

Triangles hold their shape

Lesson at a glance

Open by holding up a loose card-strip square and taking quick guesses on whether a sideways push will make it lean. Teach rigid and brace, then groups build a square and a triangle with equal strips and wobbly split pins, push one corner of each, and add one diagonal brace to the square. Results go on the ExperimentRecord page. Close with a photo-card triangle hunt sorted into roof/frame, gate/fence and machine, plus a quick look for one real triangle in school.

Learning objectives

- Show that a triangle cannot be pushed out of shape while a square can
- Explain what a diagonal brace does to a square frame
- Identify triangles doing structural work in everyday Irish structures

Before the bell – prep

Cut equal card strips (~15 cm; at least 8 per group) and punch end holes the day before. Pot of split pins per table. Print one photo-card set per group (roof trusses, farm gate, pylon, bike, shelf bracket, climbing frame) with job labels on the reverse only.

Materials

Item	Qty	Per	Source	Low-cost substitute
equal card strips about 15 cm long	8	group	classroom	strips cut from cereal boxes or old folders
split pins	12	group	classroom	paper fasteners or short pipe cleaners twisted through the holes
hole punch	1	class	classroom	teacher pre-makes holes with a sharp pencil onto a mat
structure photograph cards (roof truss, farm gate, pylon, bike frame, shelf bracket, climbing frame)	1	group	provided printable	IWB photos of the same six structures shown one at a time

**Safety watch-point**

Split pins are small and sharp when opened — count them into pots, supervise pinching, and collect every pin at pack-away so none go on the floor.

**Teaching moves**

- **Getting Started:** Hold up the ready-made loose square so all can see; do not push it yet. Take two or three hands-up guesses only — stay square or lean over — then move on. Keep strip sets on group tables for the build, not as a demo kit here.
- **What holds its shape?:** Project only the short board text. Teach rigid and brace; leave structure for the hunt. Model the method live — equal strips, pins kept wobbly, one gentle sideways push — and show how a brace pins corner to corner, but do not reveal what happens when you push.
- **Build and push the frames:** Groups build both frames first, then test flat on the desk. Circulate and loosen any pin that is too tight — a square that 'holds' is almost always a fair-test fail. Ask: what is the only difference between the shapes, and what job is the diagonal doing?
- **Record the results:** Check every group has tested square, triangle and braced square before writing. On the ExperimentRecord page keep language concrete: did it move, what the brace changed. Offer stems only if needed: The square... The triangle... When we added the brace...
- **Triangle hunt:** Introduce structure with the photo cards. Put the three short job labels on the board and have groups sort by the job the triangle does, not the material. Ask what would happen if that triangle were a loose square. Finish with a two-minute doorway or corridor spot of one real school triangle.

**What it should show**

The loose square leans into a parallelogram every time; the triangle holds its shape; one diagonal brace stops the square leaning. A square that will not lean almost always has a pin too tight — loosen joints and re-push from a still start. Two braces the other way feel no freer than one for most groups.

**Misconceptions & interventions**

- **The triangle holds because its strips are thicker or its pins are tighter — it's 'stronger' materials, not the shape.** — Point at the equal strips and deliberately wobbly pins on both frames. Re-voice: the only difference is the shape, so we say 'holds its shape' or 'rigid', not 'strong'.
- **Any extra strip counts as a brace, even if it runs along one side instead of corner to corner.** — Hold the square and pin the strip side-to-side, then corner-to-corner. Push both and ask which job actually stops the lean — the diagonal path is the brace.
- **Triangles in the photo cards are just decoration or a design pattern, not doing a job.** — Ask: what would happen to this gate, roof or bike if that triangle were a loose square? Sort again by the job — stopping lean, holding a roof, stiffening a frame.



Differentiation

Emerging	Developing	Proficient
• Adult pinches the first two corners of the square so the group can finish joining and still run the push test with loose pins. • Offer the sentence stems on the ExperimentRecord page: The square... The triangle... When we added the brace...	• After the braced square holds, ask why the brace works using the key question: what job is the diagonal strip doing?	• Try a second brace the other way and say whether two braces change anything they can feel compared with one. • On the triangle hunt, argue one card into a different job group and defend it with what would fail if the triangle were a loose square.

Cross-curricular hook

Link to Maths 2-D shape — name triangle and square, then spot the same rigid triangles in Irish farm gates, roof trusses and bike frames.