

Guidelines for Labeling Element Variables

Some element voltages and currents will be labeled as part of the problem statement. For example, an input variable and an output variable will probably be labeled.

Meters:

Replace each (ideal) ammeter by a short circuit. Label the current in the short circuit to be equal to the ammeter current.

Replace each (ideal) voltmeter by an open circuit. Label the voltage across the open circuit to be equal to the voltmeter voltage.

Resistors:

Label the voltage and current of each resistor to adhere to the passive convention.

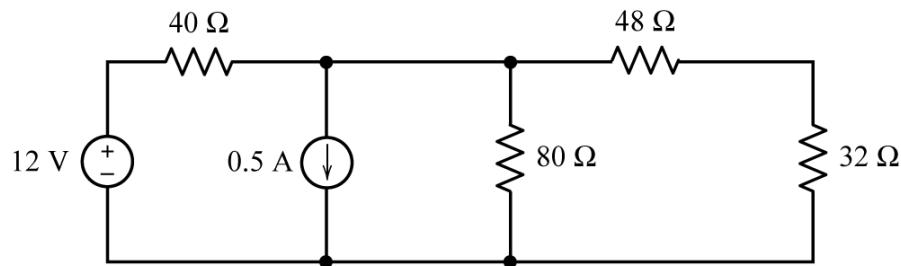
Series and Parallel Elements:

Label series elements so that their currents are equal. Label parallel elements so that their voltages are equal.

The rest:

Label the remaining currents and voltage as convenient. Reference directions will be arbitrary.

Problem: Determine the values of the resistor voltages and currents in this circuit.



Label the resistor voltages and currents. In anticipation of using Ohm's law, label the voltage and current of each resistor to adhere to the passive convention.

Apply KCL to the node at which the current source and the 40 Ω, 48 Ω and 80 Ω resistors are connected together.

EQN 1: _____

Apply KCL to the node at which the 48 Ω and 32 Ω resistors are connected together.

EQN 2: _____

Apply KVL to the loop consisting of the voltage source and the $40\ \Omega$ and $80\ \Omega$ resistors.

EQN 3: _____

Apply KVL to the loop consisting of the $48\ \Omega$, $32\ \Omega$ and $80\ \Omega$ resistors.

EQN 4: _____

Apply Ohm's law to the resistors.

Ohm's law: _____

Use the Ohm's law equations to eliminate the variables representing resistor voltages from the KVL equations.

EQN 5 (from EQN 3): _____

EQN 6 (from EQN 4): _____

Use EQN 2 to eliminate the current of the $32\ \Omega$ resistor from EQN 6.

EQN 7: _____

Use EQN 7 to eliminate the current of the $48\ \Omega$ resistor from EQN 1.

EQN 8: _____

Use EQN 8 to eliminate the current of the $80\ \Omega$ resistor from EQN 5. Solve the resulting equation to determine the value of the current of the $40\ \Omega$ resistor

EQN 9: _____

Determine the values of the rest of the resistor voltages and currents.

How much power is supplied by each source?

How much power is dissipated by each resistor?