Charge and circuits: units and diagnosis

Student activity • observation and reasoning

YEAR 10 / LESSON 40 / PHYSICS + SCIENCE (DOUBLE AWARD)

The question

Can you connect a correct circuit explanation to a calculation with units?

Use the previous lesson's evidence and original numerical prompts to diagnose errors in charge calculations and circuit diagrams.

Equipment

- Previous circuit records, booklet, calculator and ruler

Desk-based review only. Do not build faulty circuit diagrams or reconnect practical equipment during this activity.

Course coverage: Shared Physics / Double Award: Review of 2.12, 2.14–2.16. Charge and current.

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. Retrieve your Lesson 39 measurements. Label current in amperes, time in seconds and calculated charge in coulombs.

2. Calculate charge for an invented 0.15 A current lasting 40 s. Rearrange Q = It to find current when 12 C passes in 30 s.

3. Convert 250 mA to amperes before finding charge in two minutes. Show both conversions explicitly.

4. Draw a correct series ammeter circuit and identify an unsafe parallel-ammeter diagram without building it.

5. Explain why a lower current after a lamp would imply charge accumulating in steady operation, contradicting the simple steady-circuit model.

6. Review how changing current affects a Q = It estimate. Correct one previous response and state a specific next revision target.

Cleanup

- Retain corrected calculations and return calculators.

Record your evidence

Blank spaces are for your own work

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Reference and task data

Invented practice cases: 0.15 A for 40 s; 12 C in 30 s; 250 mA for two minutes. Keep these separate from actual Lesson 39 readings. The equation needs seconds and amperes when charge is required in coulombs.

Case	Conversion / equation	Answer with unit
0.15 A; 40 s		
12 C; 30 s		
250 mA; 2 min		
Own measured example		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Find Q for 0.15 A and 40 s.

2. Find I for 12 C in 30 s.

3. Convert 250 mA to A.

4. Find charge for 250 mA over two minutes.

5. Is current used up in a series lamp?

6. What if current changes during the interval?