

materials

Analyse, present and re-test

Lesson at a glance

Open by glancing at first-trial separation scores from earlier in the project. Groups call out method and sand-left score while you drive the data-recorder interactive into a class table and bar chart (1–5 cloudiness scale). With the chart still open, name the pattern and what must stay the same for a fair re-test. Each group chooses one method improvement, predicts, runs one careful re-test with fresh mixture, then compares the two scores aloud before the full Investigation Journal write-up and a short pack-away.

Learning objectives

- Contribute first-trial scores to a class results table and bar chart
- Read the pattern in the data and say what the evidence shows
- Choose one method improvement, re-test, and compare with the first results

Before the bell – prep

Gather the wet kit from earlier in the project and mix fresh sand–salt–water so starting cloudiness is even. Ensure each group can find its first-trial scores on its Investigation Journal pages. Print today's Journal page and open the data-recorder interactive on the IWB before the bell.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
Investigation Journal pages from earlier in this project (first-trial results)	1	pupil	classroom	a sticky note with each group's first method name and sand-left score
Investigation Journal page (today's printable, class-chart analysis)	1	pupil	classroom	ruled paper for noting own method score and which class method left the least sand
group comparison half-sheet for re-test write-up	1	group	classroom	reverse side of today's Investigation Journal page or one large sticky note per group
sand	1	group	classroom	clean play sand or fine horticultural sand
table salt	1	group	supermarket	any cooking salt
water in a jug	1	group	classroom	tap water in recycled bottles
sieve	1	group	school kit	kitchen colander or mesh tea strainer
filter paper and funnel set	1	group	school kit	kitchen roll or coffee filter paper pushed into a cut plastic bottle neck
clear plastic cups or jars	3	group	classroom	clean yoghurt pots or jam jars
cotton wool	1	group	supermarket	a small piece of clean cloth or extra kitchen roll
plastic spoons or stirrers	2	group	classroom	lollipop sticks
paper towels	1	group	classroom	old tea towels designated for spills
30 cm ruler	1	group	classroom	marked strip of card in centimetres
tray to catch spills	1	group	classroom	a shallow baking tray or plastic lid

Safety watch-point

Do not taste the water. Wipe spills as you go; empty cups carefully at pack-away; wash hands after wet sand-salt work.

Teaching moves

- **Getting Started:** Keep it light—no full rebuild yet. Pairs glance only at first-trial readings. Ask which reading looks best and worst, and whether they are looking at what they saw or what they hoped for. Point to any baseline jar still standing as a comparison, not a new demo.
- **Chart our first results:** Drive the data-recorder in explore mode; pupils call out and you enter Method and Sand left score (1–5). Anchor the scale aloud: 1 = print readable through the cup; 3 = weak tea; 5 = spoon not visible. Map any millimetre groups onto 1–5 before they call out; they keep original numbers on paper. When the table is full, show the bar chart and leave it open. Head off “tall bar means best”—on this scale tall means more sand left.
- **What does the evidence show?:** Leave the bar chart on screen; do not cover it with another slide. Ask which method left the least sand and what must stay the same for a fair improvement. Hang each term on the class answer: pattern after they point at the lowest bars; evidence when they separate saw from think; re-test when they name what stays the same. Model one worked sample set aloud only after they have read their own chart.
- **Choose one improvement:** Police one change only and safety; groups design the improvement. Offer method menus as prompts: sieving—finer mesh, twice, or rinse; filtering—extra layer or pour slowly; settling—longer still time or taller narrower jar. Refuse two changes, new mixture amount, or a new scoring rule. Require the stem “If we ..., then the sand-left score will ... because ...” before handing out wet kit.
- **Re-test the improved method:** Circulate with the fair-test checklist: one change, same mixture amount, timing, container, and 1–5 (or mm) scoring. Default is one careful improved run and one score—do not push settling or spill-reset groups into a second run. A knocked cup is a reset, not a new method. If two clean runs happen, they keep one agreed score, not a middle.
- **Compare first and improved results:** Whole-class talk on the two numbers only—not the full Journal write-up. Fold the class in: Was that change fair? What else might explain the new score? Push “We saw the score fall from 4 to 2” before “so it worked.” Unexpected results are data, not failure.
- **Record on your Investigation Journal page:** Full paper write-up: first score, improved score, the single change, whether the prediction was supported, one fair-test note, and one next-step idea for the clean-water challenge. Catch hope-based conclusions—“Which numbers show that?” Keep journals safe for the next part of the project.
- **Reflect and look ahead:** About two minutes of display-only pair share on what the class chart made easier to see than one cup, then protect pack-away: empty cups, dry trays, return sieves and funnels, wipe tables, wash hands. Start pack-away even if only a few pairs have shared.

What it should show

First-trial chart often shows filtering rows lower (cleaner) than sieving; settling sits between. A fair one-change re-test commonly lowers the sand-left score (e.g. sieve twice, extra filter layer, longer settle). Score up or flat is still valid data—often two changes at once, uneven mixture, or scoring from memory. A knocked cup needs a reset, not a new improvement.



Misconceptions & interventions

- **“The tallest bar is the best method.”** — Point at the chart and restate the scale: tall means more sand left, so worse separation. Ask which bar is lowest and what that means for cleaner water.
- **“Our one cup on the desk already proves our method is best.”** — Keep the class chart visible. Ask what a single lucky reading might hide that the pattern across groups shows.
- **Pupils change two things at once (e.g. finer mesh and double pass) or alter the mixture amount, then claim the re-test is fair.** — Stop the hand-out and have them name the single change and list what stays the same—amount, time, container, scoring—before they touch the wet kit.



Differentiation

Emerging	Developing	Proficient
• Offer a simple visible change only (pour more slowly; wait two more minutes) and sit with the group to agree the 1–5 score against the printed anchors. • Let them jot just the two scores and the one change on the Journal page; scribe the short conclusion if writing stalls.	• Prompt the full prediction stem and a fair-test check aloud before the re-test; ask why the score moved after they report both numbers.	• Allow tighter quantifying (settled depth in mm) while still changing only one thing; invite a fair-test critique of another group’s reported change. • Stretch the conclusion: which claim the two scores support, and which claim goes too far for drinking-water safety.



Cross-curricular hook

Tie to the Maths Data strand—class table and bar chart, reading lowest bar, pattern and range across methods.