materials

Analyse, present and re-test

Lesson at a glance

Open with each group's first-trial sand-left reading from earlier in this project. Drive the data-recorder on the IWB so groups call out scores onto a shared 1–5 cloudiness scale, then show the bar chart. Read the pattern across the chart before naming pattern, evidence and re-test. Each group picks one fair method improvement, predicts, runs one careful re-test with fresh sand–salt–water mixture, then compares the two scores in talk and on a half-sheet.

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

Night before: gather Part 1 wet kit (cups, sieves, funnels, trays, filter materials) and mix fresh sand–salt–water so starting cloudiness is even. Print today's Investigation Journal page and blank half-sheets for re-test write-ups. Check each group can find its first-trial score. Open the data-recorder interactive on the IWB.

Lesson 13

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	provided printable	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; wet sand on floors is a slip hazard. Full pack-away and handwashing before the next class.

Teaching moves

- **Getting Started:** Keep apparatus boxed. Ask only which of their first-trial readings looks best and worst, and whether they are looking at what they saw or what they hoped for. Point at any leftover baseline jar rather than re-demonstrating.
- **Chart our first results:** Run the data-recorder yourself (or one trusted pupil). Agree the shared 1–5 cloudiness anchors aloud: 1 = print readable through the cup; 3 = weak tea; 5 = spoon not visible. Map any mm settled-sand readings onto that scale before they call out. Add one row per group, show the bar chart, and leave it open. Pupils complete the class-chart sections of today's Investigation Journal page while it builds.
- **What does the evidence show?:** Keep the same chart full-screen — do not switch slides. After pupils name the lowest bars and clusters, speak the three definitions so each word labels thinking already done. Model one worked read-aloud of sample rows, then ask what must stay the same for a fair re-test.
- **Choose one improvement:** Groups design the change; you only police one change and safety. Offer method menus as prompts: sieve twice or finer mesh; extra filter layer or slower pour; longer settle or taller jar. Refuse two changes or a new mixture amount. Hand out wet kit only when each group can name its one change and say the prediction stem.
- **Re-test the improved method:** Circulate with the fair-test checklist: one change, same mixture amount, same timing, same container, same 1–5 score. One careful improved run is the default. A knocked cup is a reset of the same improvement, not a second change. Score after the run, not from memory.
- **Compare first and improved results:** Whole-class talk only — no full journal write-up yet. Each group states the change and both scores. Push observation before inference: score fell from 4 to 2 before so the improvement worked. Fold peers in: was that change fair, and what else might explain the new score?
- **Record the re-test:** Point groups to the blank half-sheet or reverse of today's page — not the class-chart side. Catch hope-based conclusions with Which numbers show that? Keep sheets safe for the clean-water challenge later in this project.
- **Reflect and pack away:** One or two minutes on the two talk questions, then four minutes of full pack-away: empty cups, dry trays, return sieves and funnels, wipe tables, wash hands. Stay until hands are washed — wet sand left on tables is a slip risk for the next class.

What it should show

On the 1–5 sand-left scale, filtering rows usually cluster lower (cleaner) than sieving; settling sits in between. A successful re-test often drops the score when only one sensible change is made and the mixture amount stays the same. A score that rises or stays put is still data — often two changes at once, a different pour volume, or scoring from memory of the first trial rather than the new cup.

Misconceptions & interventions

- **A tall bar means the best method.** — Point back at the chart scale: tall means more sand left, so worse separation. Re-ask which bar is lowest and what lowest means on this scale.
- **One cup on our desk is enough to decide which method works.** — Hold the class chart up as the counter-example: name the pattern across many rows, then ask which claim a single reading can support and which goes too far.
- **We can change two things at once if both seem helpful, or decide it worked because we tried hard.** — At choose-and-re-test time, make them name the single change before kit goes out. At write-up, prompt Which numbers show that? and what stayed the same.

Differentiation

Emerging	Developing	Proficient
• Offer a simple visible change only (pour more slowly; wait two more minutes) and sit with the group to map their first-trial reading onto the shared 1–5 scale before they call it out. • Provide the prediction stem orally and scribe the half-sheet scores if writing load blocks the comparison.	• After one clean improved run, ask why the score moved or stayed, naming what was kept the same. • If time remains, take part in the optional spoken pool of improved scores beside the first-trial chart.	• Quantify more tightly (settled depth in mm) while still changing only one thing, then map back to the class 1–5 scale. • Critique another group's re-test for fairness: which claim the two numbers support, and which claim goes too far.

Cross-curricular hook

Maths Data strand — build and read the class bar chart, then compare first and improved scores as evidence.