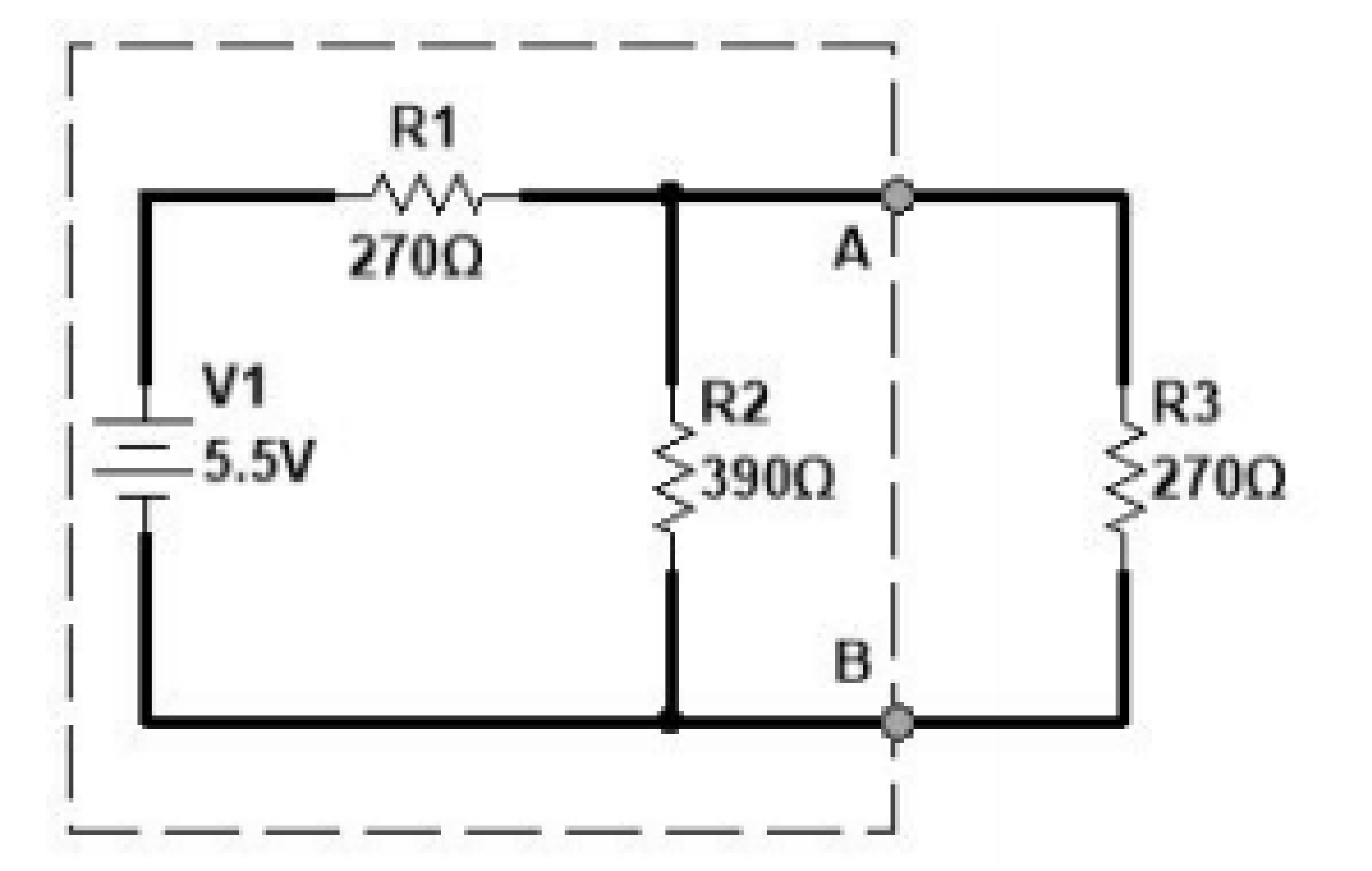
THEVENIN EQUIVALENT

BY JAKE CLATTERBUCK

OBJECTIVES

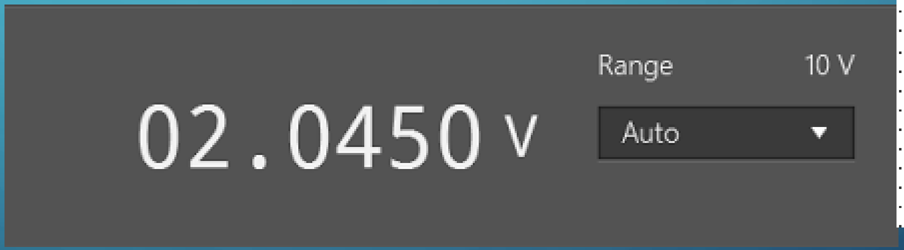
- To determine the Thevenin Equivalent of a given circuit
- To experimentally verify Thevenin's Theorem by building both circuits and observing their equivalence

