living-things

Plants: what do plants need to grow?

Lesson at a glance

Open with a handful of dry cress seeds and harvest ideas about what plants need. Teach the fair-test rule, then groups choose light or water as their one factor and voice a question and prediction. Drive the fair-test-planner interactive with warmth as the model factor so nothing is given away. Groups plant matching cotton-wool cups, place them in agreed spots, and record day-zero looks on the Investigation Journal page before a display-only talk on fairness.

Learning objectives

- Pose a testable question about one factor plants need to grow
- Plan a fair test: change one factor, measure growth, keep the rest the same
- Set up the investigation so results can be observed and recorded over days

Before the bell — prep

Pre-portion equal seed pinches for two cups per group (~20 cress seeds each). Decide the bright sill and dark covers or cupboard. Set two or three shared water stations with tablespoons. Optional: pre-dampen cotton wool. Have rim labels ready — cups stay put for days.

Lesson 3

Materials

Item	Qty	Per	Source	Low-cost substitute
cress seeds (default for multi-day classroom test)	pre-portioned pack for two matching cups (about 20 seeds per cup)	group	supermarket	mustard seeds (similar speed). Dried beans only as a slower alternative that may need one to two weeks to show clear differences
clear plastic cups or small plant pots	2	group	supermarket	clean yoghurt pots with drainage holes punched by an adult
cotton wool or peat-free potting soil	1	group	supermarket	damp kitchen paper folded into each cup
water jugs and measuring spoons (two or three class stations)	2	class	classroom	two clean tablespoons used as shared water measures at opposite ends of the room
sticky labels and pencils	1	group	classroom	masking tape strips labelled with pencil
dark card or foil covers for dark conditions	1	group	classroom	a closed cupboard shelf reserved for dark-test cups
Investigation Journal page	1	pupil	provided printable	plain paper; pupils record question, prediction, change, measure, keep the same, day-zero look, and check plan from the board stems

Safety watch-point

Wash hands after handling seeds; no tasting. Mop water spills at once. An adult places any cups in high cupboards.

Teaching moves

- **Getting Started:** Show only the dry seeds on your palm; keep cups, cotton wool and water out of sight. Take hands-up ideas without correcting yet — light, water, soil, warmth, air all welcome. Flag soil-as-food thinking for later.
- **What plants need, and how we test fairly:** Board only the fair-test rule and the light-or-water choice. Speak the one-minute first-person model: change only light, keep seeds, cotton wool, cup and water the same, judge greenness and sturdiness over days — not height alone, because dark seedlings can grow tall and spindly.
- **Question and predict:** Seat groups of three or four first. Write the two stems: 'Our question: Does ... change how well our seeds grow?' and 'We predict ... because ...'. Two minutes to choose light or water, then hear three or four predictions; fold listeners in with 'Do you agree?' Steer light groups off 'taller' alone.
- **See the shape, then plan your own:** Open the fair-test-planner interactive in explore mode and model warmth, not light or water. Talk cards into Change, Measure and Keep the same. Let groups err for a minute — growth into Keep the same is the error worth catching aloud. Ask stuck groups: 'If you changed two things, what could you not say at the end?'
- **Plant and set up the test:** Agree places whole-class first: bright sill, dark cover or cupboard, shared sill for water pairs. Front-model one matching pair, narrating equal seeds and cotton wool. Light groups: same water, one bright and one dark. Water groups: same light, one tablespoon versus a few drops — not bone-dry. Check labels before cups move.
- **Baseline observations:** Write shared look-fors on the board: greener or paler, sturdy or floppy, number of green shoots. Pupils record question, prediction, change, keep-the-same, day-zero looks and the check plan on the Investigation Journal page. Circulate: are the cups truly matched except one thing?
- **Make sense of today's set-up:** Display-only talk. Draw out fair versus unfair examples (unequal seeds, radiator versus cold corner, accidental extra water). Separate observation from inference: white cotton wool and unsprouted seeds is what we see; 'plants need light' is not claimable yet.

What it should show

No growth today — this is set-up. Over a few school days expect light-group windowsill cups greener and sturdier; dark cups paler, yellow or floppy (they may be taller — that is etiolation, not healthier). Water groups: tablespoon cups healthier than barely-damp. Odd results usually mean unequal seed counts, a second factor drifting, or top-ups given to only one light-test cup.

Lesson 3

Misconceptions & interventions

- **Pupils say seeds need soil more than light or water, or that plants 'eat' soil.** — Honour the idea, then show the cotton wool holding water and roots. Today's fair test isolates light or water so the class can compare trustworthy results.
- **Pupils treat 'taller' as proof the plant is healthier, especially in the dark cup.** — Point back to the board look-fors: greener or paler, sturdy or floppy, number of green shoots. Dark-grown cress can be tall and spindly — colour and sturdiness are the headline measures.
- **A group changes light and water together, or tops up only the dry-looking light-test cup.** — Ask: 'If two things changed, what could you not say at the end?' Help them reset. For light pairs, any moisture top-up must go equally to both cups.

Differentiation

- {'emerging': ["Offer the ready questions: 'Does the amount of light change how well cress grows?' or the water twin, and pair them at the teacher table to match seed pinches and labels.", 'Scribe the keep-the-same list while they say it aloud; they still place their own cups.'], 'developing': ["Prompt a second reason in the prediction ('...because plants use light to make food') and a named checker for the same time each day.", 'Ask how they will match any moisture top-ups so water does not sneak in as a second factor.'], 'proficient': ["Critique another group's plan: name one thing that would make it unfair before cups move.", 'Suggest how the class could later compare light-group and water-group findings without mixing the two data sets.']}

Cross-curricular hook

Tie to Maths measures — same seed count, same water spoonfuls, and later height notes in centimetres using the shared look-fors.