

You should wear the eye protection provided during the practical work in question 1.

- 1 Citrus fruits, such as oranges, contain sugars. You are going to investigate the simple (reducing) sugar content of three different citrus fruits.

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

Step 1 You are provided with samples of three different types of fruit. Take three separate beakers and label these with the names of the fruits you have been given. Record the names of the fruits in Table 1.1 in **1(a)(i)**.

Step 2 Squeeze the juice from one type of fruit into the labelled beaker.

Step 3 Repeat step 2 with the other two types of fruit.

Step 4 Use the measuring cylinder to measure the volume of juice you have extracted from each type of fruit and record this in Table 1.1 in **1(a)(i)**. Pour the fruit juice back into the labelled beaker when you have finished measuring it.

Rinse the measuring cylinder with the **washing water** after each measurement.

If you have less than 5 cm³ of each juice raise your hand to obtain more fruit and repeat step 2.

(a) (i)

Table 1.1

	type of fruit	volume of juice / cm ³
1		
2		
3		

[1]

Step 5 Label three large test-tubes **1, 2, and 3**.

Step 6 Add 2 cm³ of the juice from fruit **1** to large test-tube **1**.

Step 7 Add 2 cm³ of **reducing sugar test solution** to large test-tube **1** and place it in the empty beaker labelled **water-bath**. Record the colour of the solution in large test-tube **1** in your table in **1(a)(ii)**.

Step 8 Repeat step **6** and step **7** with the juice from fruit **2** and the juice from fruit **3**.

Step 9 You are now going to add hot water to the beaker labelled **water-bath**. Raise your hand when you are ready for hot water. Leave the large test-tubes in the water-bath for 10 minutes.

During this time continue with the rest of the questions.

Step 10 After 10 minutes record the colour observed in large test-tubes **1, 2 and 3** in your table in **1(a)(ii)**.

(ii) Prepare a table to record your results.

[4]

(iii) State the name of the solution used to test for reducing sugars.

.....[1]

(iv) State which fruits contain reducing sugars.

.....[1]

(v) Explain why it was necessary to record the colour of the reducing sugar test solution and fruit juice mixture **before** heating.

.....
.....
.....[1]

(b) State **one** variable that has been kept constant in the investigation you have carried out.

Describe how this variable has been kept constant.

variable

how it has been kept constant

.....
.....

[2]

(c) Identify **two** sources of error in the method.

For each of these errors, describe how the method could be improved to reduce the error.

error

improvement

.....
.....

error

improvement

.....
.....

[4]

(d) Describe a test that could be used to determine if the fruits you have tested contain protein.

.....
.....

.....
.....

[2]

(f) You are provided with a slice of orange.

Draw a large diagram of the slice of orange.

[4]

[Total: 26]

- 2 Hormones are involved in tropic responses in plants, such as gravitropism and phototropism. Auxin is a plant growth hormone.

A student investigated the length of roots from seedlings grown in different concentrations of auxin.

The student measured the root length of five of the seedlings grown in each concentration of auxin.

Table 2.1 shows the results.

Table 2.1

percentage concentration of auxin	root length/mm					average root length/mm
	1	2	3	4	5	
0.0	15	16	18	14	15	15.6
0.2	18	17	19	20	18	
0.4	24	21	22	22	23	22.4
0.6	17	16	18	17	19	17.4
0.8	13	12	14	5	12	11.2
1.0	12	10	10	12	11	11.0

- (a) (i) Calculate the missing average value from the Table 2.1.

Show your working and give your answer to one decimal place in Table 2.1.

[2]

- (ii) Scientists do not include anomalous data in their average calculations.

One of the pieces of data in Table 2.1 is not consistent with the other results for that concentration. This means it is anomalous.

