

Etta Tsosie  
Maxine Norton

# Basic Electronics

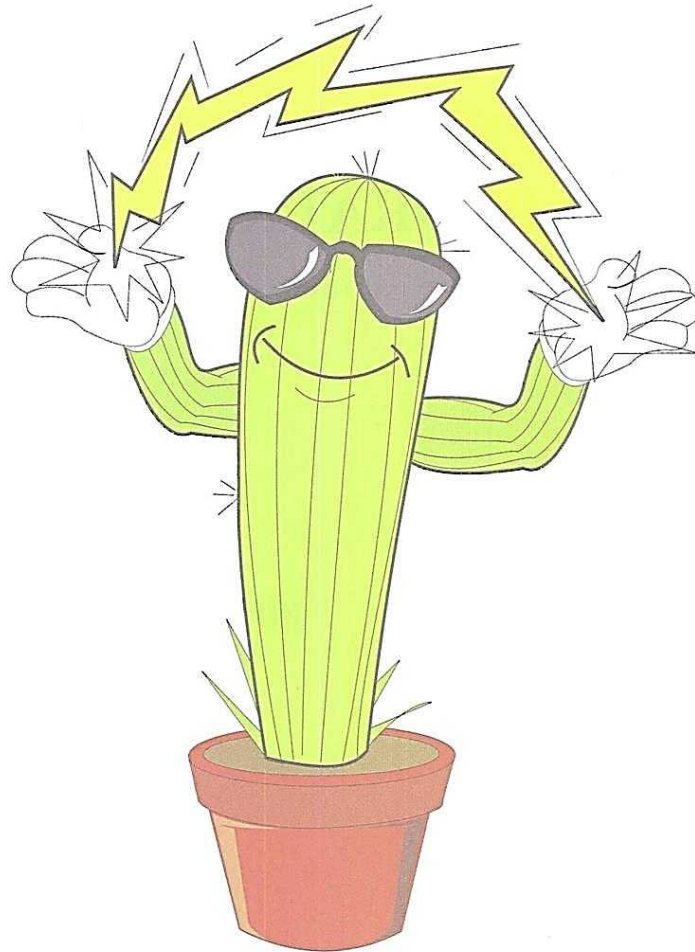
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Sandia National Laboratories

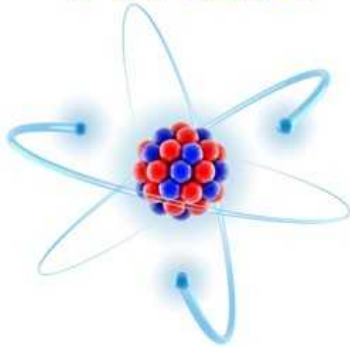


# Spike: permission to use material

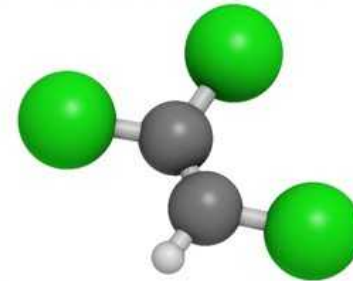


# Nature of Electricity

Atoms



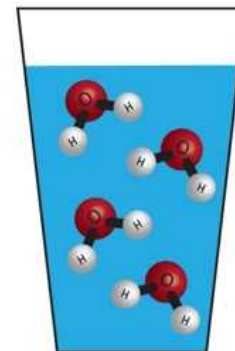
Molecules



Matter

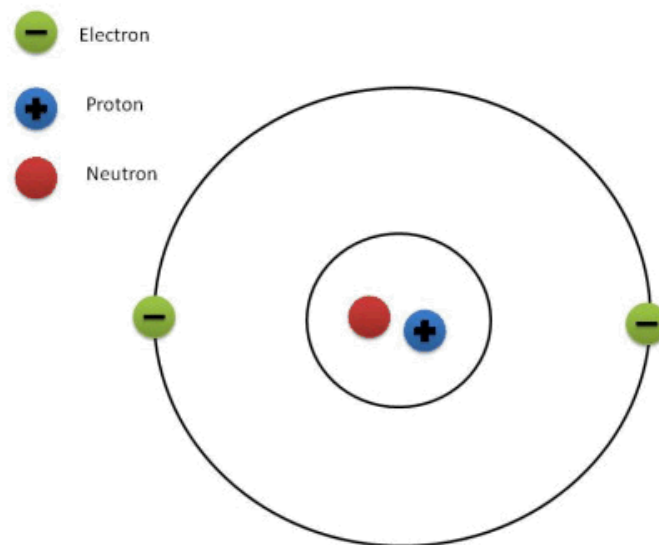
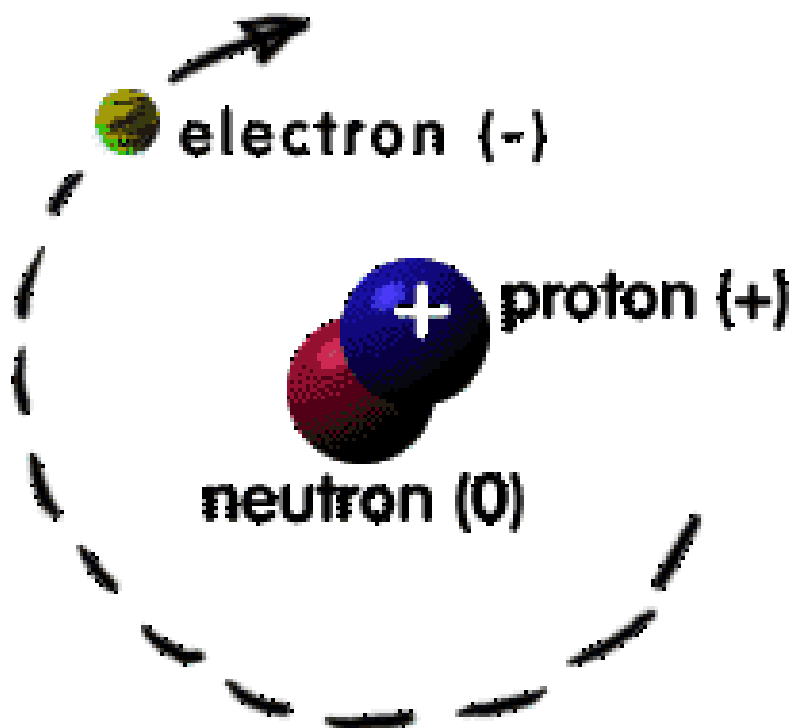


