

An inquiry into ramps and rolling

Lesson at a glance

Open with a hands-up guess: steep hill, gentle hill, or big push — which makes a toy car roll further? Model force and compare with one car and books-as-ramp, then the class agrees one shared question (ramp height or push size). Practise a slope compare on the ramp-and-roll interactive, then groups run two real tries, measuring floor distance in cm. They tidy both numbers onto the Investigation Journal page, share distances on the board chart, and name the pattern.

Learning objectives

- Ask a simple question about how a force changes how far something rolls
- Predict, try two conditions, measure distance and say what they found

Before the bell – prep

Pre-stage one station per group: stiff folder or board, books to raise one end, one toy car, masking tape start mark, metre stick. Clear ~2 m smooth floor lanes. Investigation Journal pages (or scrap paper) already at stations so distances are jotted before tidy-up.

Materials

Item	Qty	Per	Source	Low-cost substitute
toy car	1	group	school kit	small wheeled toy or block with bottle-top wheels
board ramp (about 50–80 cm long)	1	group	classroom	a stiff cardboard folder or the hard cover of a large book
books to raise the ramp	4	group	classroom	small boxes or wooden blocks of similar height
masking tape	1	group	classroom	chalk marks on the floor or sticky notes as markers
metre stick or measuring tape	1	group	classroom	a 30 cm ruler used end to end, counting how many lengths
Investigation Journal page	1	pupil	classroom	plain A4 paper with the class question written at the top



Safety watch-point

Roll cars away from feet and faces; no running in the lane; crouch to pick up cars. Collect cars, tape and metre sticks; leave walkways clear.



Teaching moves

- **Forces on a ramp:** Point at the board picture of same car, same floor, only slope changed. Model one full cycle aloud with one car and books: wonder, predict, test (one book then three), observe the real distances you get, think. Say the five words as you go. Head off anyone who wants to change height and push together.
- **Our question and prediction:** Let the class vote one shared question — higher vs lower ramp, or bigger vs smaller push. Jot it in child-friendly words on the board. Whisper-pair predictions, take three or four aloud, and stress: change only that one thing; car, start mark and floor stay the same.
- **Practise a compare on the board:** Open the ramp-and-roll interactive in explore mode with tiles on, slope at 2. Frame it as practice only — real stations still follow the class question. Demand a loud prediction before every release; leave both stop markers visible; ask what the change did. Fold desk watchers in after each run.
- **Try it with real ramps:** Remind the shared rule: start mark on the floor at the bottom of the ramp; measure only along the floor to the stopped car. One go each way is enough. Circulate asking what is changing and what stays the same. Capture both cm values on the journal page at the station before anyone leaves the floor.
- **Record our results:** Five minutes of paper tidy only — copy the board question, finish a short prediction, check the two cm numbers already jotted. Offer the stem 'The ____ went further' or a circled higher/lower (or bigger/smaller) plus the two numbers if a full sentence is too much.
- **Share our distances:** Scribe two columns on the ordinary board — What we tried | Distance (cm). Take call-outs so every group hears at least one distance read back. Stop scribing with three minutes left for the closing talk; leave the finished list up.
- **What the numbers show:** Point at the bigger numbers on the board list and ask the class to say the pattern in one sentence linked to the class question. Revoice findings with force, further, compare. Ask why two tries beat one, and what they would keep the same next time.



What it should show

Most groups should find the higher/steeper ramp or the bigger push sends the car further along the floor. If both runs look the same, the ramp is too low or the floor too rough — add a book or clear a longer smooth lane. Oddly long carpet-side runs usually mean the car was pushed on a ramp trial; re-run from a still start.



Misconceptions & interventions

- ‘We’ll make the ramp higher and give it a bigger push so it really goes far.’ — Stop the build and revoice the class question: change only that one thing. Point at the car, start mark and floor and ask what must stay the same so we can say what made the difference.
- Pupils measure from the top of the ramp or include the slope length in the distance. — Walk them to the tape mark at the bottom end of the ramp and restate the rule: only floor travel after the car leaves the ramp, start mark to stop mark.

Differentiation

Emerging	Developing	Proficient
• Fix the start-mark tape for the group and help read the metre stick to the nearest centimetre at the station. • Accept one careful go each way and a circled higher/ lower (or bigger/smaller) plus the two numbers on the journal page.	• Prompt while circulating: What is the one thing you are changing? Which roll went further, and how do you know?	• If time allows, try a third height or check the same question on a slightly rougher floor strip. • Fast finishers sketch the ramp set-up on the journal page and label the one thing they changed.

Cross-curricular hook

Tie to Maths measures and data — read distances in centimetres and compare which number is biggest on the class board chart.