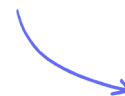


Structured Questions

Water Potential

Osmosis / Osmosis in Cells / Osmosis: Skills

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Total Marks**/19**

1 (a) A biologist investigated how surface area affects osmosis in potato cubes.

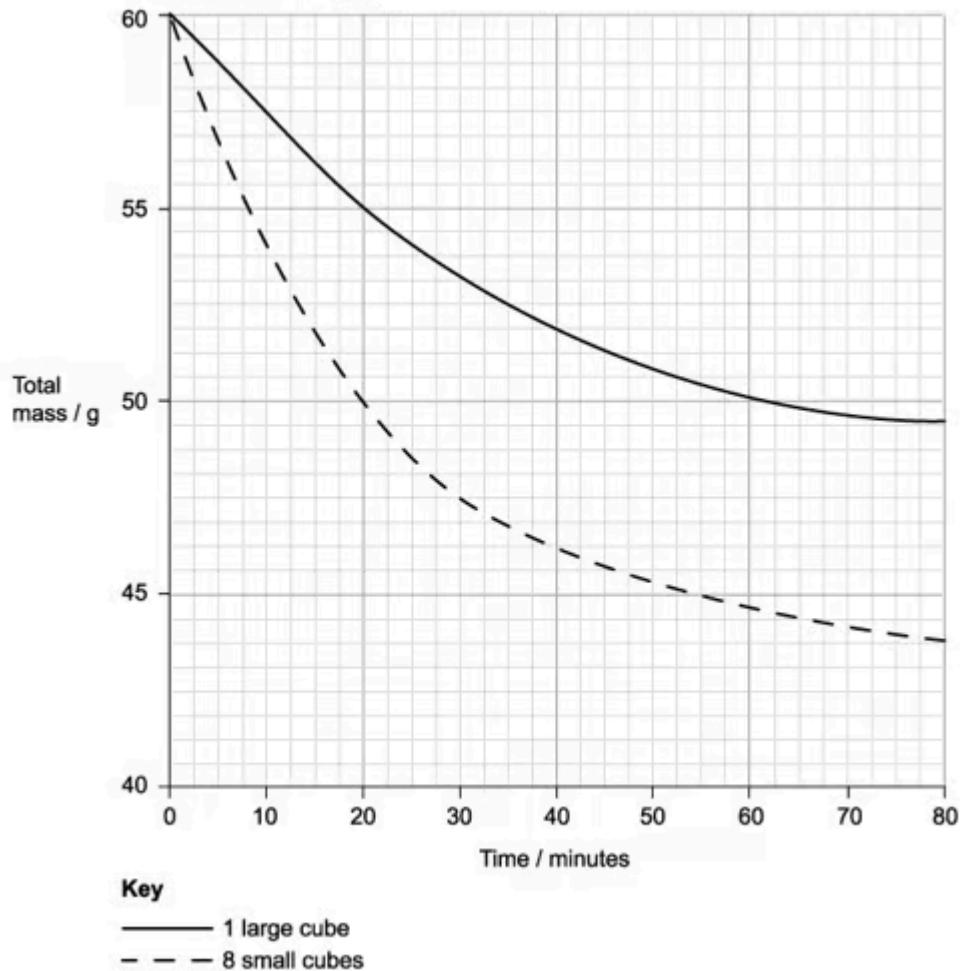
Step 1: Cut two cubes of potato, each with sides of 4 cm in length.

Step 2: Place one cube into concentrated (40%) sucrose solution.

Step 3: Cut the remaining cube into eight equal-sized smaller cubes and place into concentrated (40%) sucrose solution.

Step 4: Record the masses of the cubes at time intervals.

The results are shown in the graph.



Explain why the potato tissue changed in mass.

(2 marks)

- (b) The biologist recorded the masses of the cubes at intervals. Before weighing the cubes at each interval, the biologist blotted the outside of each cube with paper towel.

Explain why.

(2 marks)

- (c) During the first 20 minutes the combined loss in mass of the eight small cubes is greater than in the single large cube (as shown in the graph in part a).

