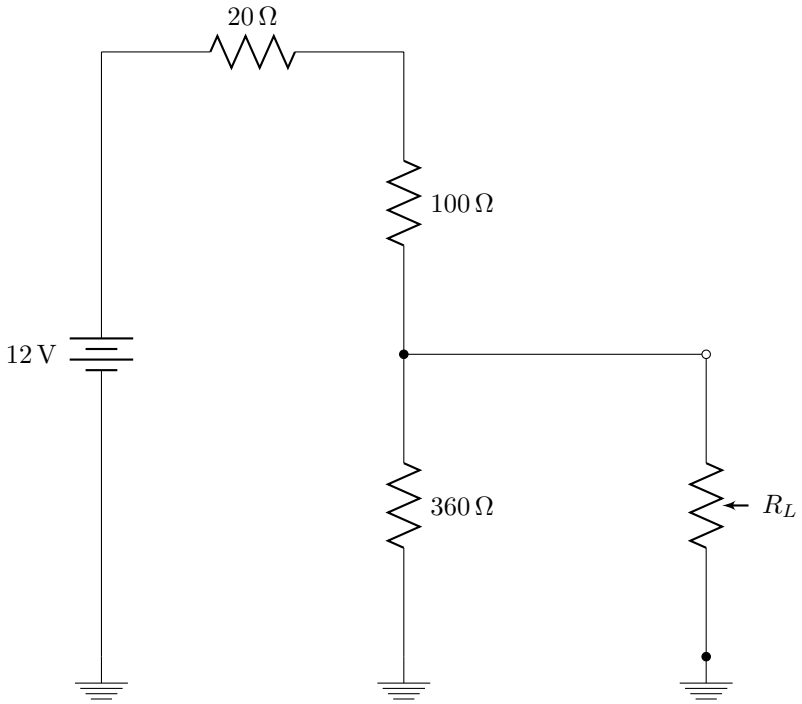
1 Thevenin's Theorem

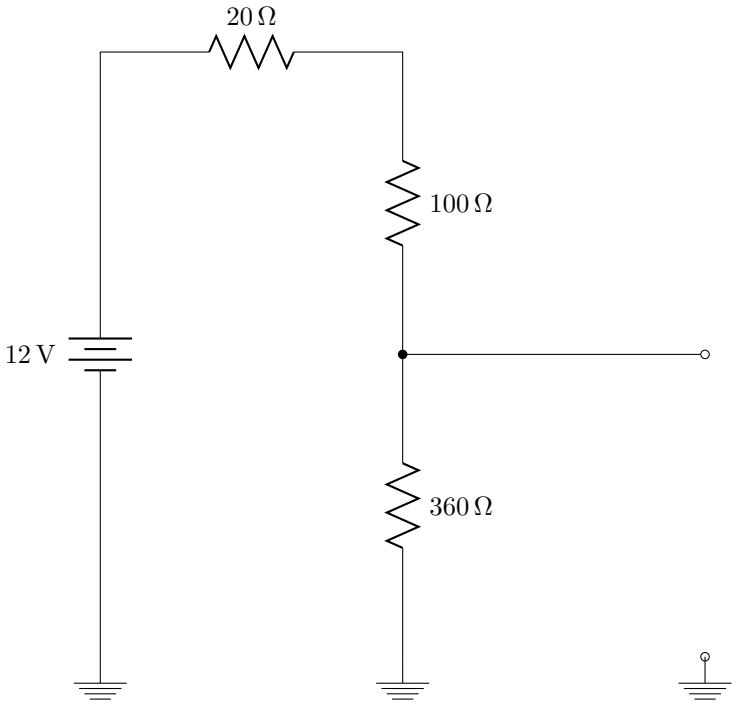
Thevenin's Theorem: Any resistive network or circuit can be represented as a voltage source in series with a source resistance. This helps predict how the circuit will respond to a change in load.

1.1 Thevenin Voltage

The Thevenin Voltage (V_{TH}) of a circuit is the voltage present at the output terminal when the load is removed.

