0 1 A student investigated the effect of different concentrations of sugar solution on pieces of potato.

This is the method used.

1. Cut five pieces of potato.

2. Record the starting mass of each piece of potato.

3. Place each piece of potato in a different concentration of sugar solution.

4. After 24 hours remove the pieces of potato from the solutions.

5. Record the final mass of each piece of potato.

6. Calculate the change in mass for each piece of potato.

0 1 . 1 What is the independent variable?

[1 mark]

Tick (✓) **one** box.

Change in mass of the pieces of potato ☐

Concentration of the sugar solution ☐

Length of time the pieces of potato are in the solution ☐

Starting mass of the pieces of potato ☐

Question 1 continues on the next page

Turn over ▶

Table 1 shows the results.

Table 1

Concentration of sugar solution in mol/dm³	Mass of potato at start in grams	Mass of potato after 24 hours in grams	Change in mass in grams
0.0	7.94	10.14	2.20
0.1	7.95	9.10	1.15
0.2	7.96	8.21	0.25
0.3	7.93	7.53	−0.40
0.4	7.93	7.18	−0.75
0.5	7.95	7.00	−0.95

0 1 . 2   Explain why the potato in 0.0 mol/dm³ sugar solution increased in mass.

[2 marks]

_____

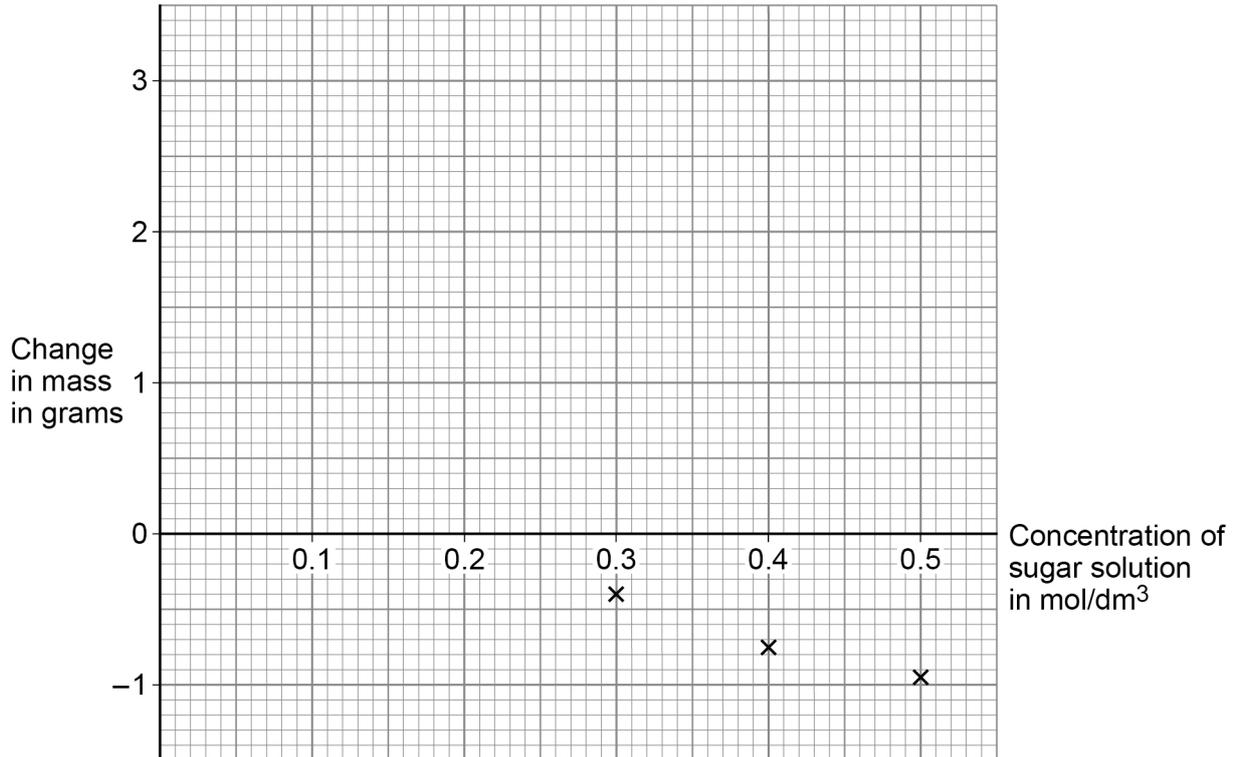_____

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_____

0 1 . 3 Complete **Figure 1**.

Some of the results have been plotted for you.

You should:

- plot the data from **Table 1**
- draw a line of best fit through all the points.

[2 marks]

Figure 1

0 1 . 4 The mass of a piece of potato does **not** change when:

concentration of solution inside cells = concentration of solution outside cells

Determine the concentration of sugar solution inside the potato cells.

Use **Figure 1**.

[1 mark]

Concentration = _____ mol/dm³

Turn over ▶

Table 1 is repeated below.

Table 1

Concentration of sugar solution in mol/dm^3	Mass of potato at start in grams	Mass of potato after 24 hours in grams	Change in mass in grams
0.0	7.94	10.14	2.20
0.1	7.95	9.10	1.15
0.2	7.96	8.21	0.25
0.3	7.93	7.53	−0.40
0.4	7.93	7.18	−0.75
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| 0 | 1 |.| 5 |

Calculate the percentage change in mass for the potato in 0.2 mol/dm^3 sugar solution.

Use **Table 1**.

Use the equation:

$$\text{percentage change in mass} = \frac{\text{change in mass}}{\text{mass of potato at start}} \times 100$$

Give your answer to 3 significant figures.

[3 marks]

Percentage change in mass (3 significant figures) = _____ %

9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	concentration of the sugar solution		1	AO1 4.1.3.2 RPA 2
01.2	gained <u>water</u>		1	AO2
	(water moves) by osmosis		1	AO1
	or	allow converse statements		4.1.3.2 RPA 2
	(because) concentration of water outside the potato is greater than inside the cells / potato	(because) concentration (of sugar solution) inside the potato is greater than outside the potato / cells		
01.3	all points correctly plotted	allow ± ½ a square	1	AO2 4.1.3.2 RPA 2
	line of best fit drawn as a curve through all the points	ignore extrapolation of curve	1	
01.4	correct reading from their graph	allow ± ½ a square	1	AO3 4.1.3.2 RPA 2
		allow answer in range 0.23 to 0.24 (mol/dm^3) if no line drawn		

01.5	$\dfrac{0.25 \times 100}{7.96}$	allow $\dfrac{(8.21-7.96) \times 100}{7.96}$	1	AO2 4.1.3.2 RPA 2
	= 3.14(070352)		1	
	3.14 (%)	allow correct rounding to 3 sig figs of an incorrectly calculated percentage change	1	
Total			**9**	