Charge and current: measuring a steady flow

Teacher / technician

YEAR 10 / LESSON 39 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Calculated charge is an estimate if current changes during the interval. Do not label the practice value as a measured result.

Coverage and delivery

Shared Physics / Double Award: 2.12, 2.14–2.16. Current, charge and Q = It.

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
Battery, lamp, switch and ammeter	1 of each per group	10 of each
Insulated leads	5 per group	50
Timers	1 per group	10
LED with rated series resistor and source	Staff demonstration	1 checked set
Booklets	1 per learner	30

Immediate safety

Use only the staff-matched low-voltage battery circuit. Never connect an ammeter directly across the battery. Disconnect before moving leads; prevent short circuits and stop if components warm. No mains or high-voltage generator is used.

Preparation and delivery

Read alongside the student method

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1. Prepare ten groups of three. Match lamp voltage to the battery, inspect leads and select a suitable fused ammeter range. Demonstrate series connection before pupils start.

2. Pilot the LED circuit using its datasheet current and voltage ratings to choose a series resistor and adequate power rating. Do not connect a bare LED directly to the source.

Close of lesson

- Open switches, disconnect batteries and return meters and lamps after cooling.

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 rate of charge flow.
- 6.0 C.
- It doubles.
- In series with the branch being measured.
- They are opposite in metal wires.
- To limit current and prevent damage; use the staff-selected value.

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.