1.1.1 Example

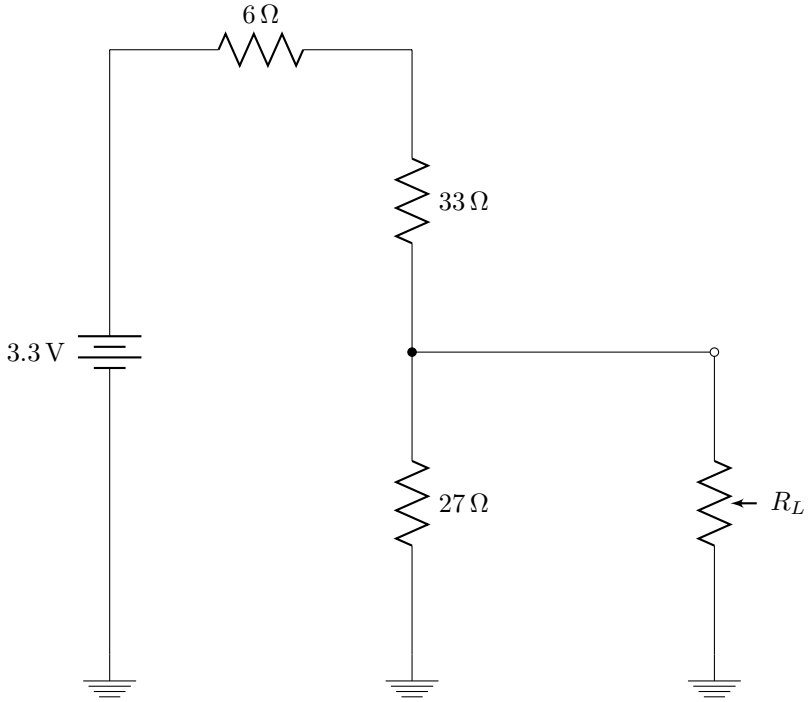




$$V_{TH} = V_S \frac{R_3}{R_T} = (12V)\frac{360\Omega}{480\Omega} = 9V$$

1.1.2 Problem

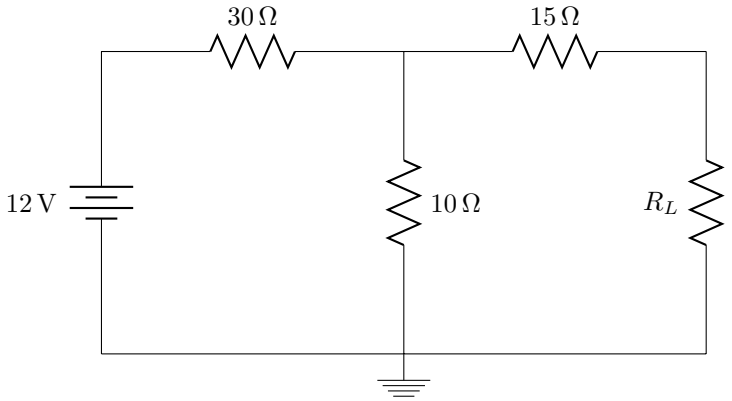
Find the Thevenin Voltage (V_{TH}) of the circuit below:



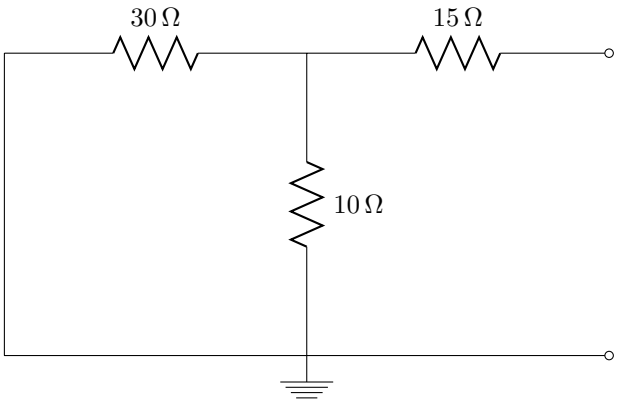
1.2 Thevenin Resistance

The Thevenin Resistance (R_{TH}) is the resistance measured across the output terminals when the load is removed. To determine this circuit we will also note the voltage source will be replaced by a wire.

