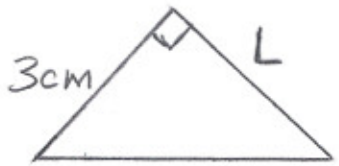
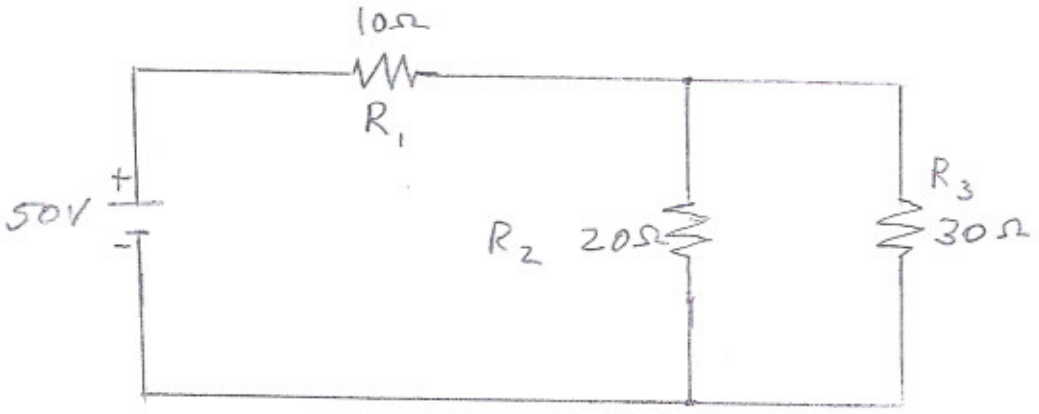
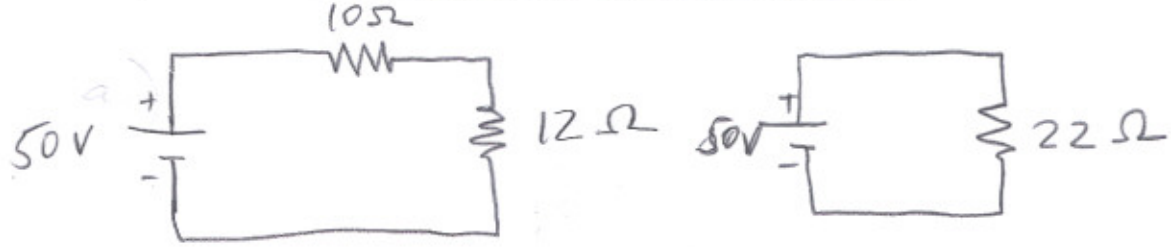
2.)



A solid copper bar 2.5 m in length has a cross-section as shown above. The bar is used as a grounding conductor designed to carry 100 A of current with a power consumption of 0.5 W. What is the length of side L of its cross-section in centimeters?

5. For the circuit shown below,
   (a) how much current flows through each resistor?
   (b) how much voltage is across each resistor?
   (c) what is the equivalent resistance?
   (d) how much power does the battery supply to the circuit?





a) $R_1 \rightarrow 2.27A$ $R_2 \rightarrow 1.36A$ $R_3 \rightarrow 0.91A$

b.) $R_1 \rightarrow 22.7V$ $R_2 \rightarrow 27.3V$ $R_3 \rightarrow 27.3V$

c.) $R_{eq} = 22\Omega$

d.) $\frac{(50V)^2}{22\Omega} = 114W$

2. The power to your home is suddenly disconnected. You talk a neighbor into allowing you to plug an extension cord into their house. You power a 100 W at 120 V lightbulb so that you can see to complete your physics homework. The extension cord is 25 m long and has a pair of 16 ga (0.00129032 m diameter) copper wires.

   (a) What is the resistance of the bulb at 120 V?

   (b) How much energy does the bulb use in 1 hour of time?

   (c) How much power is dissipated through the extension cord? (Assume that the potential difference across the bulb is 120 V.)

a.) $P = \frac{V^2}{R}$ $\quad R = \frac{V^2}{P}$

$$R = \frac{(120V)^2}{(100\,\omega)} = \boxed{144\,\Omega}$$

b.) $100\,\omega = 100\,\frac{J}{s}$

$$\frac{100\,J}{s} \times 3600\,s = \boxed{3.6 \times 10^5\,J}$$

c.) $R = \rho\frac{l}{A}$ $\quad \frac{(1.7\times10^{-8}\,\Omega\cdot m)(25\,m)}{\left(\frac{\pi\,(0.00129032\,m)^2}{4}\right)} =$

$R = 3.25 \times 10^{-1}\,\Omega$

$I = 8.33 \times 10^{-1}\,A$ $\quad P_{cord} = 2(I^2R)$

$$= \boxed{0.45\,\omega}$$