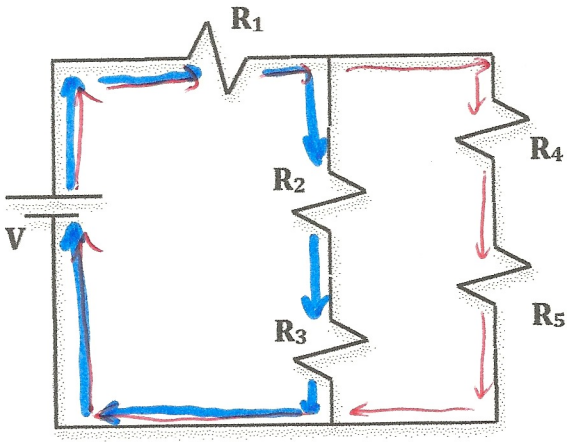
Example 13:
Five resistors are connected to an 18.0 v battery. The resistors have values as follows:

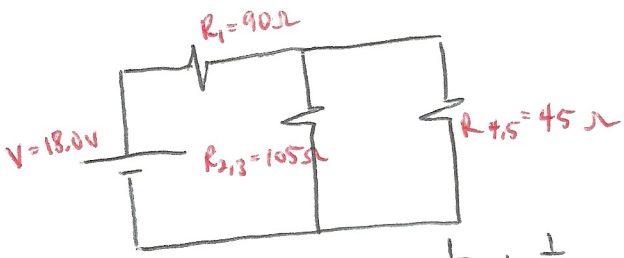
$R_1 = 90.0\ \Omega$ $R_4 = 10.0\ \Omega$
$R_2 = 60.0\ \Omega$ $R_5 = 35.0\ \Omega$
$R_3 = 45.0\ \Omega$

A. What is the equivalent resistance?
B. What is the current at the battery?
C. What is the current and voltage drop though each resistor?



$R_{2,3} = R_2 + R_3 = 60 + 45 = 105\ \Omega$

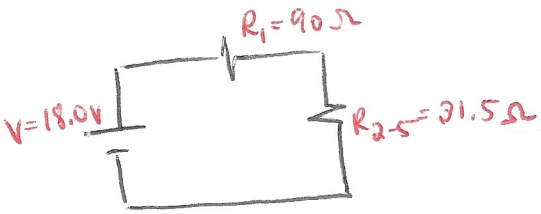
$R_{4,5} = R_4 + R_5 = 10 + 35 = 45\ \Omega$



$$\frac{1}{R_{2\text{-}5}} = \frac{1}{R_{2,3}} + \frac{1}{R_{4,5}} = \frac{1}{105} + \frac{1}{45}$$

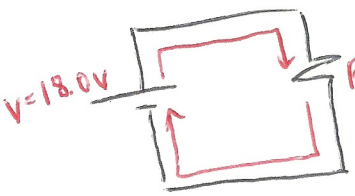
$$\frac{1}{R_{2\text{-}5}} = 0.0317$$

$$R_{2\text{-}5} = 31.5\ \Omega$$



$$R_{eq} = R_1 + R_{2\text{-}5} = 90 + 31.5$$

$$R_{eq} = 121.5\ \Omega \approx 122\ \Omega$$



$V = I \cdot R$

$$I = \frac{V}{R} = \frac{18.0}{122}$$

$$\boxed{I = 0.148\ A}$$