Q1. Strawberries may be dehydrated by removing most of the water they contain. Dehydrated strawberries have many different uses in the food industry.

Food scientists investigated the effect of using osmosis to dehydrate strawberries.

1. The scientists weighed a sample of strawberries and then cut them into 10 mm thick slices.
2. They put the strawberry slices into a 1.2 mol dm^{-3} solution of sucrose at a temperature of 25 °C.
3. After 1 hour, they removed the slices from the sucrose solution and washed them in water. They dried the slices by blotting them and then weighed them.
4. They also measured the texture of the strawberry slices.
5. The scientists repeated steps 1 to 4, but they left the strawberry slices in the sucrose solution for different amounts of time.

The results of the investigation are shown in the table.

Length of time in sucrose solution / hours	Percentage loss in mass	Texture / arbitrary units
0	Not applicable	1.2
1	15.96	0.9
2	22.88	0.7
4	32.36	0.7
6	38.78	0.7

(a) (i) In this investigation, the scientists cut the strawberries into slices (step 1). Explain the advantage of this.

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(2)

(ii) The scientists blotted the strawberry slices dry before weighing them (step 3). Explain why.

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(2)

(b) In the second column of the table, the percentage loss in mass for one of the values has been recorded as not applicable. Explain why.

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(1)

(c) Use the table to describe how the length of time in the sucrose solution affected the strawberries.

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(Extra space) .....

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(3)

(d) You could use the data in the table to predict the time that strawberries should be left in sucrose solution to dehydrate them fully. Describe how you could use a graph to do this.

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(Extra space) .....

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(3)
(Total 11 marks)

Q2. A student investigated the effect of putting cylinders cut from a potato into sodium chloride solutions of different concentration. He cut cylinders from a potato and weighed each cylinder. He then placed each cylinder in a test tube. Each test tube contained a different concentration of sodium chloride solution. The tubes were left overnight. He then removed the cylinders from the solutions and reweighed them.

(a) Before reweighing, the student blotted dry the outside of each cylinder. Explain why.

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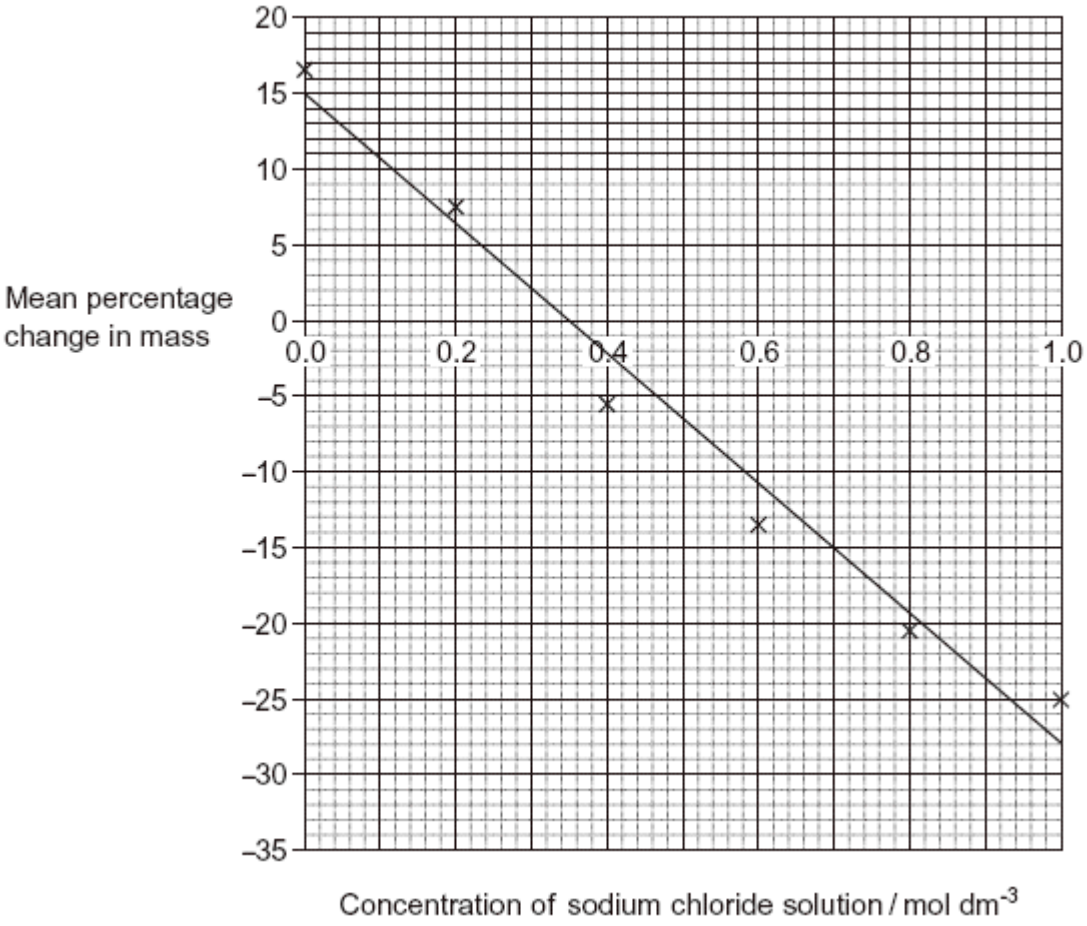
(2)

The student repeated the experiment several times at each concentration of sodium chloride solution. His results are shown in the graph.



(b) The student made up all the sodium chloride solutions using a 1.0 mol dm^{-3} sodium chloride solution and distilled water.

Complete the table to show how he made 20 cm^3 of a 0.2 mol dm^{-3} sodium chloride solution.

Volume of 1.0 mol dm^{-3} sodium chloride solution	**Volume of distilled water**

(1)

(c) The student calculated the *percentage* change in mass rather than the change in mass. Explain the advantage of this.

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(2)

(d) The student carried out several repeats at each concentration of sodium chloride solution. Explain why the repeats were important.

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(2)

(e) Use the graph to find the concentration of sodium chloride solution that has the same water potential as the potato cylinders.

..... mol dm^{-3}

(1)
(Total 8 marks)

Q3.A group of students carried out an investigation to find the water potential of potato tissue.

The students were each given a potato and 50 cm^3 of a 1.0 mol dm^{-3} solution of sucrose.

- They used the 1.0 mol dm^{-3} solution of sucrose to make a series of different concentrations.
- They cut and weighed discs of potato tissue and left them in the sucrose solutions for a set time.
- They then removed the discs of potato tissue and reweighed them.

The table below shows how one student presented his processed results.

Concentration of sucrose solution / mol dm^{-3}	**Percentage change in mass of potato tissue**
0.15	+4.7
0.20	+4.1
0.25	+3.0
0.30	+1.9
0.35	−0.9
0.40	−3.8

(a) Explain why the data in the table above are described as **processed** results.

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(1)

(b) Describe how you would use a 1.0 mol dm^{-3} solution of sucrose to produce 30 cm^3 of a 0.15 mol dm^{-3} solution of sucrose.

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(c) Explain the change in mass of potato tissue in the 0.40 mol dm^{-3} solution of sucrose.

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(d) Describe how you would use the student's results in the table above to find the water potential of the potato tissue.

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(3)

(Total 8 marks)