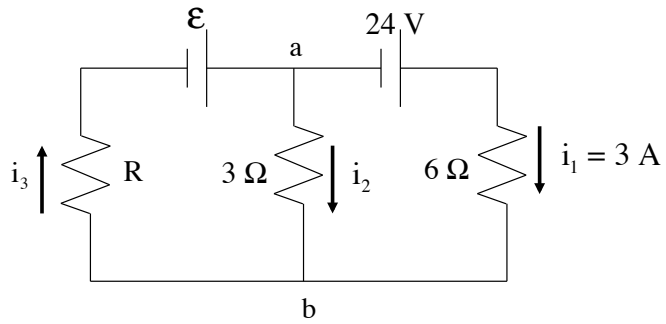


Problem 18.20

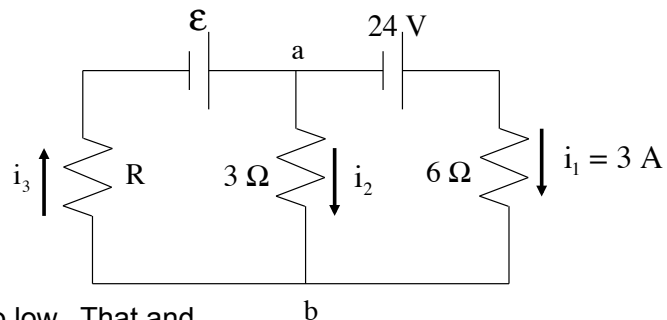
Determine the remaining currents.



1.)

Assuming the 24 volt battery's ground is zero, the voltage at "b" is:

$$\begin{aligned}V_b &= 24 - (6 \Omega)(3 \text{ A}) \\ &= 6 \text{ V}\end{aligned}$$



Current goes from high voltage to low. That and Ohm's Law yields across the 3 ohm resistor yields:

$$\begin{aligned}V_b - V_a &= (6 \text{ V}) - 0 \\ &= -(3 \Omega)i_2 \\ \Rightarrow i_2 &= -2 \text{ A}\end{aligned}$$

(The negative sign in front of the "i_r" quantity is due to the fact that current flows with voltage DROPS across resistors, and the negative current means the current was defined in the wrong direction in the first place.)

The sum of the currents into *node b* must equal the sum of the currents out of *node b*, or:

$$\begin{aligned}i_3 &= i_2 + i_1 \\ &= (-2 \text{ A}) + (3 \text{ A}) \\ &= 1 \text{ A}\end{aligned}$$

2.)