# Resistance Lab

**Objectives:**
1. Practice solving for resistance from the color code
2. Calculate series resistance
3. Calculate parallel resistance

**Materials:**

| | |
|---|---|
| various resistors | resistor color code chart* |
| breadboard | Multi-meter |

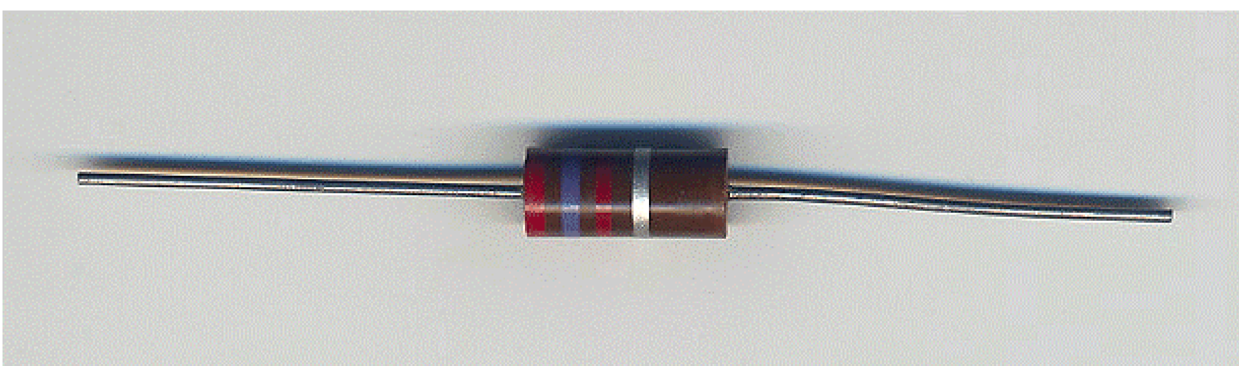
* Search for and download a resistor color code chart from the Internet.

## Procedures:

**1.** Study the example. Position the resistor with the band nearest/adjacent to one end of the resistor with that band to the left as shown below. The first band is the first significant digit. The second band is the second significant digit. The third band is the multiplier. The forth band, if present is the tolerance. Use the first three bands to determine the ohmic value of the resistor.

The resistor below has red-violet-red-silver bands. The first three bands from left to right determine the value of the resistor in ohms. The forth, silver band is the tolerance.

| 1st Color Band | 2nd color band | 3rd color band | Calculated | 4th Color band |
|---|---|---|---|---|
| 1st Sig-fig | 2nd sig-fig | multiplier | Value | tolerance |
| **Red** | **Violet** | **Red** | | **Silver** |
| **2** | **7** | **x 100** | **2700** W | ±10% |



**Reproduce and complete the tables below on your own paper.**

**Table 1:**

| Color Code | Calculated Value | Measured Value |
|---|---|---|
| yellow-violet-black | | |
| red-red-red | | |
| brown-black-yellow | | |
| orange-white-orange | | |
| red-black-blue | | |

**Table 2:**

| Value | Color Code | Measured Value |
|---|---|---|
| 68 Ω | | |
| 47k Ω | | |
| 180 Ω | | |
| 5.6k Ω | | |
| 8.2m Ω | | |

## Series Resistance

When resistors are place in series in a circuit, the total circuit resistance is equal to the sum of all the series resistances. The current only has one path it can take through the circuit.

Formula for series resistance is: $\mathbf{R_t = R_1 + R_2 + R_3 + R_4 \ldots}$

**Problems:**

**1.** Use the resistors from the first column.
**a.** Calculate the total series resistance.
**b.** Connect the resistors together on the breadboard to form a series circuit. Show your circuit to Mr. F.
**c.** Measure the total resistance with the multi-meter.
**d.** Draw the series circuit with the above resistors to include a switch and a 1.5 VDC battery.

**2.** Perform **a** and **c** above with the resistors in the second column.

## Parallel Resistance

When resistors connected parallel to each other, the current now has multiple paths to take through the circuit. If your calculations and measurements are correct, the total resistance will be less than the resistor with the least value.

Formulas for parallel resistance are: $\mathbf{R_t} = \dfrac{1}{\dfrac{1}{R_1}+\dfrac{1}{R_2}+\dfrac{1}{R_3}+\dfrac{1}{R_4}\cdots}$ **and** $\mathbf{R_t} = \dfrac{R_1R_2}{R_1+R_2}$

**Problems:**

**3.** Calculate the total parallel resistance with the 68 Ω and 180 Ω resistors.
**4.** Connect the above two resistors together in parallel on the breadboard. What is the total measured resistance?
**5.** Calculate the total parallel resistance with the 47k Ω, 5.6k Ω, and 8.2m Ω resistors.
**6.** Connect the above three resistors together in parallel on the breadboard. What is the total measured resistance?
**7.** If the parallel resistors in **3** and the parallel resistors in **5** are connected in series, what is the total resistance?
**8.** Draw the circuit in problem **7** to include a switch and a 1.5 VDC battery.

**Conclusion:**
**9.** Discuss what you have learned about the total resistance value of resistors connected in series and resistors connected in parallel.