

Lab 35-4: Parallel Circuits

- Purpose:**
1. To calculate the voltages and currents for individual resistors in a parallel circuit.
 2. To calculate the equivalent resistance of a parallel circuit.
 3. To determine what happens to voltage, current and resistance in a parallel circuit.

Equipment: 7 wires 6 alligator clips one 5-Ω & two 2-Ω resistors
 1 ammeter 1 voltmeter 1 power supply

Procedure:

Circuit 1: Two resistors in parallel.

1. Hook up the circuit shown in the diagram below.
2. Set the power supply for 1 volt. **DON'T CHANGE IT ONCE IT IS SET.**
3. Measure the current and voltage for the 3 Ω resistor and record in the data table below the diagram.
4. Repeat measurements for the 5 Ω resistor.
5. Measure the total voltage and total current using your portable meters. (This makes sure you use the same devices to measure all the currents and voltages.)

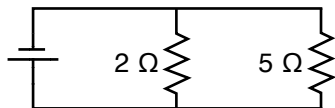
Circuit 2: Three resistors in parallel.

1. Hook up the circuit shown in the diagram below.
2. Repeat your procedure from Part I, recording your results in the data table below the diagram.

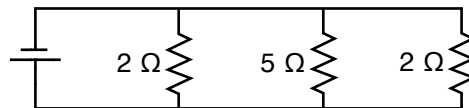
Remember: Ammeters are connected in series. Voltmeters are connected in parallel.

Diagrams:

Circuit 1



Circuit 2



Data:

<i>Circuit 1</i>		
R	V	I
2 Ω		
5 Ω		

$V_{\text{power supply}}$	
$I_{\text{power supply}}$	

<i>Circuit 2</i>		
R	V	I
2 Ω		
5 Ω		
2 Ω		

$V_{\text{power supply}}$	
$I_{\text{power supply}}$	

Lab 35-4: Parallel Circuits

Questions:

1. For each circuit, compare the current from the power supply to the current passing through the individual resistors.
2. For each circuit, compare the total voltage coming from the power supply to the voltages of each individual resistor.

3. Calculate the total equivalent resistance for each circuit by $R_{equivalent} = \frac{V_{power\ supply}}{I_{power\ supply}}$.

4. With calculations, show that $\frac{1}{R_{equivalent}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots$ in a parallel circuit.

5. In general, what happens to voltage, current, and resistance in a parallel circuit?

Follow Up:

1. A $4\ \Omega$ and a $4\ \Omega$ resistor are connected in parallel. What is their total resistance?
2. A $3\ \Omega$ and a $6\ \Omega$ resistor are connected in parallel. What is their total resistance?
3. What is the total resistance of three $2\text{-}\Omega$ resistors connected in parallel?
4. Two identical resistors are connected in parallel and have a total resistance of $4\ \Omega$. What are the individual resistors?