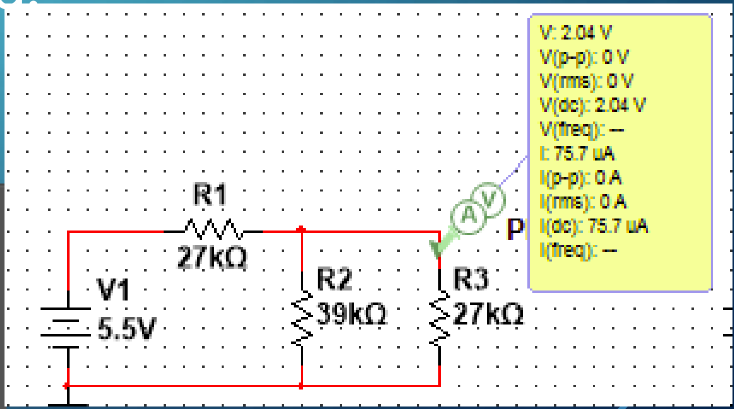
THE CIRCUIT



VOLTAGE ACROSS LOAD RESISTOR

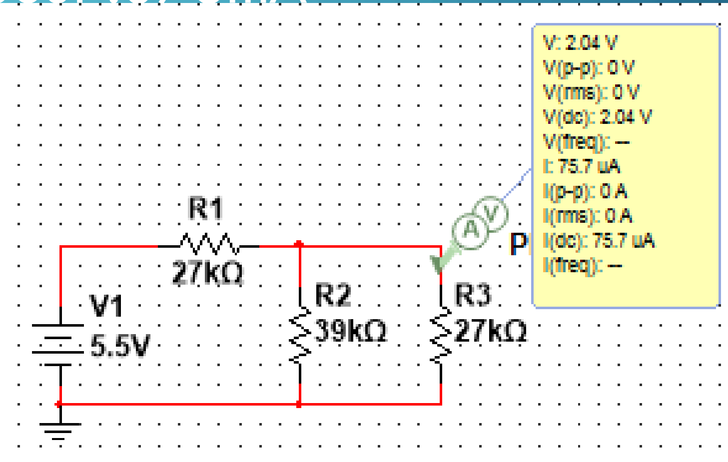
- Analytical: With the load resistor and 39k resistor in parallel (39k||27k=15.95k), the circuit becomes a voltage divider. The voltage across the combined resistors is equal to the voltage across the load. 5.5V*16/(16+27) = 2.04V
- Multisim: 2.04V
- Experimental: 2.045V





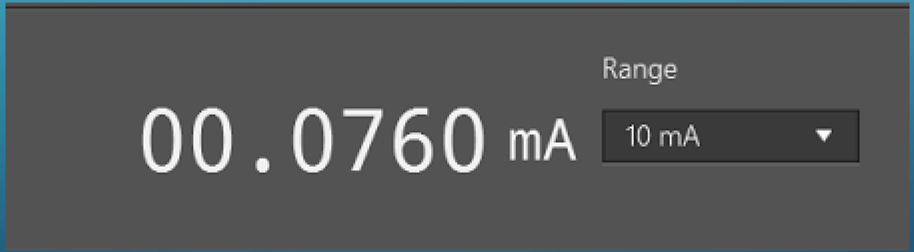
CURRENT THROUGH LOAD RESISTOR

- Analytical: If voltage across the load is 2.04V, the load resistor is 27kOhms, V=IR, I=V/R= 2.04/27000 = 75.6 microAmps, or about .076mA



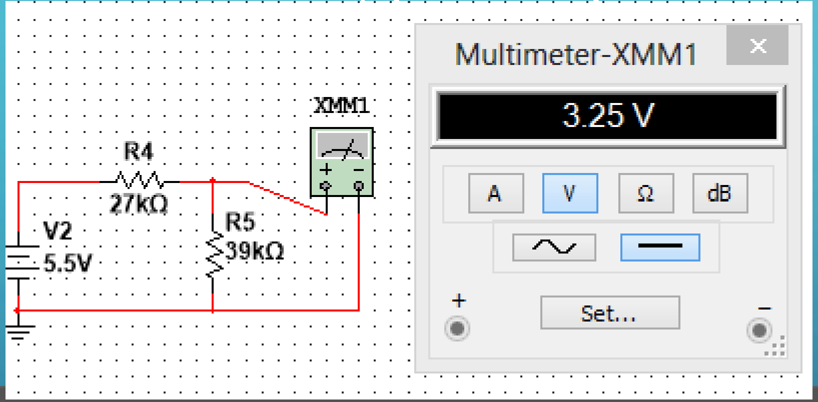
- MultiSim: 75.7 microAmps

- Experimental

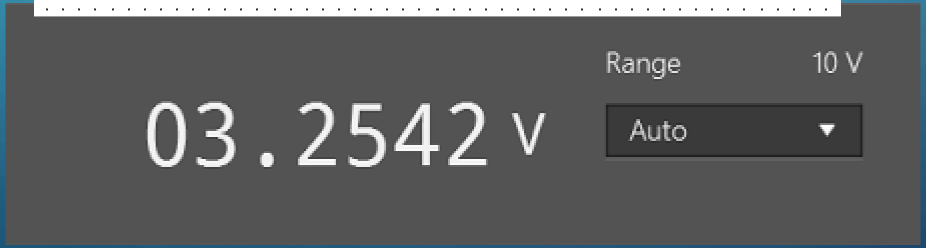


OPEN CIRCUIT VOLTAGE

- Analytical: With an open circuit in place of the load, the circuit becomes a simple voltage divider. 5.5*39/(39+27) = 3.25V
- Multisim: 3.25V



