

0 5

A student investigated the effect of different sugar solutions on potato tissue.

This is the method used.

1. Add 30 cm³ of 0.8 mol dm⁻³ sugar solution to a boiling tube.
2. Repeat step 1 with equal volumes of 0.6, 0.4 and 0.2 mol dm⁻³ sugar solutions.
3. Use water to give a concentration of 0.0 mol dm⁻³.
4. Cut five cylinders of potato of equal size using a cork borer.
5. Weigh each potato cylinder and place one in each tube.
6. Remove the potato cylinders from the solutions after 24 hours.
7. Dry each potato cylinder with a paper towel.
8. Reweigh the potato cylinders.

Table 2 shows the results.

Table 2

Concentration of sugar solution in mol dm ⁻³	Starting mass in g	Final mass in g	Change of mass in g	Percentage (%) change
0.0	1.30	1.51	0.21	16.2
0.2	1.35	1.50	0.15	X
0.4	1.30	1.35	0.05	3.8
0.6	1.34	1.28	-0.06	-4.5
0.8	1.22	1.11	-0.11	-9.0

0 5**. 1**

Calculate the value of **X** in **Table 2**.

[2 marks]

Percentage change in mass = _____ %

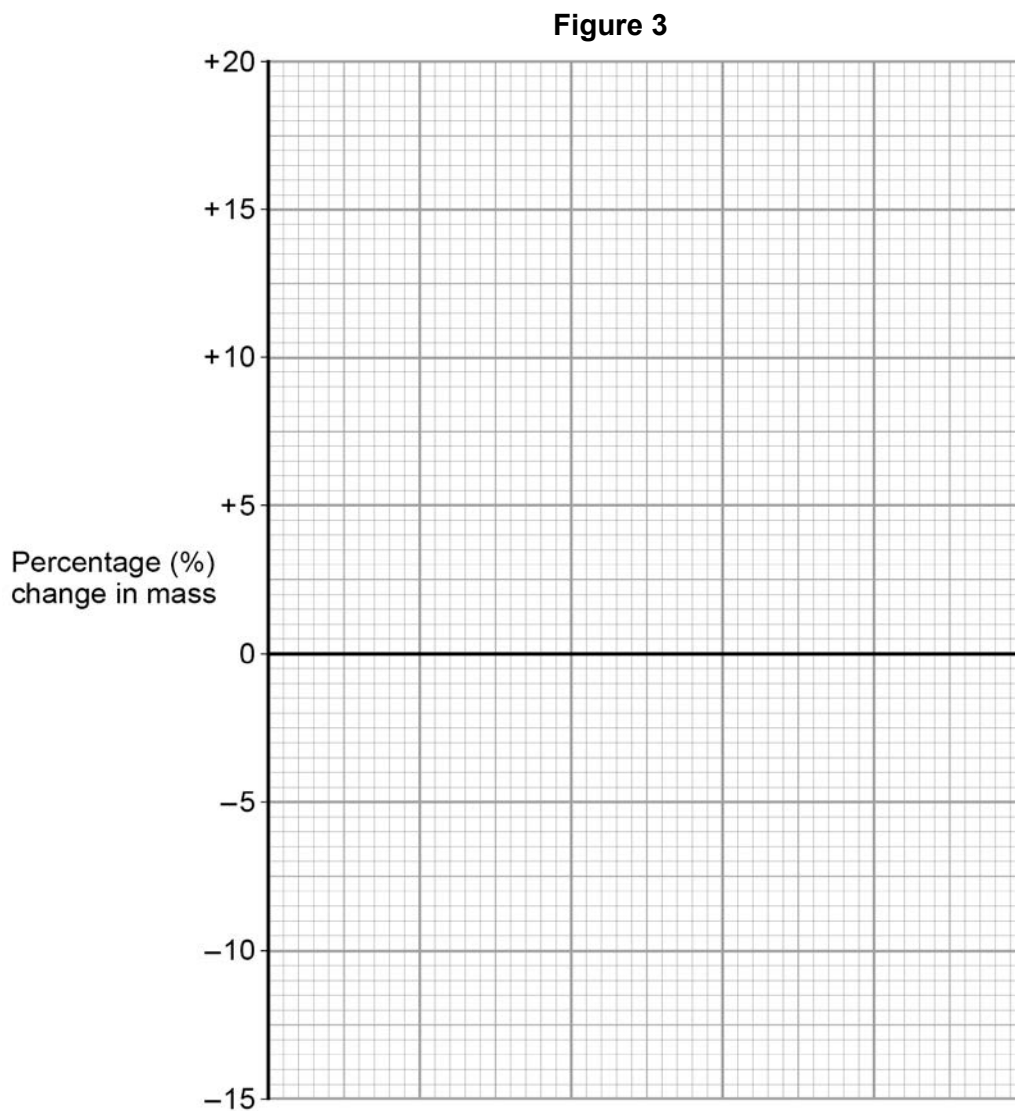
- 0 5** . **2** Why did the student calculate the percentage change in mass as well as the change in grams?

[1 mark]

- 0 5** . **3** Complete **Figure 3** using data from **Table 2**.

- Choose a suitable scale and label for the x-axis.
- Plot the percentage (%) change in mass.
- Draw a line of best fit.

[4 marks]



Question 5 continues on the next page

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- 0 5** . **4** Use your graph in **Figure 3** to estimate the concentration of the solution inside the potato cells. **[1 mark]**

Concentration = _____ mol dm⁻³

- 0 5** . **5** The results in **Table 2** show the percentage change in mass of the potato cylinders.

Explain why the percentage change results are positive **and** negative.

[3 marks]

- 0 5** . **6** Suggest **two** possible sources of error in the method given on **page 16**.

[2 marks]

1 _____

2 _____

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	$(0.15/1.35) \times 100$		1	AO2/2 4.1.3.2
	11.1 (%)	allow 11.1 (%) with no working shown for 2 marks	1	AO2/2 4.1.3.2
05.2	to allow results to be compared or they had different masses at the start		1	AO2/2 4.1.3.2
05.3	axis correct scale and labelled		1	AO2/2 4.1.3.2
	5 points correctly plotted	allow ecf from 05.1 allow 1 mark for 4 points correctly plotted	2	AO2/2 4.1.3.2
	line of best fit		1	AO2/2 4.1.3.2
05.4	0.5	allow 0.45–0.55	1	AO3/2a 4.1.3.2
05.5	(0.0 to 0.4) water moves into cells		1	AO2/1 4.1.3.2
	(0.6 to 0.8) water leaves cells		1	AO2/1 4.1.3.2
	by osmosis		1	AO1/1 4.1.3.2

Question 5 continues on the next page

Question 5 continued

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	any two from: <ul style="list-style-type: none">• concentration of solutions• drying of chips• accuracy of balance• evaporation from tubes		2	AO3/3a 4.1.3.2
Total			13	