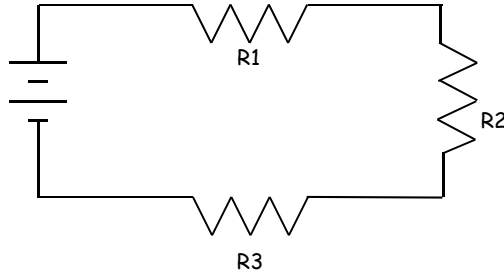


## Lab - Series and Parallel Circuits

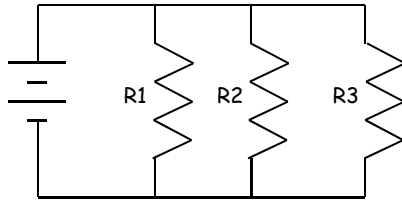
Purpose - To verify Kirchoff's laws to within acceptable experimental error.

Procedure -

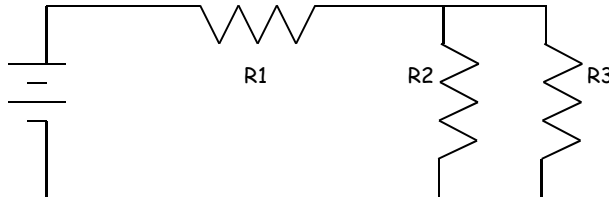
- 1.) Use a source voltage of 2 cells connected in series and  $R_1 = 39 \Omega$ ,  $R_2 = 68 \Omega$ ,  $R_3 = 22 \Omega$
- 2.) Assemble the circuit below, using ammeters and voltmeters to find values for  $V_o \rightarrow V_3$ , and  $I_o \rightarrow I_3$ .



- 3.) Assemble the circuit below, using ammeters and voltmeters to find values for  $V_o \rightarrow V_3$ , and  $I_o \rightarrow I_3$ .



- 4.) Assemble the circuit below, using ammeters and voltmeters to find values for  $V_o \rightarrow V_3$ , and  $I_o \rightarrow I_3$ .



- 5.) Complete the table below:

	<u><math>R_o</math> using Ohm's Law</u>	<u><math>R_o</math> using resistor rules</u>	<u>% difference</u>
<i>Circuit 1</i>			
<i>Circuit 2</i>			
<i>Circuit 3</i>			

Discussion -

- 1.) In *circuit 1*, are Kirchoff's current and voltage laws obeyed, and how do you know?
- 2.) In *circuit 2*, are Kirchoff's current and voltage laws obeyed, and how do you know?
- 3.) In *circuit 3*, are Kirchoff's current and voltage laws obeyed, and how do you know?
- 4.) Provide a reasonable explanation to why there is a difference in the  $R_o$  values in the table.

Conclusion - Answer the purpose, cite possible errors and mention how this might be made a better lab!

## Curricular Competencies

- 1b - I can generate questions based upon the observations I make about the world around me.
- 2a - I can plan and perform scientific investigations that collect reliable data, both on my own and in groups.
- 2d. - I can be accurate and precise when recording data.
- 3a. - I can experience and explain the meaning of my surroundings.
- 3c. - I can identify connections in data and describe relationships between variables.
- 3d. - I can make, analyze, and interpret graphs, models, and diagrams (circuit).
- 3e. - I can use my knowledge to draw conclusions that are supported by evidence.
- 3f. - I can identify the connections between events or actions.
- 4b. - I can describe ways to improve my investigation.
- 6b. - I can use scientific language to communicate ideas for a specific purpose.

	Acquiring Standard	Approaching Standard	Refining Standard	Mastering Standard
<b>Purpose</b> N/A/2	- The purpose is incompletely stated.	- The purpose is stated in a clear but incomplete manner.	- The purpose is clearly and fully stated.	- The purpose is precisely and fully stated.
<b>Materials</b> N/A /2	- Not all equipment is listed and improper names are used.	- The equipment listed is incomplete and/or improper names are used.	- The equipment is listed, with 1 or 2 improper names.	- The equipment is listed accurately with proper names.
<b>Procedure</b> N/A /2	- The procedure is missing key details and has procedural errors.	- The procedure is missing details.	- The procedure is accurate detailed enough to be replicated.	- The procedure is designed to obtain accurate and reliable results. - No unnecessary steps
<b>Analysis</b> /4	- Observations (tables) are not set-up correctly and some details are missing. - Calculations have methodological errors and units/sig figs errors. - Answers are rarely correct and detailed in their explanation.	- Observations (tables) are set-up correctly, but incomplete. - Calculations have methodological errors and units/sig figs errors. - Answers are detailed and mostly correct.	- Observations (tables) are organized, and accurately reflect what occurred. - Calculations have minor or few errors and units/sig figs are correct. - Answers are thorough in their explanation and correct.	- Observations use all 4 senses and contain all details needed to understand the data and accurately reflect on what occurred. - Calculations have no errors and units/sig figs are included and correct. - Answers are correct and show thought and insight.
<b>Outcomes</b> /5	- I can identify, with examples, at least 3 outcomes in this lab.	- I can identify, with examples, at least 6 outcomes in this lab.	- I can identify, with examples, at least 8 outcomes in this lab.	- I can identify, with examples, at least 10 outcomes in this lab.
<b>Conclusion</b> /3	- The purpose of the lab is addressed and answered.	- The purpose of the lab is addressed. - Results are explained.	- The purpose is answered and results of the lab are fully explained. - Possible errors and improvements are discussed.	- Purpose is answered completely. - Results of the lab are fully explained in detail. - Possible errors are discussed. - Suggestions for extensions of the lab and possible improvements are presented.

Examples for outcomes presented/explained here.