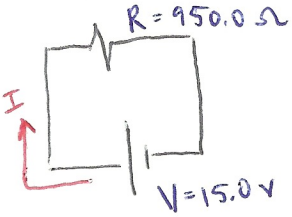
Ohm's Law:

Example 3

A. A circuit with a 950.0 Ω resistor is connected to a battery with a potential difference of 15.0 v. What is the current through the resistor?
B. How much charge will flow through this circuit in 1.50 minutes?



A.) $V = I \cdot R$

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

$I = \frac{15.0}{950}$

$I = 0.0158\ A$

B.) $\Delta q = ?$

$\Delta t = 1.50$ minutes

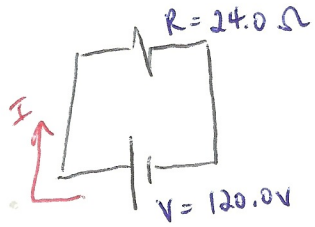
$\frac{1.50\ \text{minutes}}{} \left| \frac{60\ s}{1\ \text{minute}} \right. = 90\ s.$

$I = \frac{|\Delta q|}{\Delta t}$

$|\Delta q| = I \cdot \Delta t = (0.0158)(90) = 1.42$ (

Example 4:

The heating element in a hair straightener has a resistance of 24.0 Ω and plugged into a 120.0 v outlet. What is the power used?



$P = I \cdot V$

* there are a number of ways to solve this pro

$V = I R$

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

$I = \frac{120}{24}$

$I = 5.00\ A$

OR

$P = I \cdot V$ $\quad V = I \cdot R$

$P = \left(\frac{V}{R}\right) \cdot V$ $\quad \frac{V}{R} = I$

$P = \frac{V^2}{R}$

$P = \frac{(120)^2}{24}$

$P = 600\ W$

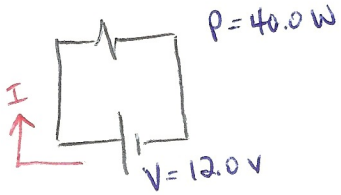
$P = I \cdot V$

$P = (5.00)(120) = 600\ W$

Example 5:

A 40.0 W light bulb is connected to a 12.0 v battery.

A. What is the resistance of the bulb?
B. What is the current flowing through the bulb?
C. How long will it take this current to push 6.00×10^{-4} C of charge through?



A.) $P = IV$ $\quad V = IR$

B.) $\frac{P}{V} = I$ $\quad V = I \cdot R$

$\frac{40.0}{12.0} = I$ $\quad \frac{V}{I} = R$

$I = 3.33\ A$ $\quad \frac{12.0}{3.33} = R$

$R = 3.60\ \Omega$

C.) $I = 3.33\ A$ $\quad \Delta q = 6.00 \times 10^{-4} C$

$I = \frac{|\Delta q|}{\Delta t}$

$|\Delta q| = I \cdot \Delta t$

$\Delta t = \frac{|\Delta q|}{I} = \frac{6.00 \times 10^{-4}}{3.33}$

$\Delta t = 1.8 \times 10^{-4}\ s$