

CSE/ENGR 120 LAB #2 – Electrical Circuits Analysis

Objectives

Apply Ohms Law and Kirchhoff's Current/Voltage Laws (KCL, KVL) to resistor simplification and circuit analyzing using TinkerCAD.

Preparation

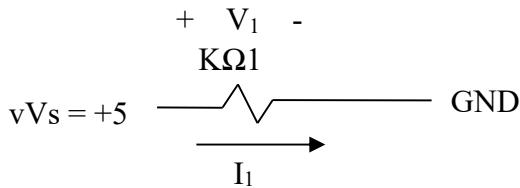
Complete the following steps before starting to work on the experiments in this lab:

- 1) Complete lecture and assignment in Electrical Circuits Chapter of textbook
- 2) Complete lab 1 experiments and report
- 3) Watch Introduction to TinkerCAD Electronics at "<https://youtu.be/38ur1kyFYxc>" if it has been a while since lab 1 completion.

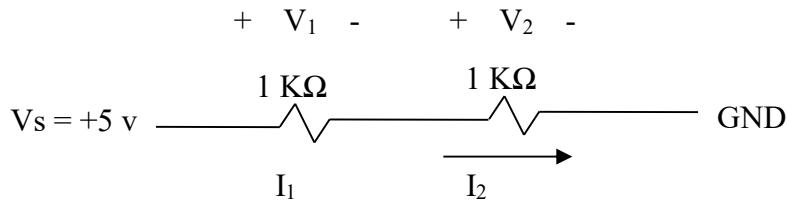
Experiment 1. Kirchhoff's and Ohm's Laws Applied to Resistors in Series

For each of the following circuits, calculate the value of voltage across and current through a single resistor. Additionally, measure the values using your circuit implemented on TinkerCAD and include the schematics from TinkerCAD in your report.

- 1) One Resistor Series Circuit

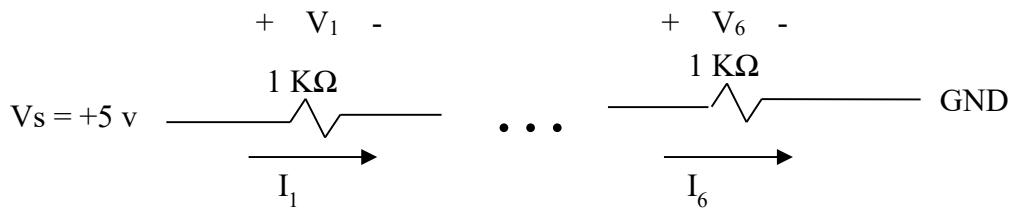


- 2) Two-Resistor Series Circuit



- 3) 6-Resistor Series Circuit

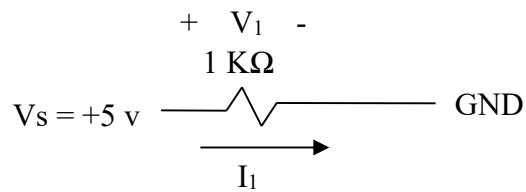
In this circuit six resistors are in series.



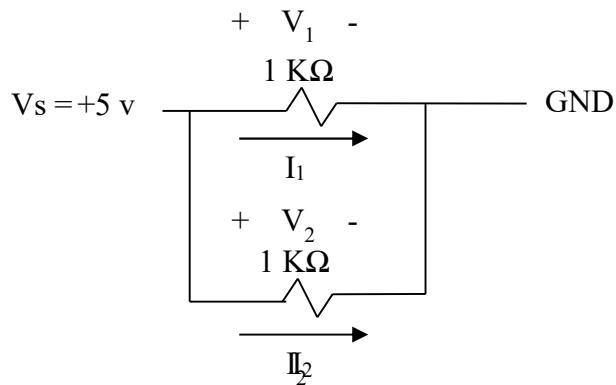
Experiment 2. Kirchhoff's and Ohm's Laws Applied to Resistors in Parallel

For each of the following circuits, calculate the value of voltage across and current through a single resistor. Additionally, measure the values using your circuit implemented on TinkerCAD and include the schematics from TinkerCAD in your report.