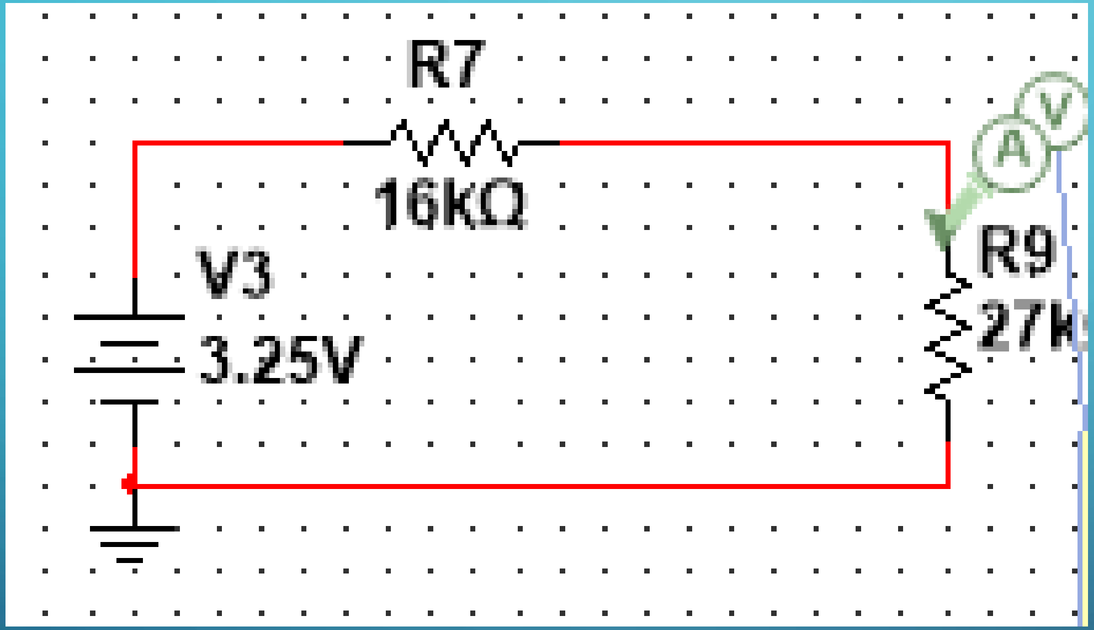
- Experimental:



THEVENIN RESISTANCE

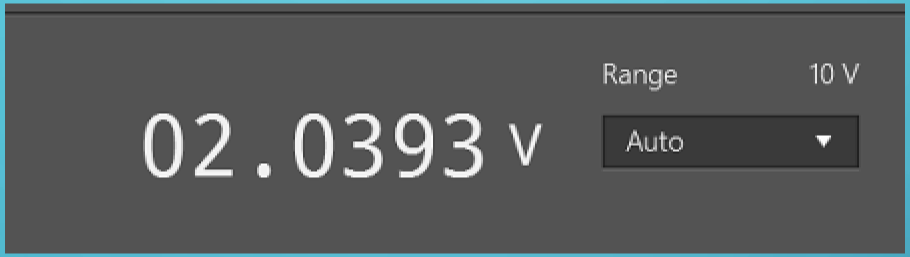
- Using Method 2: The voltage source is replaced by a short circuit. The remaining circuit's equivalent resistance is then easily found as 2 parallel resistors. 27*39/(27+39) = 15.95kOhm

THEVENIN CIRCUIT

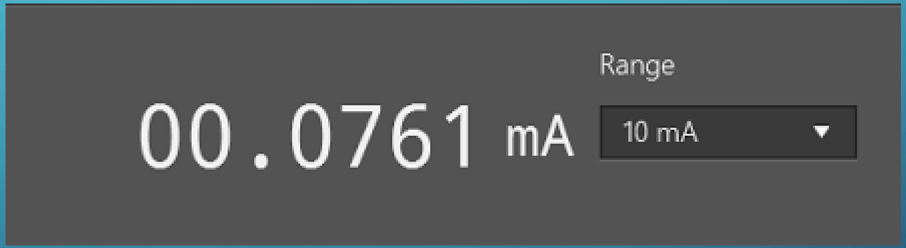


EXPERIMENTAL VERIFICATION OF THEVENIN EQUIVALENT

- Voltage across load:



- Current through load:



CONCLUSION

- Thevenin’s Theorem is shown to work, as the constructed thevenin equivalent circuit performs the same as the original circuit.