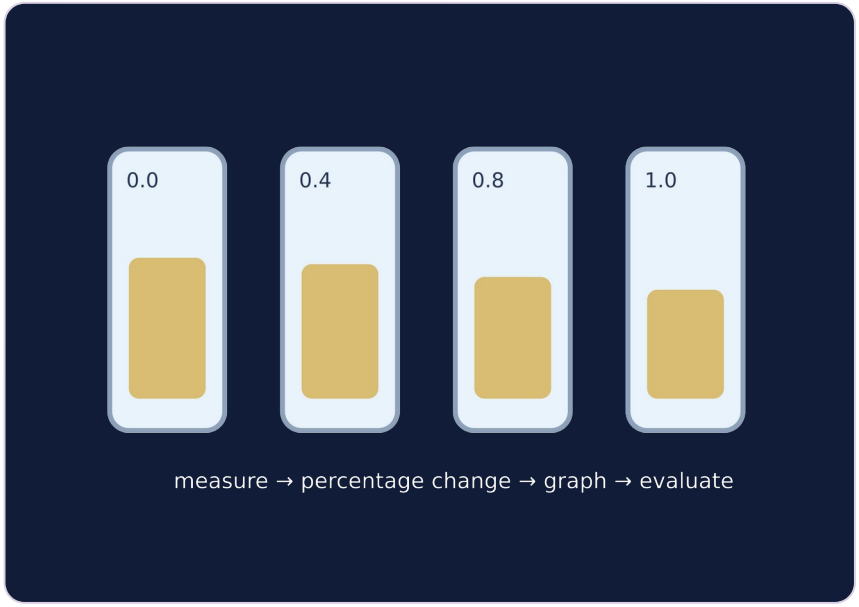
Planning osmosis

I can plan a potato osmosis investigation, calculate percentage change from sample data and evaluate the controls.

Notice. Recall. Be ready to explain.

1 State the independent variable in a potato osmosis investigation.

2 Write the percentage-change equation.



Retrieval answers

Make a prediction

Two identical potato cylinders start at 3.00 g. Which result would be strongest evidence of net water movement: colour change, final mass or beaker position?

A Colour change

B Final mass compared with initial mass

C Beaker position

Commit, then check

Watch the model

1. Change solution concentration and measure the potato cylinder’s mass change.
2. Control potato source, dimensions, solution volume, time, temperature and blotting method.
3. Use repeats where possible and keep every raw value, including an unusual result.

Plan a fair comparison

CHANGE	Concentration
MEASURE	Mass change
KEEP SAME	Other conditions

View labelled diagram

Optional video

Choose and justify

Why is percentage change more useful than mass change alone when starting masses differ?

A It removes all uncertainty

B It compares the change with the starting value

C It makes every trend linear

D It deletes anomalies

Give the deciding clue before checking.

Check the reasoning

Connect the science

1. Percentage change = (final mass − initial mass) ÷ initial mass × 100.
2. A positive result means mass gain; a negative result means mass loss.
3. Link each weakness to its effect on the result and a clear improvement.

Mass is evidence of net water movement

4.00 g → 3.60 g Change = −0.40 g

(−0.40 ÷ 4.00) × 100 = −10%

Negative change: net water loss from cells.

Plan a fair comparison

Sample data. Calculate signed change, then choose a control.

Solution	Initial / g	Final / g
Water	4.00	4.40
0.4 mol dm^{-3} sucrose	4.00	4.00
0.8 mol dm^{-3} sucrose	4.00	3.60

What should stay the same? What would inconsistent blotting do?

Reveal shared reasoning

Independent Task · 10 min

Your independent evidence

Potato diameters differ, and blotting varies from 2 to 10 seconds. Explain each problem, its effect on results and one improvement. Then explain what a negative percentage mass change means for osmosis.

Optional support

Change = final mass minus initial mass. Percentage change = change ÷ initial mass × 100. Keep the + or - sign.

Make one precise correction to the same work after feedback.

Open worksheet pages

Model after first attempt

What changed in your thinking?

Why is ‘repeat it’ incomplete as an evaluation unless you explain what repeats improve?

1. Point to one improvement in your work.
2. Choose what you want to revisit.
3. Tell your teacher; agree the next step together.

Retrieval and prediction check

1 Solution/sucrose concentration.

2 (Final mass − initial mass) ÷ initial mass × 100.

Final mass compared with initial mass

Return to Starter

Check the deciding clue

It compares the change with the starting value

Correct. Dividing by initial mass makes different starting masses more comparable.

Compare your reason. Correct one step if needed.

Return to We Do

Our shared reasoning

Water: +0.40 g, +10%.
0.4 mol dm^{-3}: 0 g, 0%.
0.8 mol dm^{-3}: −0.40 g, −10%.
Standardise blotting: surface liquid changes the measured final mass.

Return to shared task

Compare after your first attempt

Different cylinder diameters change surface area and the amount of potato tissue, so concentration may not be the only cause of different percentage changes. Use a cork borer and cut equal lengths. Unequal blotting leaves different amounts of solution on the surface, changing the measured final mass; use the same blotting method and time. A negative percentage change means the potato lost mass because net water movement was out of its cells by osmosis.

