

materials

Plan and run the fair test

Lesson at a glance

Hold up two jars of the same sand–salt–water mix and name one the baseline (poured through nothing). Groups choose two methods from sieving, filtering and settling, then plan a fair test on the Investigation Journal using the fair-test-planner interactive: change only the method, measure cloudiness 1–5, keep amount, time and container the same. They run two trials each, score against the baseline, and pool live class scores on the data-recorder before a short evidence talk.

Learning objectives

- Turn the theme of separating a mixture into a testable question for your group
- Plan a fair test: change the method, measure sand left, keep amount, time and container the same
- Run the planned test with repeats and record readings separately from inferences

Before the bell – prep

Print Investigation Journal pages. Mix one sand–salt–water jar per group plus two baseline jars ahead of time. Set sieves, funnels, filter paper (kitchen roll works), clear cups, jugs and timers on a side bench. Open the fair-test-planner and data-recorder interactives. Place a class waste bucket — sandy mix must not go down sinks.

**Materials**

Item	Qty	Per	Source	Low-cost substitute
sand-salt-water mixture in a clear jar	1	group	classroom	sandy water without salt (salt is not required for today's sand separation)
clear plastic cups or beakers	3	group	classroom	clean yoghurt pots
sieve	1	group	school kit	kitchen colander
funnel	1	group	school kit	top half of a clean plastic bottle
filter paper	2	group	school kit	kitchen roll or coffee filter paper
jug of clean water for rinsing and top-ups	1	group	classroom	shared class jugs
tablespoon or small scoop	1	group	classroom	same clean yoghurt pot used as a scoop for every trial
timer or stopwatch	1	group	classroom	shared class clock, interactive whiteboard timer, or one phone timer per pair of groups
class waste bucket for sandy leftover mixture	1	class	classroom	large washing-up bowl lined with a bin bag
Investigation Journal pages	1	pupil	classroom	—
cloths or paper towels for spills	1	group	classroom	shared class towel pile

Safety watch-point

Wipe spills at once; no tasting; keep sand out of eyes; wash hands at the end. Pour sandy waste into the class bucket — never down the sink. No heat sources for pupils.

Teaching moves

- **Getting Started:** Hold up one clear jar of the cloudy mix so everyone sees the swirl, stand the second jar beside it and name it aloud as the baseline. One light question only — how could we get the sand out fairly — then hands-up ideas. Leave both jars visible; do not name variables or hand out kit yet.
- **Our Question and Prediction:** Put the model question on the board and leave it up: Does filtering leave less sand in the water than sieving? Point to the kit as you name the three methods in plain words. Groups choose two methods and say a rough prediction with a because — oral only; no Investigation Journal page yet. Evaporation is not a pupil method today.
- **Plan a Fair Test:** Lead the five-card sort on the fair-test-planner interactive first: separation method → Change; how much sand is left → Measure; amount, time and container → Keep the same. Agree the shared cloudiness scale (1 = clear, 5 = as cloudy as the baseline) in one short line, then model observation versus inference. Groups complete the Investigation Journal planner. Checkpoint before kit: two named methods, three controls listed, and the 1–5 measure rule written — no group pours without a complete plan.
- **Run Your Test:** Groups claim only the tools for their two methods. Keep the 19-minute practical as one block: stir, same scoop, timer on the agreed rule, score beside the baseline, write the score straight away, two trials each. Cap settling still-time at about two minutes unless both of that group's methods can share a slightly longer time. Fold watchers in with “What must they keep the same?” Walk for changed scoop sizes and delayed scoring.
- **Record What You Saw:** Use this beat to finish gaps, not as homework. Check every group has two trials per method in the results table, scores only in the observation space, and “filtering is better” moved under inference if it snuck into a results cell. If two trials disagree a lot, ask what might have changed rather than calling the test a failure.
- **What Does the Evidence Show?:** Open the data-recorder in explore mode and type live cloudiness scores from this room — do not present sample rows as class results. Prioritise at least one averaged score per method from several groups so all three methods appear. Keep the spine tight: lowest bars, what stayed the same, observation or inference on one number, and one unfair change.

What it should show

Filtering usually gives the lowest cloudiness scores (clearest water). Sieving often scores higher because fine sand passes the mesh. Settling sits in between and may still look cloudy after two minutes. If every score matches the baseline, the scoop was too small or the time too short — lengthen still-time only when both of that group's methods can share it.



Misconceptions & interventions

- **“We should use more mixture for the method we like so it has a better chance.”** — Point back at the Keep-the-same cards on the fair-test-planner: amount must match every trial. If two things change, you cannot tell which caused the result.
- **Pupils write “filtering is better” in the results table instead of a cloudiness score.** — Hold up their page and separate the two lines: the score is what you saw; “filtering won” is what you think. Move the conclusion into the inference box.
- **Pupils think the salt is caught by the sieve or filter along with the sand.** — Remind them salt is dissolved — it stays in the water. Today’s measure is sand left as cloudiness; dissolved salt is a next-step wonder, not today’s score.



Differentiation

Emerging	Developing	Proficient
• Shortlist two named methods and give a 30-second stem for the question and the three keep-the-sames before they write the planner. • Pair at the teacher table for the first scored trial so the baseline compare and 1–5 rule are modelled once with their own cup.	• Prompt a because on the prediction and a quick check that both trials used the same scoop and time rule. • If trials disagree, ask which control might have slipped rather than re-running the whole test.	• Phrase the full question with the controls named (same amount, time and container). • Fast finishers sketch one change that would make their test unfair, or say where the dissolved salt still is after the sand is removed.



Cross-curricular hook

Tie to the Maths Data strand — live cloudiness scores become a class bar chart; lower bars mean less sand left.