Osmosis in potato tissue

Teacher / technician

YEAR 10 / LESSON 18 / BIOLOGY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Living-tissue investigation. The zero-change estimate depends on tissue, time, solution and measurement conditions.

Coverage and delivery

Shared Biology / Double Award: 2.17. Core practical: osmosis in living tissue.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklets	1 per learner	30
Matched potato cylinders	3 per pair	45 plus 10 spares
Tubes / forceps / timers	3 tubes and 1 forceps/timer per pair	45 tubes; 15 forceps and timers
Five sucrose solutions	45 cm^3 assigned solution per pair	175 cm^3 of each concentration
Balances / measuring vessels	shared balances; 1 measure per pair	5 balances; 15 measures
Paper towels / labels	consistent blotting and identification	class supply

Immediate safety

Staff use the cork borer and cutting blade on a stable board; learners receive pre-cut tissue. Handle glass carefully, wipe spills promptly and do not eat any material. Wash hands after handling potato.

Preparation and delivery

Read alongside the student method

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1. Prepare five labelled sucrose solutions at 0.0, 0.2, 0.4, 0.6 and 0.8 mol dm^{-3}. Provide 175 cm^3 of each, including spare; check preparation calculations and final solution volumes.

2. Staff cut matched cylinders from comparable potato tissue, excluding skin. Keep tissue fresh and randomise allocation across concentrations; do not leave one treatment waiting much longer than others.

3. Allocate three pairs to each concentration, with three separate cylinders per pair. Pilot a 30-minute exposure and confirm changes are resolvable with the available balances.

4. Use identical blotting instructions and consistent temperatures. Keep raw cylinder-level measurements and do not merge them before calculating percentage changes.

Close of lesson

- Place potato in solid waste, not the sink. Return solutions as directed.
- Rinse tubes, wipe balances and benches, and wash hands.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Sucrose concentration; percentage mass change after a fixed time.
- (0.69−0.75)/0.75×100 = −8%.
- It adjusts for differing initial masses and makes proportional changes more comparable.
- Liquid clinging to the surface would alter the measured mass without representing water taken into tissue.
- Water moves by osmosis into cells from the higher-water-potential external solution under these conditions.
- The zero-change point is not bracketed; investigate an appropriate additional range rather than inventing an intercept.

References and provenance

Pearson Biology specification

Practical Biology: potato mass-change method

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.