

## Activity 1.2.4 Circuit Calculations

### Introduction

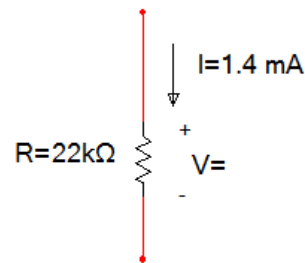
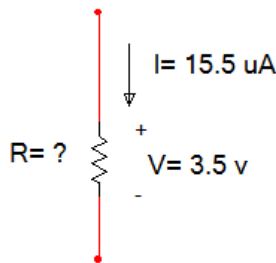
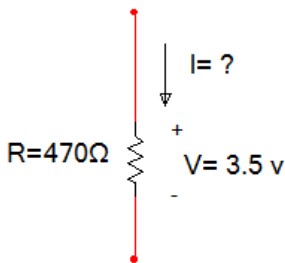
Regardless of circuit complexity, circuit designers as well as users need to be able to apply basic electrical theories to circuits in order to verify safe operation and troubleshoot unexpected circuit failure. In this activity you will gain experience applying Ohm's law and Kirchhoff's voltage and current laws to circuits in order to gain understanding of circuit requirements and relationships between voltage, current, and resistance.

### Equipment

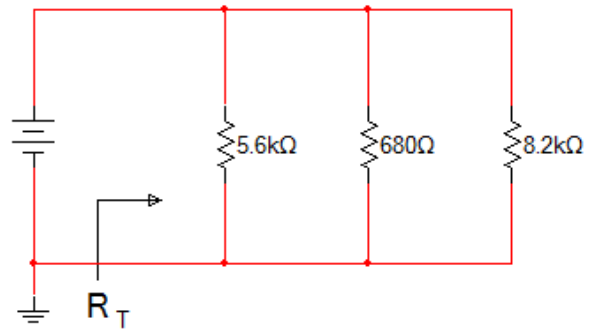
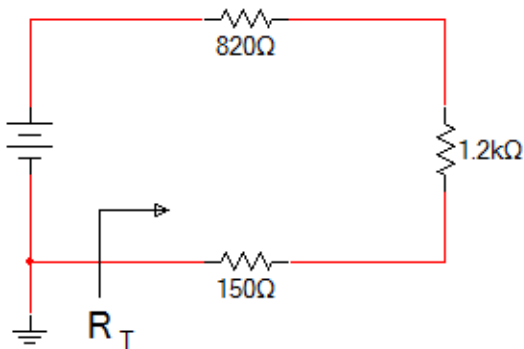
- Engineering notebook
- Pencil
- Calculator

### Procedure

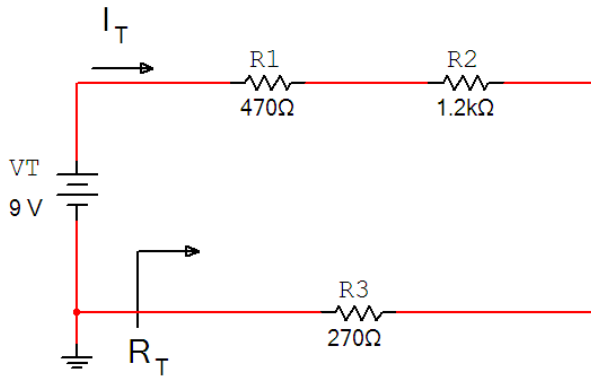
1. For each of the resistors shown below, use Ohm's law to calculate the unknown quantity. Be sure to put your answer in proper engineering notation and use the correct units.



2. For each of the circuits shown below, calculate the value for  $R_T$ . Be sure to put your answer in proper engineering notation and use the correct units.

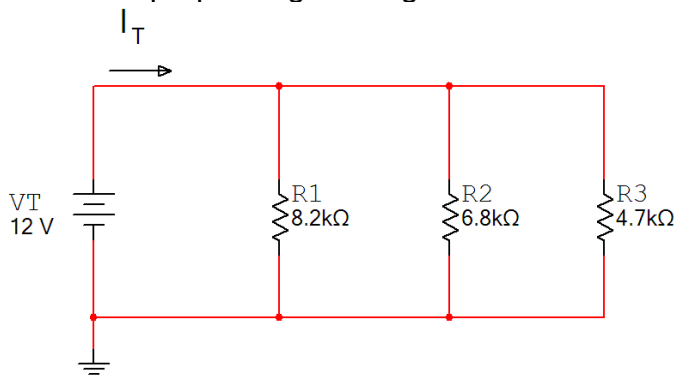


3. Using the laws of circuit theory, solve for  $R_T$ ,  $I_T$ ,  $V_{R1}$ ,  $V_{R2}$ , and  $V_{R3}$ . Be sure to put your answer in proper engineering notation and use the correct units.



Using the data from problem (3), verify your results using Kirchhoff's voltage law.

4. Using the laws of circuit theory, solve for  $R_T$ ,  $I_T$ ,  $I_{R1}$ ,  $I_{R2}$ , and  $I_{R3}$ . Be sure to put your answer in proper engineering notation and use the correct units.



Using the calculated results from problem (5), verify your results using Kirchhoff's current law.

## Conclusions

1. State two rules for the voltage and current in a series circuit.
  - a.
  - b.
2. State two rules for the voltage and current in a parallel circuit.
  - a.
  - b.
3. If you remove a single bulb from an inexpensive string of Christmas tree lights, all of the lights in the entire string will go off. Are the bulbs connected in series or parallel? Explain.