# 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.
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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.

I= ?	I= 15.5 uA	I=1.4 mA
R=470Ω V= 3.5 v	R= ? V= 3.5 v	R=22kΩ V=
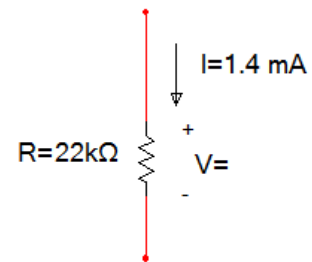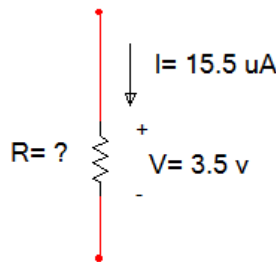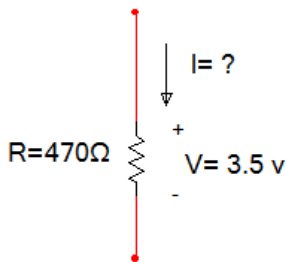
2. For each of the circuits shown below, calculate the value for R_T. Be sure to put your answer in proper engineering notation and use the correct units.

820Ω

1.2kΩ

150Ω

R_T

5.6kΩ   680Ω   8.2kΩ

R_T
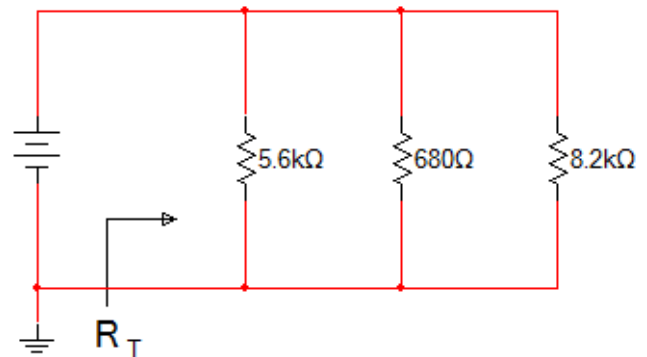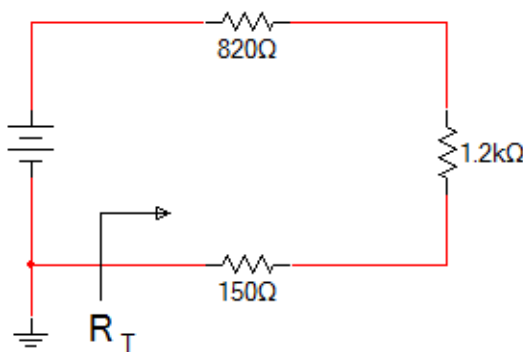
3. Using the laws of circuit theory, solve for R_T, I_T, V_1, V_2, and V_3. Be sure to put your answer in proper engineering notation and use the correct units.

I_T

	R1		R2
	470Ω		1.2kΩ

VT
9 V

R3
270Ω

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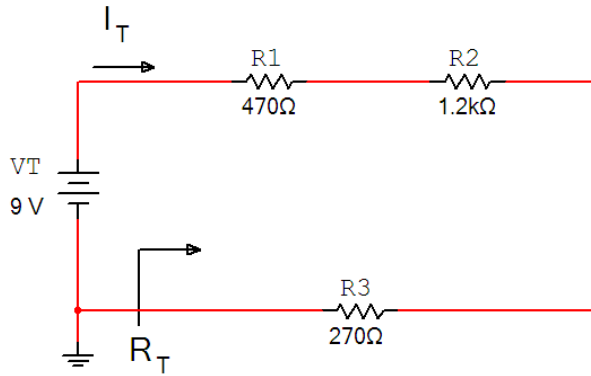
Using the data from problem (3), verify your results using Kirchhoff's voltage law.

4. Using the laws of circuit theory, solve for R_T, I_T, I_1, I_2, and I_3. Be sure to put your answer in proper engineering notation and use the correct units.

I_T

VT
12 V

R1
8.2kΩ

R2
6.8kΩ

R3
4.7kΩ
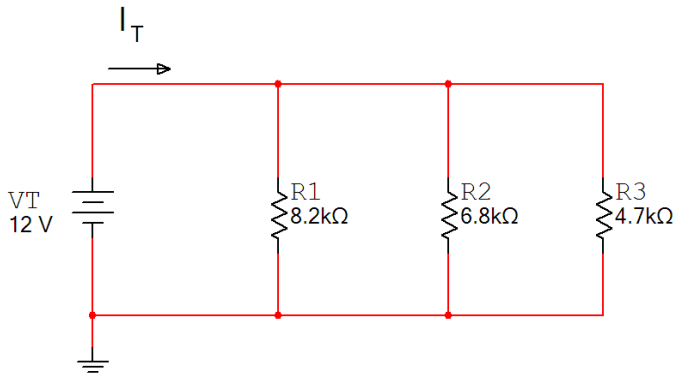
Using the calculated results from problem (5), verify your results using Kirchhoff's current law.

Conclusion

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.