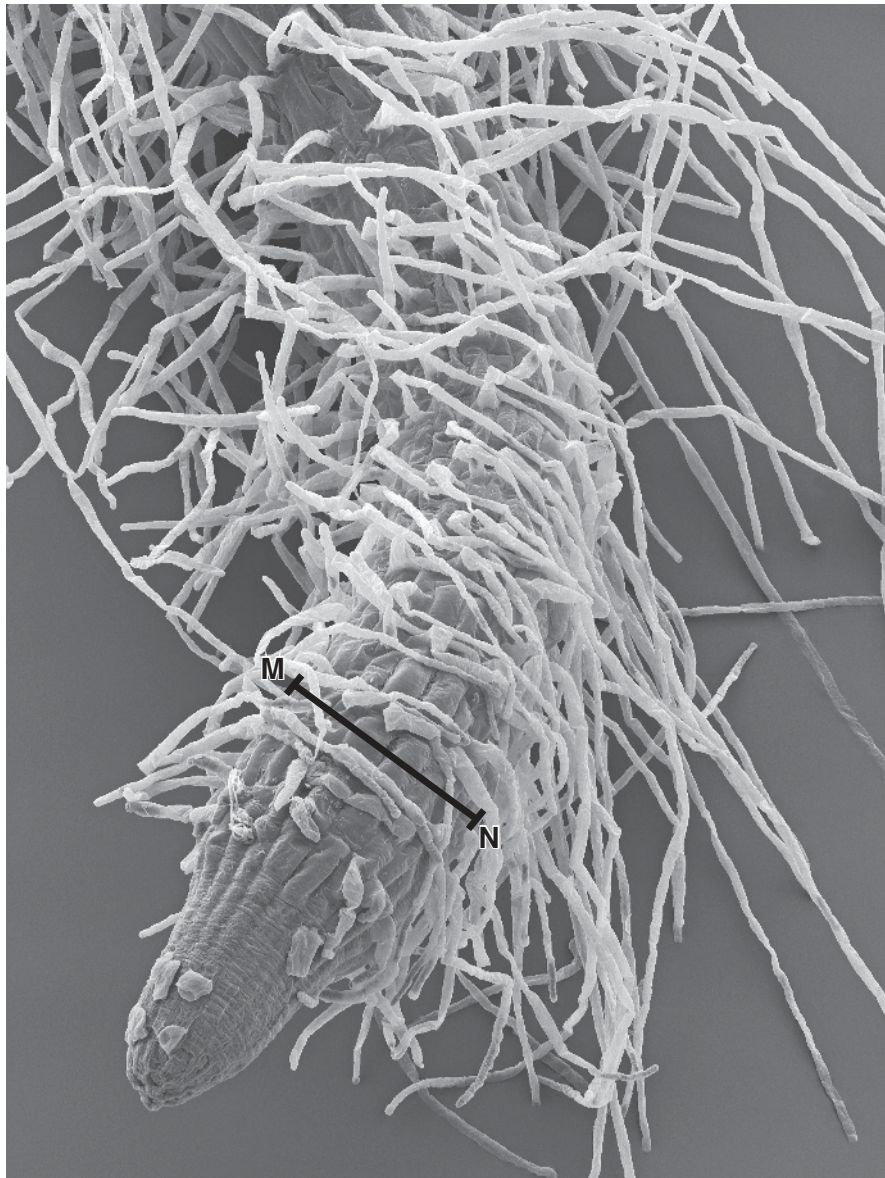
Circle the anomalous data in Table 2.1.

Calculate the correct average for this concentration of auxin, excluding the anomalous data. Give your answer to one decimal place.

Space for working.

.....mm
[2]

(b) Fig. 2.1 shows the root tip of a poppy seedling.



magnification $\times 120$

Fig. 2.1

Measure the length of the line **MN** on Fig. 2.1. Include the unit.

length of **MN**

Calculate the actual size of the root tip at **MN** using the formula. Include the unit in your answer.

$$\text{magnification} = \frac{\text{length of } \mathbf{MN} \text{ on Fig. 2.1}}{\text{actual size of } \mathbf{MN}}$$

Space for working.

.....
[3]

[Total: 14]

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