

**Science 9 – Physics Topic 3.3 Concept 2-4 Load/Resistance**

**Load:** A device that converts electrical energy into another form of energy

- As electrons pass through a load, they lose energy as electrical energy is converted to another type of energy
- **Light bulb:** A load that transforms electrical energy into Light energy
- **Speaker:** A load that transforms electrical energy into sound energy

**Resistor:**

- Resistor is a special kind of load that turn electrical energy into heat.
- Resistor's main purpose is to limit/ control the amount of energy going into different parts of a device

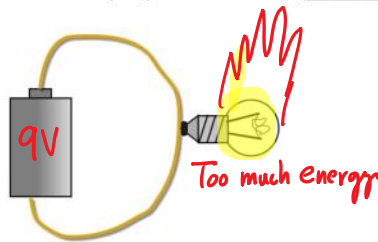


Figure 1: Without Resistor

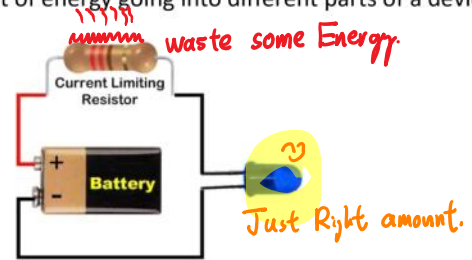
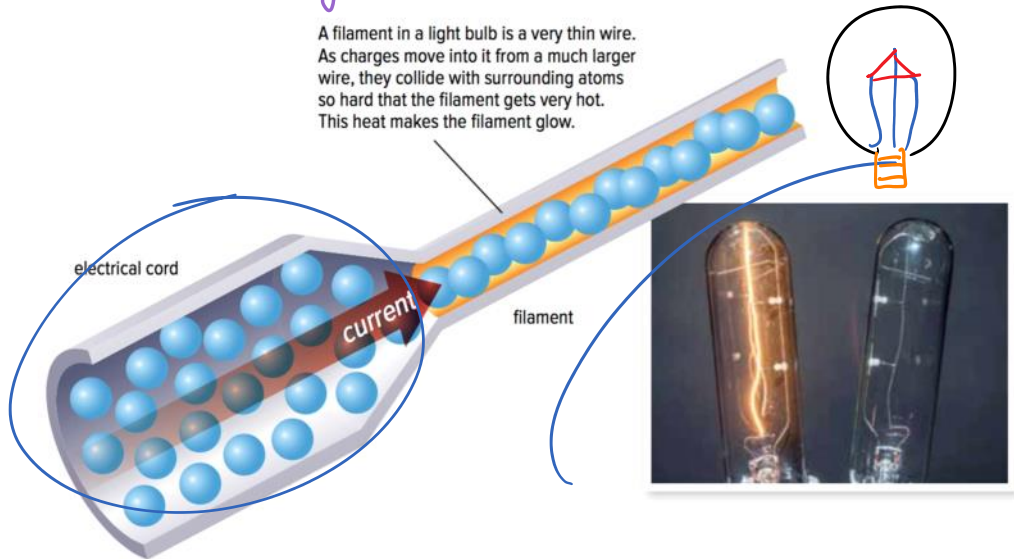


Figure 2: With resistor

**How does a load/resistor work?**

- Example of Resistance: Filament in a Light Bulb
  - Charges move from a large wire (electrical cord) into a very thin wire (filament)
  - Since the charges have less room in the filament (the filament *resists* the movement of charges), they collide with atom so hard that the filament gets very hot
  - The heat makes the filament glow ("light up")

A filament in a light bulb is a very thin wire. As charges move into it from a much larger wire, they collide with surrounding atoms so hard that the filament gets very hot. This heat makes the filament glow.



## Resistance: Ohm ( $\Omega$ )

When a resistor is connected to an electric cell, the amount of electron that flows through the circuit depends on the amount of resistance

- The symbol for resistance is: R  $1.29 \times 1000,000 =$
- The unit is ohm ( $\Omega$ )  $0.37 \times 1000000 = 370,000 \Omega$

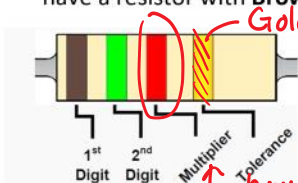
Example: metal  $R \approx 200 \Omega$

- Resistance value of your skin.  $R = 1,290,000 \Omega \approx$  million  $\Omega$
- Resistance value of a small strip of metal  $R = \approx 100 \Omega$
- Every part of a circuit has some amount of resistance, even the WIRE!!



## Resistor Colour Code

- Resistance value is usually colour coded because the device is too small.
- For Science 9 we will only focus on the first 3 colour bands. Let say we have a resistor with Brown, Green and Red colour bands



$1500 \Omega$   
two zeros  
how many zero to add

Colour	Numeric Value
Black	0
Brown	1
Red	2
Orange	3
Yellow	4
Green	5
Blue	6
Violet	7
Grey	8
White	9

	1 <sup>st</sup> band colour	2 <sup>nd</sup> band colour	3 <sup>rd</sup> band colour	Resistor Value ( $\Omega$ )
(a)	blue	green	red 00	6500 $\Omega$
(b)	violet	black	yellow 0000	700000 $\Omega$
(c)	green 5	blue 6	brown 0	560 $\Omega$
(d)	brown 1	red 2	black No	12 $\Omega$
(e)	grey 8	violet 7	orange 000	87000 $\Omega$
(f)	red 2	brown 1	red 00	2100 $\Omega$

Try

The value of a resistor is 230  $\Omega$ . What are the first three bands of colour on this resistor?

$230 \Omega$   
1 zero  
Red Orange Brown

The value of this resistor is 6400  $\Omega$ . What are the first three bands of colour on this resistor?

$6400 \Omega$   
2 zero  
Blue Yellow Red

