Electromotive Force

(emf)

- The ElectroMotive Force (emf) is the difference in potential between the terminals of a battery when it is not connected to a circuit.

- As soon as a battery is connected to a circuit and current flows through it, there is energy lost inside the battery due to its internal resistance.
- The causes the battery to deliver less energy to the circuit
- The voltage available to the circuit is called the terminal voltage and is always less than the emf of the battery.

$$V_{term} = \mathcal{E} - IR$$

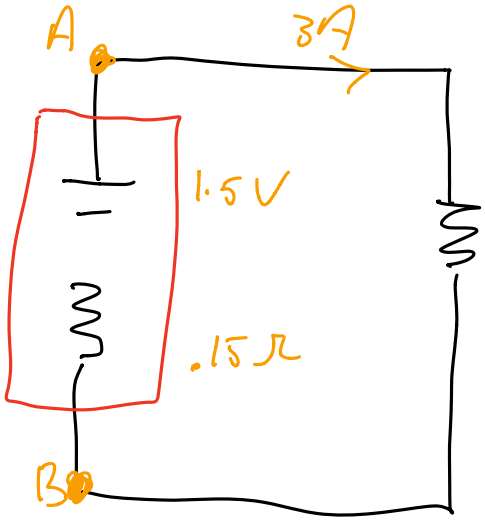
V_{term} is voltage (in V)

$\mathcal{E}$ is emf (in V)

I is current (in A)

R is resistance (in Ω)

If a 1.5 V battery has an internal resistance of 0.15 Ω, what is the terminal voltage of the battery as 3 A flows through it?

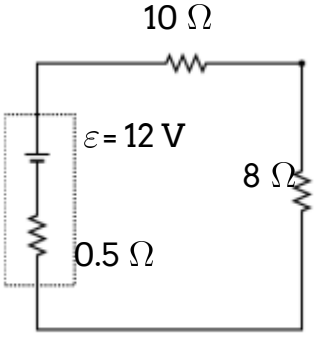


$V_{Term} = V_{ab} = \mathcal{E} - IR$

$= 1.5 - 3(0.15)$

$= 1.05V$

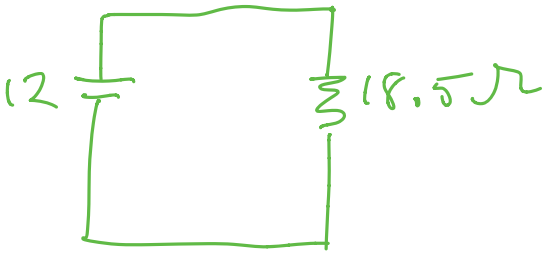
Determine $V_{Terminal}$.



$V_{Term} = \mathcal{E} - IR$

$= 12 - (.649)(.5)$

$= 11.68\,V$



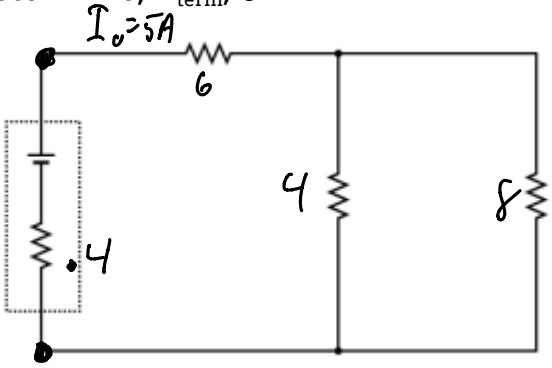
$V = IR$

$12 = I\,18.5$

$\frac{12}{18.5} = I$

$0.649A = I$

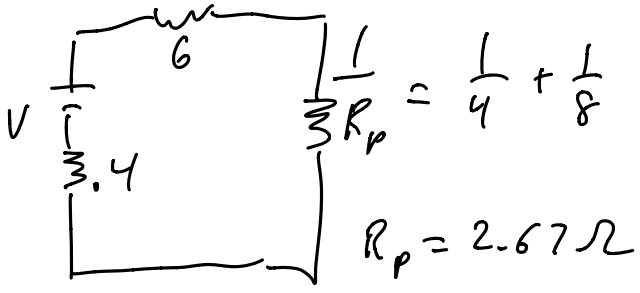
Determine, V_{term}, ε.

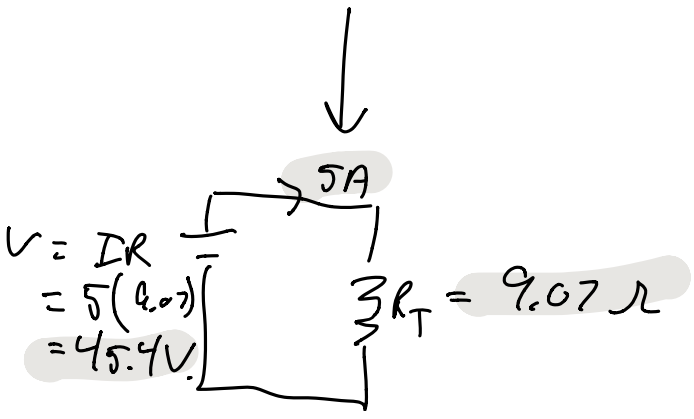


$V_{Term} = \mathcal{E} - IR$

$= 45.4 - 5(.4)$

$= 43.4\,V$





Determine, V_{Term}, ε.