Calculate the *rate of loss* in mass, per cm^2 , per minute for the single large cube **and** the eight small cubes during the first 20 minutes.

Give your answers in grams, per cm^2 , per minute.

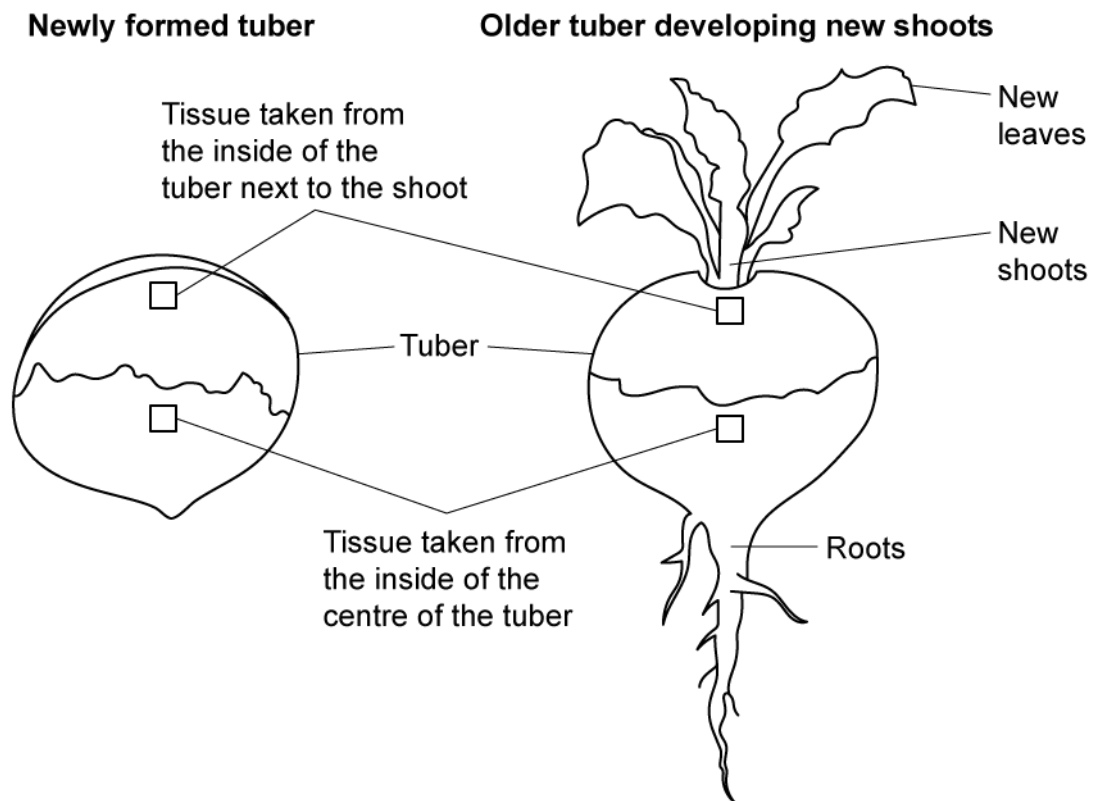
(4 marks)

2 (a) A biologist investigated the solute concentration of cells from different parts of turnip tubers of different ages (as shown in the diagram below).

