Week 1

Experiment #1

Understanding the different components

Aim: To learn the resistor color codes and building a circuit on a BreadBoard

Equipment required: Resistances, millimeter, power supply

Resistors are color coded for easy reading. The value and tolerance of resistors are represented by four stripes of color on the resistor body. The 4th stripe is the tolerance stripe and is usually silver (5% tolerance) or gold (10% tolerance). The colors for the other stripes are never silver or gold, allowing you to easily determine which stripe is the 4th stripe.

- 1st color stripe represents the 1st digit.
- The next color stripe represents the 2nd digit.
- The 3rd color stripe represents the multiplier.

To determine the value of a resistor, combine the first and second digits together, then attatch zeros as indicated by the multiplier.

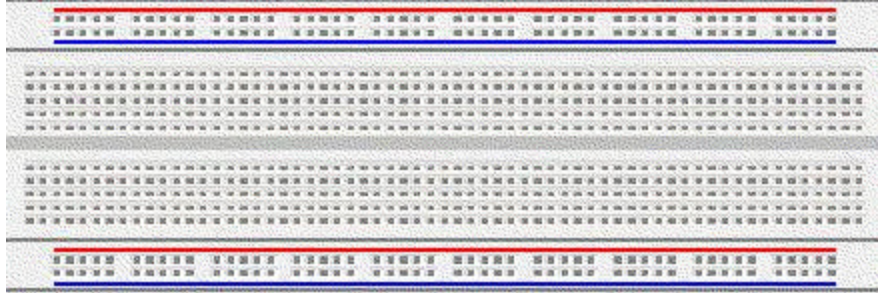| Color	Color Name	1st Digit 1st Stripe	2nd Digit 2nd Stripe	Multiplier 3rd Stripe	Tolerance 4th Stripe
	Black	0	0	x1	-
	Brown	1	1	x10	-
	Red	2	2	x100	-
	Orange	3	3	x1,000	-
	Yellow	4	4	x10,000	-
	Green	5	5	x100,000	-
	Blue	6	6	x1,000,000	-
	Violet	7	7	-	-
	Gray	8	8	-	-
	White	9	9	-	-
	Gold	-	-	-	5%
	Silver	-	-	-	10%

For example, the first three stripes on the resistor shown below are yellow, violet, and orange. So, the resistance value is 4 7 000 or **47K ohms** (yellow is 4, violet is 7, orange is 3). The fourth stripe is silver, indicating that this resistor value has a 10% tolerance.
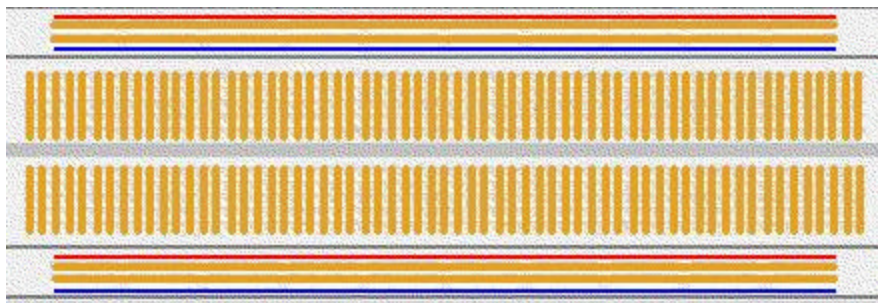
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Y  V   0    S
4  7  1000  10%
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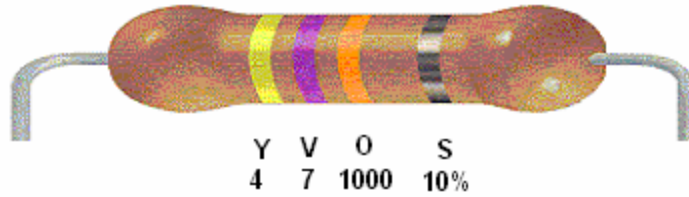
Find the values of the given resistance using the color code and verify using the multi-meter.

S. No.	1st Color	2nd Color	3rd Color	Value (color code)	Measured value (Multimeter)
1.					
2.					
3.					
4.					
5.					

Using the Bread Board (Socket Board)

The bread board has many strips of metal (copper usually) which run underneath the board. The metal strips are laid out as shown below

These strips connect the holes on the top of the board. This makes it easy to connect components together to build circuits. To use the bread board, the legs of components are placed in the holes (the sockets). The holes are made so that they will hold the

component in place. Each hole is connected to one of the metal strips running underneath the board.

Each wire forms a node. A node is a point in a circuit where two components are connected. Connections between different components are formed by putting their legs in a common node. On the bread board, a node is the row of holes that are connected by the strip of metal underneath.

The long top and bottom row of holes are usually used for power supply connections.

The rest of the circuit is built by placing components and connecting them together with jumper wires. Then when a path is formed by wires and components from the positive supply node to the negative supply node, we can turn on the power and current flows through the path and the circuit comes alive.

**Building A Series And Parallel Circuit on the Bread board.**

Aim: To build a series and parallel circuit on the bread board

Equipments required: Resistances, Breadboard, Multi-meter, Power supply.

Definition of Series Combination of Resistors: Two resistors are in series. If one end of one is connected to one end of the other, in all cases, the same current will flow through each. The resistors below are in series
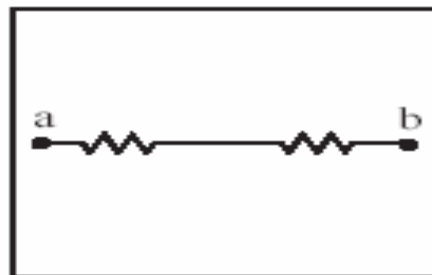
Definition of Parallel Combination of Resistors: Two resistors are in parallel if both ends of each are connected together so that both have the same potential difference for all values of current through the circuit. The resistors below are in
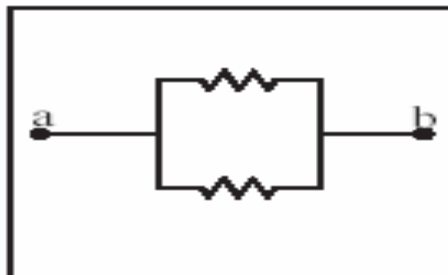
Resistor values add normally when connected in series, but add in reciprocal when connected in parallel. For example, if three resistors of values 1K, 2.2K, and 3.9K are connected in series, the total resistance would be:

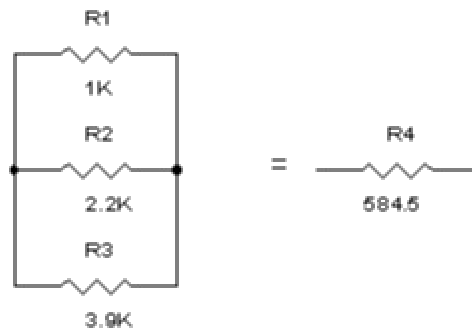$$R = R1 + R2 + R3$$

$$= 1K + 2.2K + 3.9K = 7.1K$$

Note that the total series resistance is always greater than the largest resistance.

If the three resistors are connected in parallel, however, they add in reciprocal, as follows:

$$1/R = 1/R1 + 1/R2 + 1/R3$$
$$= 1/1K + 1/2.2K + 1/3.9K = 1/584.5, \text{ therefore } R = 584.5 \text{ ohms}$$

Note that the total parallel resistance is always less than the smallest resistance.

	Measured voltage (V)
V_{R1}	
V_{R2}	
V	

	Measured

	Current (A)
I_{R1}	
I_{R2}	
I	