# Mains safety: matching protections to faults

Teacher / technician

YEAR 10 / LESSON 49 / 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: 2.2. Insulation, earthing and protective devices.

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

## Requisition • class of 30, working in 15 pairs

| Item | Per pair / setup | Class total |
|---|---|---|
| Booklets | 1 per learner | 30 |
| Diagram and fault-card sets | 1 per pair | 15 sets |

## Immediate safety

Paper activity only. Do not open plugs or appliances, connect to mains, burn wire wool, melt fuse wire or deliberately create electrical faults. Report damaged classroom equipment to staff.

# Preparation and delivery

Read alongside the student method

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**1.** Provide 15 original fault-card sets and a clear double-insulation symbol diagram. Use the EMSD reference for local safety context.

**2.** Distinguish a fuse or overcurrent breaker from an RCD; avoid implying identical operation or complete protection against every shock.

## Close of lesson

• Return cards and retain corrected fault explanations.

## 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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- It separates live conductive parts from accessible parts.
- It provides a protective fault-current path so the appropriate protection can disconnect.
- Sufficient overcurrent heats and melts its element.
- No; a dangerous body current may be below the fuse rating.
- An imbalance between currents in the monitored live conductors, commonly live and neutral.
- Stop using it and report it; do not attempt repair.

## References and provenance

Pearson Physics specification

EMSD: electrical product safety guidance

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.