

## Ohm's Law Problems

1. Find the missing quantities in each of the following:

a) Potential difference is 120 V and the current is 30 A, what is the resistance?

$$V = IR \quad 120 = 30 R \quad R = 4 \Omega$$

b)  $R = 30 \Omega$  and the battery supplies 5.0 V, What is the current?

$$I = \frac{V}{R} = \frac{5}{30} = 0.167 \text{ Amps}$$

c) If a 6 A current flows through a circuit with  $200 \Omega$  of resistance, what is the potential difference across the circuit?

$$V = IR = 6(200) = 1200 \text{ Volts}$$

2. An electric heater produces heat by applying a potential difference of 50 V across a nichrome wire with a total resistance of  $8.0 \Omega$ .

a) find the current in the wire (6.25 A)

$$I = \frac{V}{R} = \frac{50}{8} = 6.25 \text{ Amps}$$

b) Determine the power rating of the heater. (313 W)

$$P = IV = 6.25(50) = 313 \text{ W}$$

3. A potential difference of 120 V is applied across a 75 W light bulb.

a) Find the current flowing through the bulb (0.63 A)

$$P = IV$$

$$I = P/V = \frac{75}{120} = 0.63 \text{ Amps}$$

b) Determine the resistance of the bulb. ( $190 \Omega$ )

$$V = IR$$

$$R = V/I = 120/0.63 = 190 \Omega$$

4. How much does it cost to burn a 100 W bulb for 24 hours if electricity cost \$0.08 per kilowatt-hour? (Remember that a kilowatt-hour is a unit of energy) - USE THE FACTOR LABEL METHOD, KEEP TRACK OF UNITS (\$0.19)

$$E = P \times \text{time}$$

$$E = (0.100 \text{ kW})(24 \text{ hrs}) = 2.4 \text{ Kw} \cdot \text{hrs}$$

$$\text{cost} = 0.08(2.4) = \$0.19$$