Investigating motion on a ramp

Teacher / technician

YEAR 10 / LESSON 2 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Record actual measurements separately from labelled practice examples.

Coverage and delivery

Shared Physics / Double Award: 1.3–1.5. Measuring speed and analysing changing motion.

Allow about 60 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, five groups of six

Item	Per pair / setup	Class total
Trolley, ramp, supports and end stop	1 set per group	5 sets
Photogates and compatible connection	2 gates per group	10 gates; 5 connections
Logger/device	1 per group	5
Metre rule and set square	1 of each per group	5 of each
Booklets and graph paper	1 of each per learner	30 of each

Immediate safety

Secure supports and gates; keep hands out of the trolley path. Use the padded stop so the trolley cannot fall from the bench. Keep feet and bags clear. Do not raise the track above the staff-approved height or 0.30 m, whichever is lower.

Preparation and delivery

Read alongside the student method

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1. Set up five groups of six; if fewer gate sets are available, rotate groups and label pooled records by group. Pilot five low heights and a reliable padded stop.

2. Configure the logger to time matching events at gates 0.80 m apart. Test a slow pass and confirm the displayed quantity and units before teaching.

3. Check the actual device/software pairing. For Go Direct, older LabQuest 2 units may need the appropriate Bluetooth adapter; compatible USB/computer arrangements may be used. Use the manufacturer's supported gate-link arrangement when timing between two gates.

4. The optional flag task requires single-beam timing and a measured flag, not the internal double-gate preset. No laser gate or dropped-ball extension is included.

Close of lesson

• Switch off and return sensors; remove trolley and supports before carrying the ramp.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

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- Ramp height; calculated mean speed between gates.
- They affect the distance or starting motion and must be controlled.
- 0.64 m s^{-1}.
- Not generally: the trolley accelerates.
- To assess variation and improve the estimate, while checking anomalies.
- It adds an uncontrolled initial speed.

References and provenance

Pearson Physics specification

Vernier Go Direct Photogate manual

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.