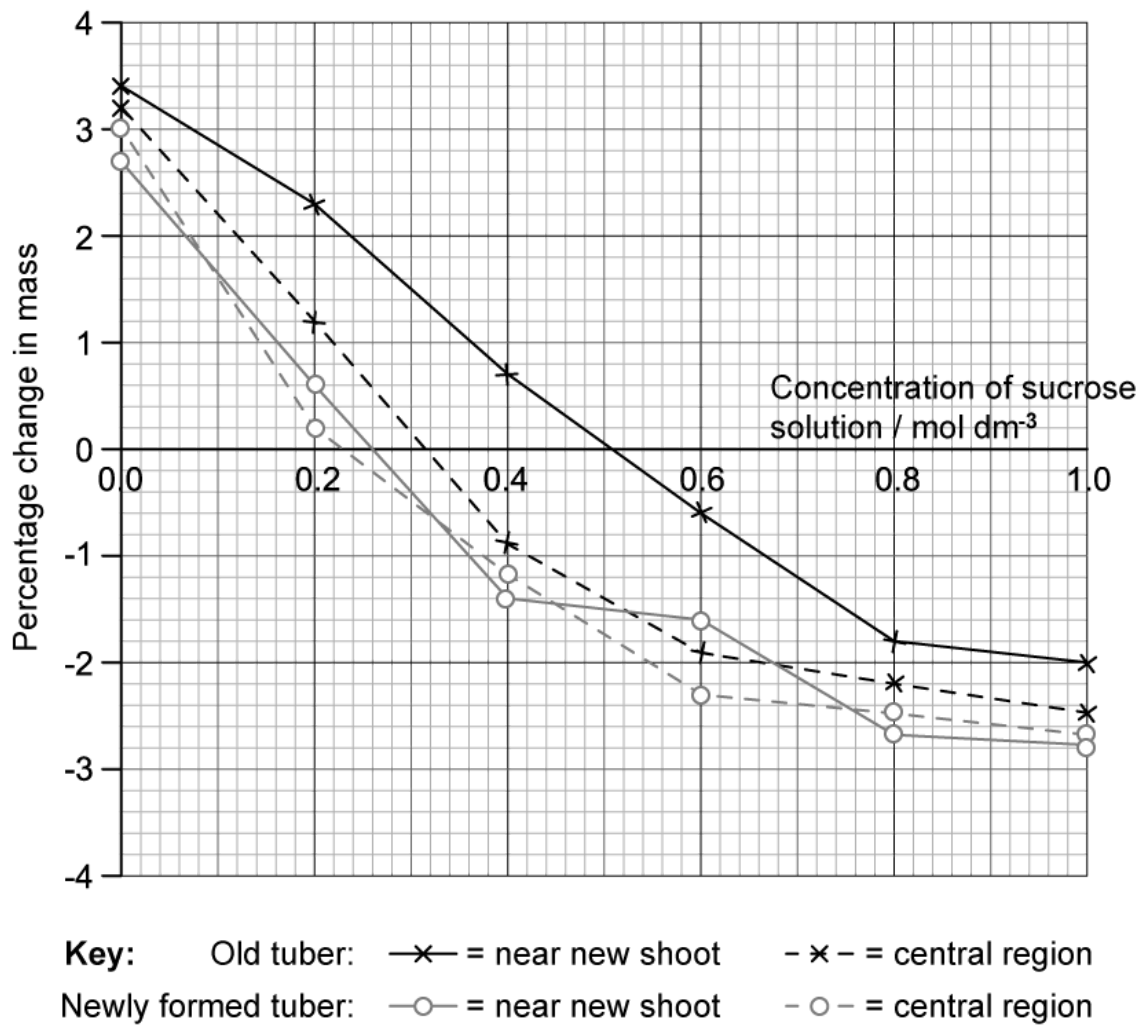
The solute concentration was estimated using discs of turnip tissue and sucrose solutions of different concentrations.

The diagram below shows:

- The appearance of the tubers
- The locations from which the tissue samples were obtained



The results are shown in the graph below



Estimate the sucrose concentration of the near new shoot sample from the old tuber.

(1 mark)

(b) Explain why the biologist used percentage change in mass rather than the change in mass.

(1 mark)

(c) After analysing the data the biologist came to the following conclusions:

1. The tissue in the old tuber, close to the new shoots has the highest solute concentration
2. In the old tuber, close to new shoots, starch reserves were being converted to sugar
3. In the old tuber, central region, starch was being converted to sugar
4. In the newly formed tuber, all the sugar had been converted to starch.

Evaluate the conclusions made by the biologist based on the evidence collected.

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(3 marks)

(d) Suggest **two** possible sources of error that the biologist may have encountered when collecting the data in this investigation.

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(2 marks)

3 Outline the effects on human heart tissue of being placed into a hypotonic solution.

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(4 marks)