Work done against friction

Teacher / technician

YEAR 10 / LESSON 22 / 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: 4.11–4.13. Work, energy transfer and gravitational energy.

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

Requisition • class of 30, ten groups of three

Item	Per pair / setup	Class total
Block/meter/ruler set	1 per group	10 sets
Surface mats of two types	2 per group	20
Booklets	1 per learner	30

Immediate safety

Keep blocks away from bench edges. Secure mats, pull slowly within the meter range and do not release stretched equipment. Avoid rough or splintered blocks and sharp abrasive-sheet edges.

Preparation and delivery

Read alongside the student method

YEAR 10 / LESSON 22 / PHYSICS + SCIENCE (DOUBLE AWARD)

1. Use ten groups of three. Pilot the pull and choose a suitable meter range. Fix a 0.30 m lane and both mats so they cannot slip.

2. Keep block mass and the pull direction fixed. If force varies substantially, record the range and describe Fd as an estimate.

Close of lesson

• Ease off the pull, disconnect meters and collect mats and blocks.

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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- 0.60 J.
- It is not representative of the full sliding distance.
- Mainly into thermal stores of the contacting surfaces.
- 0.98 J using g = 9.8 N kg^{-1}.
- No; displacement in the force direction is required.
- The relevant component is along motion; lifting also changes the contact force.

References and provenance

Pearson Physics specification

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.