Spring extension: loading and unloading

Teacher / technician

YEAR 10 / LESSON 7 / 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: 1.22–1.24. Force–extension measurements and elastic behaviour.

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
Clamped stand, ruler, pointer and tray	1 set per group	10 sets
Springs of two types	2 per group	20
Light hanger and small mass set	1 per group	10 sets
Eye protection	1 per learner	30
Booklet and graph paper	1 of each per learner	30 of each

Immediate safety

Wear eye protection and closed footwear. Clamp stands to benches and place padded trays under loads. Keep faces out of the spring line, add and remove masses gently, and use only the approved loads. Never pull a loaded spring sideways or deliberately stretch it to failure.

Preparation and delivery

Read alongside the student method

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1. Use ten groups of three. Pilot each spring type with small steps and mark its allowed maximum; do not use a generic 1 kg limit. Select five loads within the reversible range.

2. Check stand clamps, spring attachments, blunt pointers and trays. Supply only the approved mass set for each spring, including the hanger.

3. Prepare a separate table for each spring. Check that pupils convert grams to kilograms and millimetres to metres.

Close of lesson

• Support the hanger while unloading; remove all masses before dismantling and report distorted springs.

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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- The measured quantity is extension, not total length.
- Its weight also stretches the spring.
- 0.98 N.
- Force is proportional to extension over that range.
- The one with the larger force/extension gradient.
- It does not recover its unloaded length after removal of the force.

References and provenance

Pearson Physics specification

IOP: stretching and force

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.