Current–voltage graphs: cool wire and fixed resistor

Teacher / technician

YEAR 10 / LESSON 45 / PHYSICS + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. An approximately linear graph supports ohmic behaviour only over the tested conditions; heating can change resistance.

Coverage and delivery

Shared Physics / Double Award: 2.9, 2.13. Ohmic current–voltage characteristics.

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
Source, switch, ammeter and voltmeter	1 set per group	10 sets
100 Ω resistor and mounted wire board	1 each per group	10 of each
Insulated leads	7 per group	70
Booklets and graph paper	1 each per learner	30 of each

Immediate safety

Staff prepare and secure the wire; pupils do not cut it. Limit current to 0.05 A, resistor voltage to 3.0 V and wire voltage to 1.0 V. Disconnect before reversing polarity. Do not touch the wire during a run; stop if it heats noticeably.

Preparation and delivery

Read alongside the student method

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1. Pilot a mounted wire of measured resistance 10–20 Ω and suitable meter resolution. At the stated current limit its power is at most 0.05 W for 20 Ω, but verify the actual setup and cooling.

2. Provide ten groups of three. Use meters that display signed DC readings, and demonstrate safe polarity reversal only with the source disconnected.

Close of lesson

• Switch off and disconnect sources; allow wire boards to cool before collection.

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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- Current in amperes.
- An approximately straight line through the origin.
- No; its inverse is resistance for the stated axes.
- Reversing polarity reverses voltage and conventional current.
- To limit heating and help keep resistance constant.
- No; use a nonzero point or the fitted gradient.

References and provenance

Pearson Physics specification

IOP: component characteristics

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.