1.2.1 Example



To measure the Thevenin Resistance we need to remove the power supply and replace it with a wire. The load is produced by measuring the resistance with your multimeter.



$$R_{TH} = (R_1||R_2) + R_3 = 30\Omega||10\Omega + 15\Omega = 7.5\Omega + 15\Omega = 22.5\Omega$$

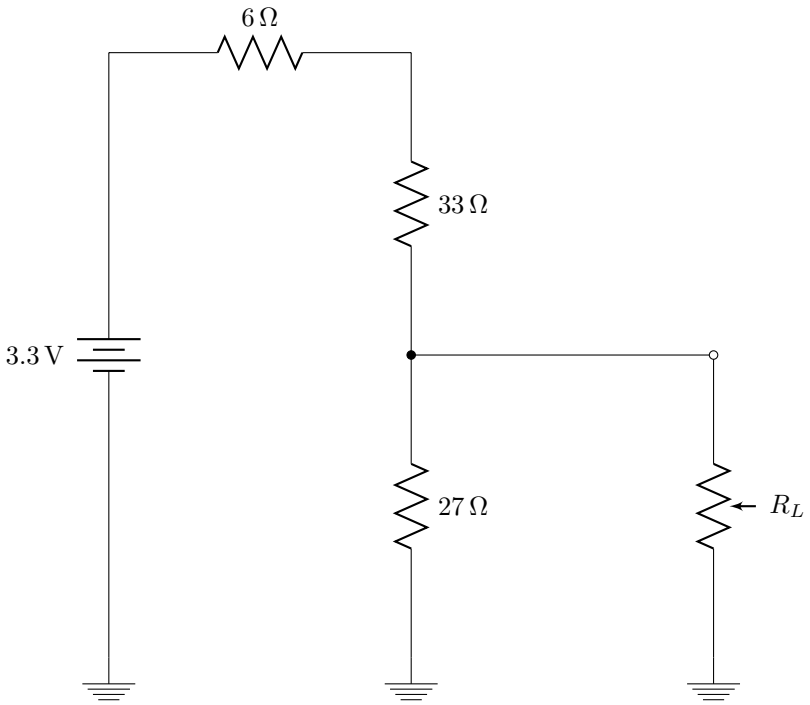
2 Norton's Theorem

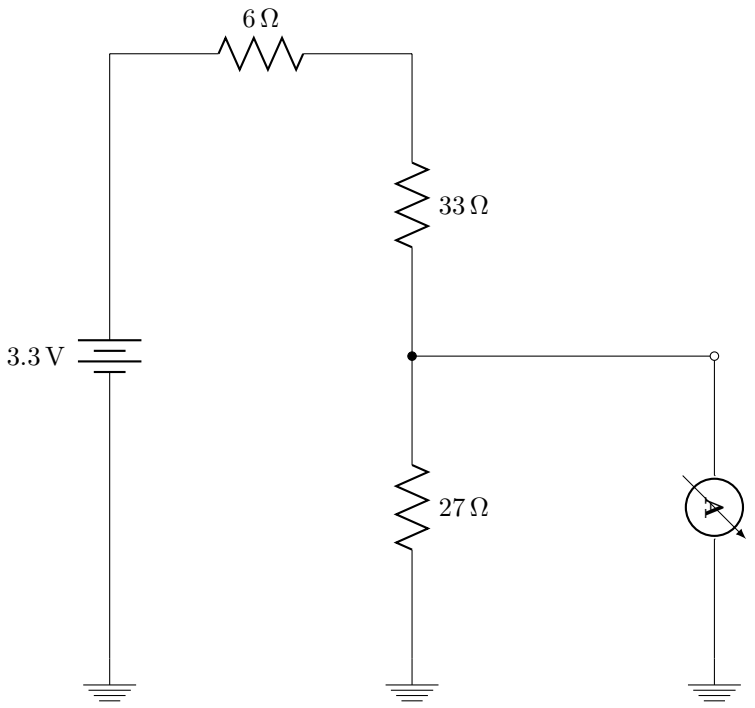
Thevenin's Theorem: Any resistive network or circuit can be represented as a current source in parallel with a source resistance. This helps predict how the circuit will respond to a change in load.

2.1 Norton Voltage

The Thevenin Voltage (V_N) of a circuit is the current present at the output terminal when the load is removed and shorted.

2.1.1 Example





2.2 Norton Resistance

The Thevenin Resistance (R_N) is the resistance measured across the output terminals when the load is removed. To determine this circuit we will also note the voltage source will be replaced by a wire.