Electricity teacher pack

Distinguish voltage, current, resistance, power and energy in a complete circuit.

For learners around age 14 and curious adults. Three 40-minute sessions. Use with the current AHA Electricity manuscript. References use chapter titles so they work in both print and ebook.

Learning goals

Distinguish voltage, current, resistance, power and energy in a complete circuit.

Use the terms volt; ampere; ohm; watt; watt-hour. Show the reasoning behind an answer and identify where the example stops applying.

Reading route

1. Current is a counting rate

2. Voltage is a difference between two points

3. Watts tell you how quickly

Teaching plan

Session 1: Ask the opening question before reading (5 minutes). Read the first selected chapter together (15). Draw the mechanism or compare two possible explanations (15). End with a one-sentence explanation (5).

Session 2: Read the remaining selected material (10 minutes). Complete the worksheet individually, then compare reasoning in pairs (20). Discuss the common wrong turn (10).

Session 3: Revisit one uncertain answer (10 minutes). Try the extension (15). Give a two-minute explanation without the book (10). Use the exit question (5).

Materials and access

Paper, pencil, the book and an optional calculator. Read diagrams aloud, allow spoken or drawn responses, and give extra time for vocabulary. No real accounts or specialist equipment are needed.

Electricity learner worksheet

Opening question

Does a lamp use up the current that passes through it?

Investigation

On paper, connect an ideal 6 V source to a 3 ohm resistor. Assume a steady DC circuit and a resistor for which Ohm's law applies. Draw the complete loop and label the voltage across the resistor.

1. What current flows?

Show your reasoning, label units or evidence, and state any assumptions.

2. How quickly does the resistor receive electrical energy?

Show your reasoning, label units or evidence, and state any assumptions.

3. How much energy is transferred in 30 minutes?

Show your reasoning, label units or evidence, and state any assumptions.

Transfer question

Replace the resistor with two 3 ohm resistors in series. Total resistance is 6 ohms, current 1 A, and total power 6 W.

Exit question

What would you now check before accepting a claim about this topic? Name one specific check and explain why.

Electricity answers and teaching notes

Answer 1

I = V/R = 6/3 = 2 A.

Answer 2

P = VI = 6 × 2 = 12 W.

Answer 3

12 W × 0.5 h = 6 Wh, or 21,600 J.

Common wrong turn

Charge circulates; energy is transferred. A watt is a rate, not an amount of energy.

Extension discussion

Replace the resistor with two 3 ohm resistors in series. Total resistance is 6 ohms, current 1 A, and total power 6 W.

Assess the explanation

Give one point each for a correct conclusion, visible reasoning, correct units or evidence, and a relevant limitation. A correct number with no explanation is not a complete answer. Accept equivalent wording and well-supported alternative interpretations where the question allows them.

If the learner gets stuck

Return to the diagram or the smallest example. Ask what is being counted, compared or transferred. Let the learner revise the answer after explaining the mistake; do not reward speed over understanding.

Family connection

Read a photograph of an appliance label and identify units. Do not open equipment, connect circuits to outlets, or treat this lesson as electrical-work training.