

Physics 11  
M. Lam

## Combination Circuits Lab

Name:

Partner:

Block:

### Objective

Use a combination circuit consisting of three resistors to investigate Ohm's law and Kirchhoff's laws.

### Equipment

Battery

Wire

Digital multimeter

Resistors (1 k $\Omega$ , 2 k $\Omega$  and 4.7 k $\Omega$ )

### Experimental Method

To be completed prior to conducting the lab. This must include a diagram of the circuit you intend to build. Label the resistors  $R_1$ ,  $R_2$  and  $R_3$  and indicate the intended resistance of each. Include all necessary ammeter and voltmeter positions in your diagram(s).

The voltage of the battery and the resistance of each resistor should be measured directly with the multimeter.

Table 1: Measured values

	Voltage (V)	Current (A)	Resistance ( $\Omega$ )
Battery			
Resistor 1			
Resistor 2			
Resistor 3			

### Analysis and Discussion

Verify that Kirchhoff's current law is satisfied.

Verify that Kirchhoff's voltage law is satisfied. Show this for a minimum of two loops in your circuit.

Use the voltage of the battery and the resistor values to determine the theoretical voltage and current values. Use measured values (of  $V_T$ ,  $R_1$ ,  $R_2$  and  $R_3$ ) instead of the voltage indicated on the battery and the resistor colour bands.

Complete Table 2 by comparing the theoretical and experimental values for the voltage and current across each resistor.

Table 2: Comparison of theoretical and measured voltage and current values

Resistor	Voltage			Current		
	Theoretical (V)	Experimental (V)	% Error	Theoretical (A)	Experimental (A)	% Error
1						
2						
3						

Component	Criterion	Weight	Mark
Introduction	<i>Objective and theory</i>	1	
Experimental Method	<i>Procedure</i>	1	
	<i>Circuit diagram</i>	1	
Data	<i>Data quality and presentation</i>	2	
Analysis and Discussion	<i>Verifying Kirchhoff's current law with appropriate calculations</i>	1	
	<i>Verifying Kirchhoff's voltage law with appropriate calculations</i>	1	
	<i>Theoretical voltage values and percent error</i>	1	
	<i>Theoretical current values and percent error</i>	1	
Conclusion	<i>Summary of the experiment and final results</i>	1	
<b>TOTAL</b>		<b>10</b>	