

Lesson 1 Ohm's Law Homework Solutions

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Lesson 1 Homework

1. If 2.0 A of current flow through a lightbulb for 20. minutes.

a) how many coulombs of charge (Q) have flowed thru the bulb?

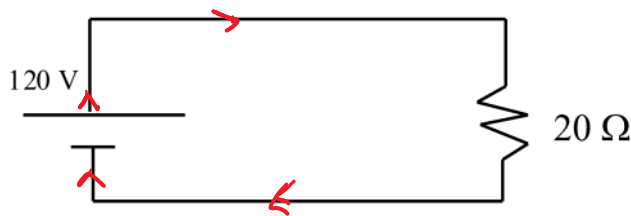
(2400 C)

$$I = \frac{Q}{t} \rightarrow Q = It = 2(20 \times 60) = 2400 \text{ C}$$

2. Find the current and direction

$$V = 120$$

$$R = 20$$



$$V = IR \quad I = \frac{V}{R} = \frac{120}{20} = 6.0 \text{ A} \quad \text{clockwise CW}$$

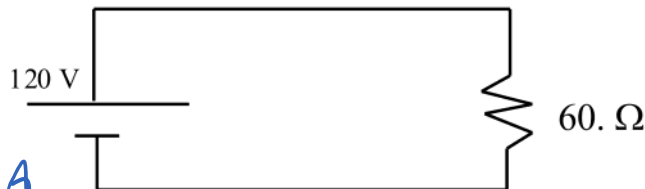
3. If this circuit is connected for 60. minutes, find

a) the current (I)

b) the total charge flow through the circuit (Q)

$$a) \quad I = \frac{V}{R}$$

$$I = \frac{120}{60} = 2.0 \text{ A}$$



$$b) \quad I = \frac{Q}{t}$$

$$Q = It = 2(60 \times 60)$$

$$Q = 7200 \text{ C}$$

5. In a house circuit, take the voltage to be 120 volts. Find the current if we plug in

a) a 240 ohm light bulb

b) a 12 ohm hair dryer

c) a 20. ohm microwave

d) a 0.10 ohm wet finger (0.50 A; 10. A; 6.0 A; 1200 A)

$$I = \frac{V}{R}$$

$$a) \quad \frac{120}{240} = 0.50 \text{ A}$$

$$b) \quad \frac{120}{12} = 10 \text{ A}$$

$$c) \quad \frac{120}{20} = 6.0 \text{ A}$$

$$d) \frac{120}{.1} = 1200 \text{ A}$$

6. The circuit breakers in your house are designed to 'break' the circuit if the current gets too large. Most circuit breakers are set to 'break' or 'trip' at 15 A. If the house voltage is 120 volts, what is the minimum resistance of an appliance? (8.0 Ω)

$$V = IR \rightarrow R = \frac{V}{I} = \frac{120}{15} = 8.0 \Omega$$

7. Why is it important to have circuit breakers (or fuses) for the circuits in our house? Explain using relevant principles of physics.

Large current = large number of coulombs/second = lots of heat generated inside the wire

Fire = bad

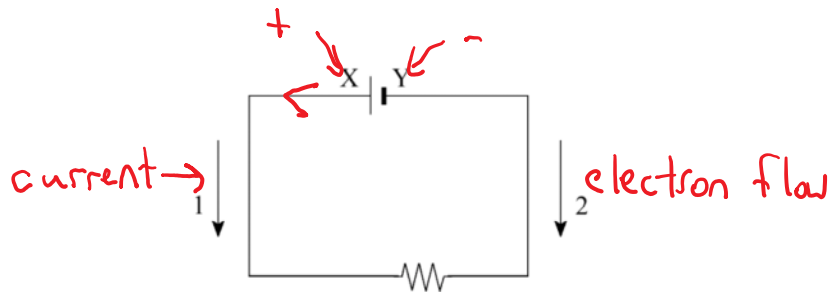
8. How is electron flow different from conventional current?

Electron flow = from negative to positive

Conventional current = from positive to negative

9.

Which of the following correctly labels arrows 1 and 2 and polarities X and Y in the circuit below?



	ARROW 1	ARROW 2	POLARITY X	POLARITY Y
A.	Electron Flow X	Conventional Current	Positive ✓	Negative
B.	Electron Flow X	Conventional Current	Negative X	Positive
C.	Conventional Current ✓	Electron Flow	Positive ✓	Negative
D.	Conventional X	Electron Flow	Negative X	Positive

	Conventional Current ✓	Electron Flow	Positive ✓	negative
D.	Conventional Current ✓	Electron Flow	Negative ✗	Positive