- 1) One Resistor Parallel Circuit

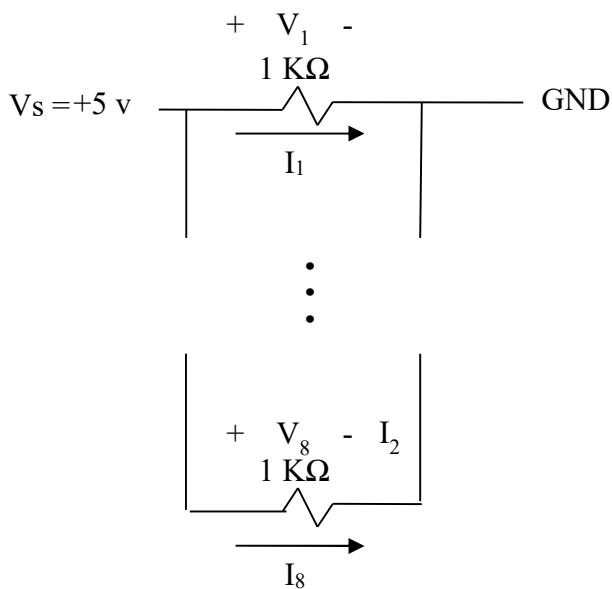


- 2) Two-Resistor Parallel Circuit



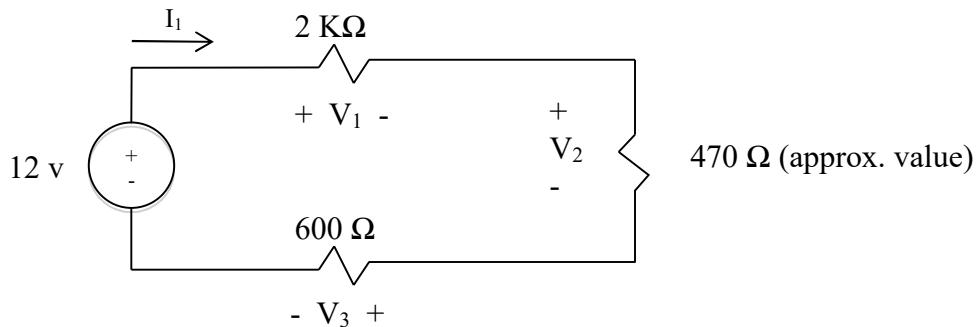
- 3) 8-Resistor Parallel Circuit

In this circuit eight resistors are in parallel.



Experiment 3. Application of Ohm's Law

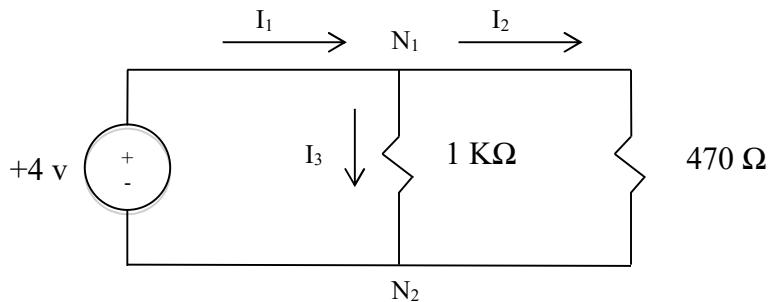
- 1) Construct the circuit shown below on TinkerCAD and include a copy of the circuit in your report.



- 2) Use TinkerCAD multimeter to measure current I₁ and voltages V₁, V₂ and V₃.
- 3) Use Ohm's Law to derive an equation relating V₁, V₂, and V₃ and verify that values from previous step satisfies the equation.

Experiment 4. Application of Kirchhoff's Current Law (KCL)

- 1) Construct the circuit shown below on TinkerCAD and include a copy of the circuit in your report.



- 2) Use TinkerCAD multimeter to measure currents I₁, I₂, I₃ and voltage across N₁ and N₂.
Note: Multimeter must be in series in order to measure current.
- 3) Use KCL to derive an equation relating I₁, I₂, and I₃ and verify that values from previous step satisfies the equation.

Report Requirements

This lab and associated report must be completed individually. All reports must be computer printed (formulas and diagrams may be hand drawn) and at minimum:

For each experiment include:

- Clear problem statement; specify items given and to be found.
- Clearly identify and answer experiment questions
- Documents resulting circuit schematics, simulation results, and other relevant information from the experiment.

For the whole report include:

- A Cover sheet with your name, class, lab and completion date.
- A Lessons Learned section which summarizes your learning from this lab.
- A New Experiment section that has description of a new experiment and the experiment's results. Experiment should be related to material covered in class but not similar to one of the experiments in this lab.