

materials

Plan and run the fair test

Lesson at a glance

Open with two identical sand-salt-water jars and name one the baseline (poured through nothing). Groups pick two methods from sieving, filtering and settling, then plan a fair test on the Investigation Journal using the fair-test-planner interactive: change only method, measure cloudiness 1–5, keep amount, time and container the same. They run two trials per method, score each cup beside the baseline, keep observations separate from inferences, and pool live scores on the data-recorder.

Learning objectives

- Turn the theme of separating a mixture into a testable question for your group
- Plan a fair test: change the method, measure how much sand is left (as a cloudiness score from 1 to 5), keep amount, time and container the same
- Run the planned test with repeats and record readings separately from inferences

Before the bell: prep

Mix one sand-salt-water jar per group plus two class baseline jars the night before. Print Investigation Journal pages. Stage sieves, funnels, filter paper (or kitchen roll), clear cups, scoops, timers and cloths on a side bench. Set a waste bucket for sandy leftovers, not the sinks. Open the fair-test-planner interactive.

**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	provided printable	none needed
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 cloudy jar and stand the second beside it as the named baseline. Ask what they can see and which part looks easiest to get out first. Keep it to one quick hands-up; do not name variables or hand out kit yet.
- **Our Question and Prediction:** Theme is fixed (get the sand out of the water), but each group chooses which two methods to compare. Leave the model question on the board: Does filtering leave less sand in the water than sieving? Oral only: two methods and a prediction with a because. No Journal page yet. Evaporation is not a pupil method today.
- **Plan a Fair Test:** Drive the fair-test-planner interactive: sort the five cards so method goes to Change, sand left to Measure, and amount, time and container to Keep the same. Agree the cloudiness scale 1–5 against the baseline, then give the worked oral model before groups write. Checkpoint every page before kit claim: two named methods, three controls, and the 1–5 measure rule must be written.
- **Run Your Test:** Groups collect only the tools for their two methods. Scores go on the page during trials, not after: same scoop, same time rule, hold each result cup beside the baseline, score 1–5, two trials each. Cap settling still-time at about two minutes. Walk the room for spills and sink pours; fold watchers in with ‘what must stay the same?’
- **Record What You Saw:** Use these minutes to finish gaps and separate observation from inference. Check the table has two trials per method and that no one has written ‘filtering is better’ in 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: Method and Cloudiness 1–5. Work briskly: which bars are lowest, what stayed the same, is that number observation or inference, what would make the test unfair. Lower bars mean clearer water.
- **Reflect and Pack Away:** Two or three spoken answers on what made the test fair, then pack-away: waste bucket not sinks, rinse cups, return kit, wipe benches, wash hands. Keep each group’s Journal pages and a note of their two methods for the next lesson in this project.

What it should show

Filtering usually gives the lowest cloudiness scores (clearest water); sieving often higher as fine sand slips through; settling sits in between and may still look cloudy after two minutes. If every score matches the baseline, the scoop is too small or the time too short: lengthen still-time slightly only if 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 to the Keep-the-same cards on the fair-test-planner: if amount changes with method, you cannot tell which caused the score. Same scoop every trial.
- **Pupils write ‘filtering is better’ in the results table as if that were the reading.** Hold up the page sections: score 2 is what you saw (observation); ‘filtering trapped more sand’ belongs under inference. Move the phrase across on the spot.
- **One wire of thinking: changing the method and the time together still counts as fair because we meant well.** Ask which bar on the data-recorder we could trust if two things changed. Re-voice: only the separation method moves; time rule stays locked.



Differentiation

Emerging	Developing	Proficient
• Shortlist two named methods and give a 30-second stem prompt for the question and Keep-the-same lines before the planner checkpoint. • Pair at the teacher table for the first scored trial so the baseline comparison is modelled once.	• Prompt a full because on the prediction and check both trials are scored before pack-away. • Ask why two trials on the same method might disagree and what that says about the scoop or timing.	• Phrase their own full question naming both methods and the shared amount rule. • 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 Maths Data: pupils read the live bar chart of cloudiness scores and compare lowest bars as the clearest method.