Electricity review: circuits and explanations

Student activity • observation and reasoning

YEAR 10 / LESSON 37 / PHYSICS + SCIENCE (DOUBLE AWARD)

The question

Can you explain a circuit without saying that current is used up?

Use original circuit diagrams to diagnose misconceptions. The separate electrostatics extension is for Physics-only learners.

Equipment

• Booklet, pencil, ruler and original circuit diagrams

Desk-based review. Do not build the deliberately faulty or short-circuit diagrams. No power supplies or static generators are used.

Course coverage: Shared Physics / Double Award: Review of circuit concepts; electrostatic extension is Physics only.

Plan, model or apparatus sketch

Draw a labelled setup or force diagram; include the measured quantities.

Method and reasoning

Read the whole sequence before starting

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1. Draw a cell, switch and lamp in one complete loop using standard symbols. Compare it with the same circuit with an open switch.

2. Explain the role of the conducting path and cell. Distinguish energy transferred in a lamp from charge disappearing there.

3. Mark two positions in the same series loop and predict how their steady currents compare. Give a reason based on charge conservation.

4. Identify the fault in a diagram where a wire bypasses the lamp and directly connects the cell terminals. Explain why the short circuit must not be built.

5. Physics-only extension: use the stated model of a plastic rod gaining electrons to explain its charge and its attraction to neutral paper. Double Award learners instead improve the open-circuit explanation.

6. Check each explanation against the answer guidance after attempting it. Rewrite one incorrect statement and create a new example that tests the same idea.

Cleanup

- Return diagram sets and retain corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

All tasks are original practice prompts. A steady series current is the same around an unbranched loop; energy can transfer to the lamp while charge is conserved. Electrostatic charging content is marked as a Physics-only extension.

Diagram / claim	Initial explanation	Correction and reason
Closed loop		
Open switch		
Current at two points		
Faulty bypass		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. What is required for a steady current through the lamp?

2. Is charge used up in the lamp?

3. Compare currents before and after the lamp.

4. Why is a direct wire across the cell hazardous?

5. What does opening the switch do?

6. Physics-only extension: what sign follows gaining electrons?