

STEM that changed Ireland

Lesson at a glance

Open with three board puzzles: send a message without speaking, lift with less effort, stop ice melting. After a two-minute cup-and-string model, groups rotate three shared stations—paper cups and string, ruler-and-pencil lever, ice wrap versus bare cube—jotting idea-that-worked notes on the Investigation Journal. Groups share one station each, then match trays to Ireland breakthroughs (wireless messages, levers, cold storage). Close by pinning genuine I-wonder questions to the year's wall.

Learning objectives

- Solve a simple engineering problem with limited kit and explain the idea that worked
- Connect each station challenge to a real STEM breakthrough and how it changed everyday life in Ireland
- Pose a genuine I wonder question for the year's living-things and materials work

Before the bell – prep

Freeze identical ice cubes overnight; pack spares in a cool bag and issue fresh pairs only on arrival at the ice tray. Set three station trays (cups+string; rulers+pencil+small weight; wrap kit) plus a separate demo cup-and-string. Print three challenge cards and Journal pages. Clear wall space for I-wonder notes.

Materials

Item	Qty	Per	Source	Low-cost substitute
paper cups (message station)	2	message station	supermarket	clean yoghurt pots with a small hole punched for the string
string, about 2 m (message station)	1	message station	classroom	wool or strong twine
demo cups and string (teacher board model only; keep separate from Station A)	1	class	classroom	same as message station kit, reserved and labelled Demo
30 cm ruler (lever station)	2	lever station	classroom	a stiff strip of card or a wooden paint-stirrer
pencil for lever pivot (lever station)	1	lever station	classroom	a thick marker or a short dowel
small weight, e.g. a 100 g mass, a small bag of rice, or a sock of rice tied shut (lever station)	1	lever station	school kit	a small hardcover book
same-size ice cubes (issued two at a time when a group arrives; keep spares cold)	12	class	school kit	identical ice cubes from a home freezer brought in an insulated bag just before the lesson
insulated cool bag or small cooler for spare ice cubes	1	class	classroom	a thick towel-wrapped lunch box with a frozen block beside the cubes
assorted wrapping scraps: wool or a sock, foil, paper, bubble wrap (ice station)	1	ice station	brought from home	newspaper, a tea towel scrap, and a plastic bag
shallow tray (ice station)	1	ice station	classroom	a plastic lid or baking tray liner
station challenge cards (message, lever lift, ice insulation)	1	class	provided printable	write the three card texts on the board beside each tray
Investigation Journal page	1	pupil	classroom	a blank page with three headed spaces labelled by the teacher on the board
	1	pupil	classroom	

Item	Qty	Per	Source	Low-cost substitute
sticky notes or scrap paper for I wonder questions				torn strips of plain paper and Blu Tack

Safety watch-point

No string around necks; keep weights low over the desk; wipe meltwater at once; no tasting ice.

Teaching moves

- **Getting Started:** Point at the three puzzle phrases only—do not name breakthroughs or hand out kits. Take two or three quick guesses, then move on. Keep energy light so curiosity carries into the stations.
- **What is STEM?:** Project the short STEM and engineering-challenge definitions. Live-model the cup-and-string with the separate demo kit, thinking aloud: wonder, predict, test a tight short string versus a loose long one, observe, name the idea that worked. Ask where pupils have already solved a problem like an engineer, then hand out Journal pages.
- **Station challenges:** Rotate on a clear signal—about seven minutes including agree-jot and tidy. At each tray ask what they are changing, keeping the same, and what tells them it is working. Fold watchers in with ‘Would you try that?’ One hint only if a station stalls (tighten string; move the pencil pivot; trap air), then step back. Issue two fresh cubes per ice group from the cooler.
- **Record what worked:** Prompt the board stems aloud: Idea that worked... I noticed... optional I think.... Circulate so every pupil has something concrete for all three stations, not only their favourite. Fast finishers add one improvement they would try on their weakest station.
- **Share what worked:** Assign stations so the class hears all three challenges; one sentence each (challenge, idea that worked, one notice). Revoice useful language: tight string, longer effort arm, trapped air, comparison cube. If groups disagree on the best wrap, ask what was different about their tests.
- **Who solved it, and what changed?:** Put the three plain labels up first and let groups match stations before any history. Only then tell the Ireland stories in your own words: Marconi’s Clifden wireless station, levers on farms ports and builds, insulation and cold storage for milk and food. Introduce breakthrough here, hung on those concrete changes.
- **I wonder, and tidy:** Model one strong question grown from today’s kit, then pupils pin their own to the ordinary noticeboard wall. Read three or four aloud and say the class will return to the wall in living-things and materials work. Exit with one spoken idea that changed life in Ireland while appointed pupils dry trays and rewind string.

What it should show

Message station works best with cups held taut and string tight. Lever feels easiest with the pencil pivot nearer the load and a longer effort arm. Ice: wool or bubble wrap usually beats bare or foil alone because trapped air slows heat; foil alone conducts. Odd ice results often mean no bare comparison cube or cubes already melting—issue fresh pairs from the cooler.

Misconceptions & interventions

- **STEM is only for scientists in white coats in labs.** — Name everyday Irish blend-jobs: a mechanic fixing a tractor, a chef choosing a pan that heats evenly, a nurse reading a pulse. Tie each back to solving a real problem with mixed know-how.
- **Foil must be the best ice wrap because it looks ‘sciencey’ and feels cold.** — Hold foil and wool side by side against the comparison cube. Stress trapped air: foil alone conducts heat and only helps if it holds an air layer (crumpled or over another wrap).
- **Inventions appear fully finished overnight.** — Point back at the trays: groups tested, failed, improved and agreed. Same pattern in the Ireland stories—people kept changing the idea until everyday life shifted.

Differentiation

Emerging	Developing	Proficient
• Pair at the teacher-facing side of a shared tray so they handle kit with a peer while you prompt the three stems aloud. • Accept a tiny sketch plus one phrase per station instead of full sentences.	• After agreeing what worked, add one ‘what we would try next’ note for their weakest station. • Prompt: what stayed the same and what changed between your best and worst try?	• In the share or reveal, name what stayed the same from tray idea to real Irish use. • Critique fairness at the ice station: did every group get same-size fresh cubes and the same wait?

Cross-curricular hook

Geography/History link: Marconi’s wireless station at Clifden, Connemara, and how messages, farms and cold storage reshaped everyday Ireland.