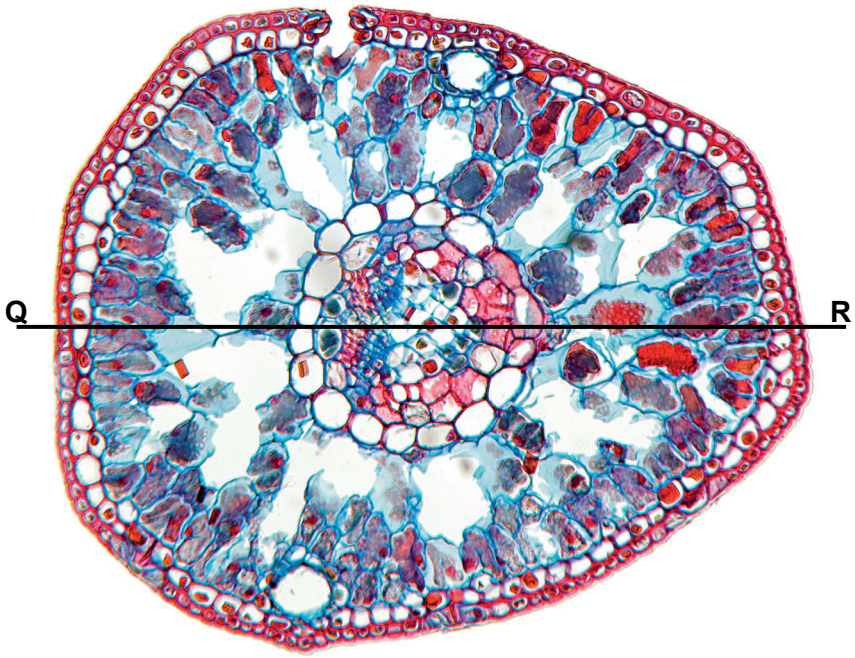


Fig. 2.2

Use the line **Q**–**R** to determine the simplest whole number ratio of the total diameter of the leaf to the diameter of the central vascular tissue.

Show all the steps in your working and use appropriate units.

simplest whole number ratio ..... [4]

[Total: 18]

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