Total internal reflection and optical fibres

Teacher / technician

YEAR 10 / LESSON 61 / 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: 3.20–3.22. Critical angle, optical fibres and prisms.

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 and LED ray box with low-voltage source	1 set per group	10 sets
Ruler, protractor, calculator and paper	1 set per group	10 sets
Booklets	1 per learner	30

Immediate safety

Use intact smooth acrylic and a low-voltage LED ray box. Keep beams on the bench and out of eyes. Do not look into fibre ends or use laser sources. Switch off before repositioning; keep leads clear.

Preparation and delivery

Read alongside the student method

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1. Pilot radial entry and a clear internal reflection at the flat surface. Distinguish a weak transmitted beam from light scattered by scratches.

2. Prepare original fibre and prism diagrams. This lesson uses diagrams rather than a live fibre transmitter.

Close of lesson

- Switch off and store blocks without scratching; retain angle brackets and diagrams.

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 higher-index medium.
- Higher-to-lower index travel and incidence greater than c.
- 90° to the normal.
- About 41.8°.
- No.
- It permits total internal reflection at suitable core–cladding incidence angles.

References and provenance

Pearson Physics specification

IOP: total internal reflection

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.