Use the model to improve your explanation in your own words.

Return to independent task

Your lesson resources

Worksheet pages are stored inside this PowerPoint.

Worksheet · page 1

Worksheet · page 2

Standard PDF

Supported PDF

Depth PDF

Editable Word worksheet

Open online lesson / model

Named files are in this week’s folder. Online lesson and video need internet.

Optional concept video

Worksheet · page 1

Use your printed copy.
Keep the first attempt.

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W5L2 | Design a fair potato investigation

Wednesday | 09:30–10:10 | Explore | Editable pupil sheet

Name: _____ Date: _____

Core first. Write, speak, point or dictate your own words. Keep the first attempt so you can improve it.

Optional support: Change = final mass minus initial mass. Percentage change = change ÷ initial mass × 100. Keep the + or - sign.

Work together

Choose the paper/sample route unless the approved practical has been arranged with suitable staffing and equipment.

Illustrative model/sample data; not measurements made by this class.

Solution label	Initial mass / g	Final mass / g	Change / g	Change / %
Water	4.00	4.40		
0.4 mol dm^{-3} sucrose	4.00	4.00		
0.8 mol dm^{-3} sucrose	4.00	3.60		

Route actually used: planning/sample data / approved practical

1. **These are illustrative sample data. Complete mass change and percentage change.**

2. **Name the independent variable, dependent variable and two controls.**

Return to task

Worksheet · page 2

Continuation is optional.
Improve the same work.

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W5L2 | Continue and improve

Use after the core questions when directed

3. **Some cylinders are not blotted. Explain the problem and a specific improvement.**

Optional transfer

Would one cylinder at each concentration show the spread of results?

Depth: name an assumption or limit, then say what evidence would strengthen your answer.

Improve the same work

One correction I made, and why:

My request for next time: _____

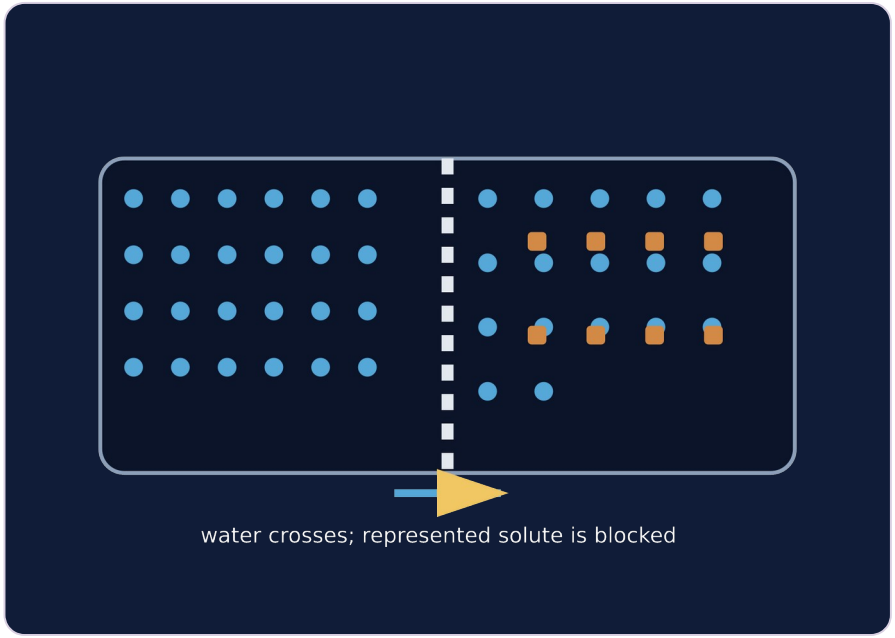
Return to task

Watch, pause and explain

Osmosis

Which substance moves, through what, and in which net direction?

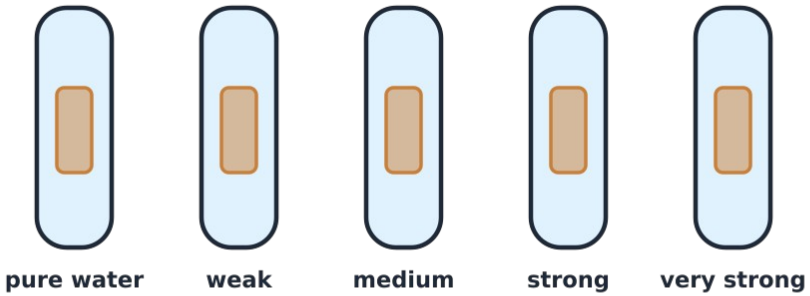
Play freesciencelessons video



No connection? Use the still model and explain the same question.

Look closely at the model

Same potato · only the concentration changes



- blot the same way every time
- record INITIAL mass first

conc.	initial (g)	final (g)	change	% change

A model illustration: use the stated data for calculations.

Return to I Do