Elements



Compounds

# The ATOM:



# Understanding positive/negative charge

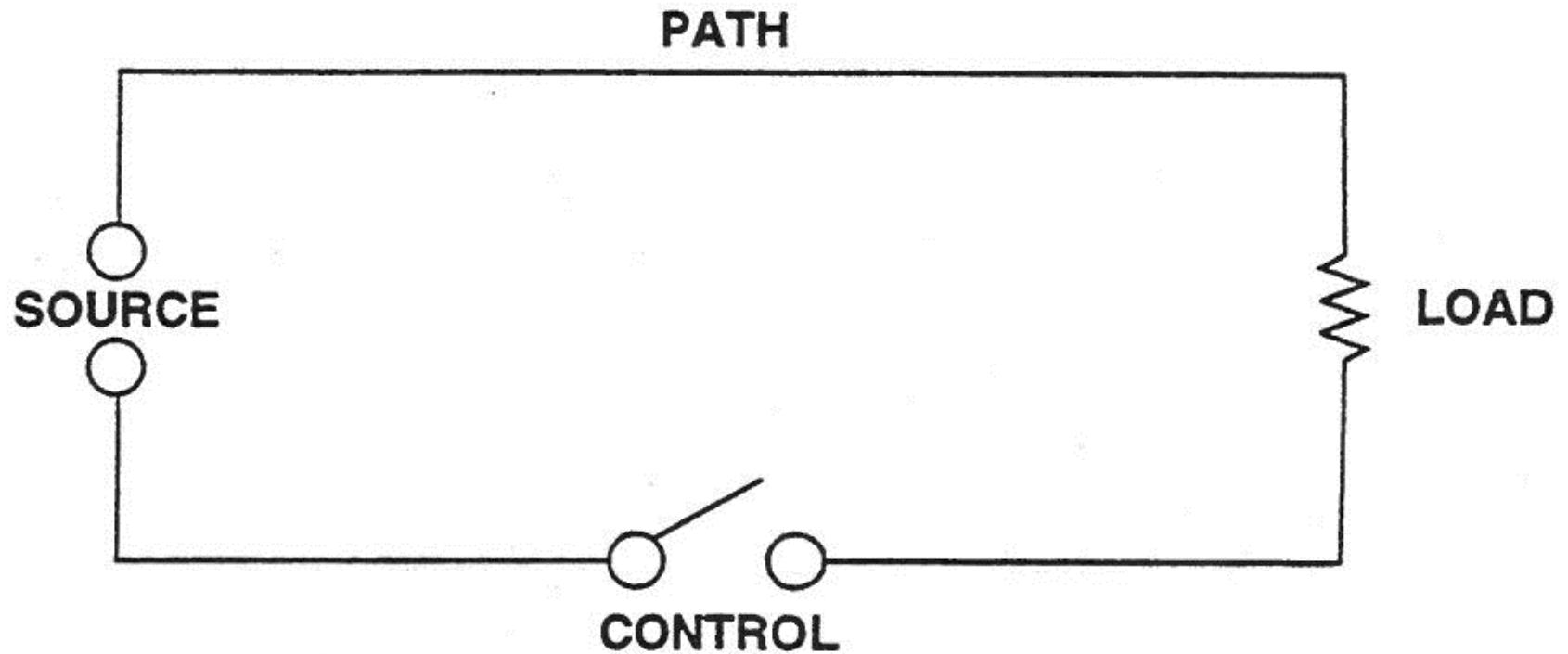


Excited atoms

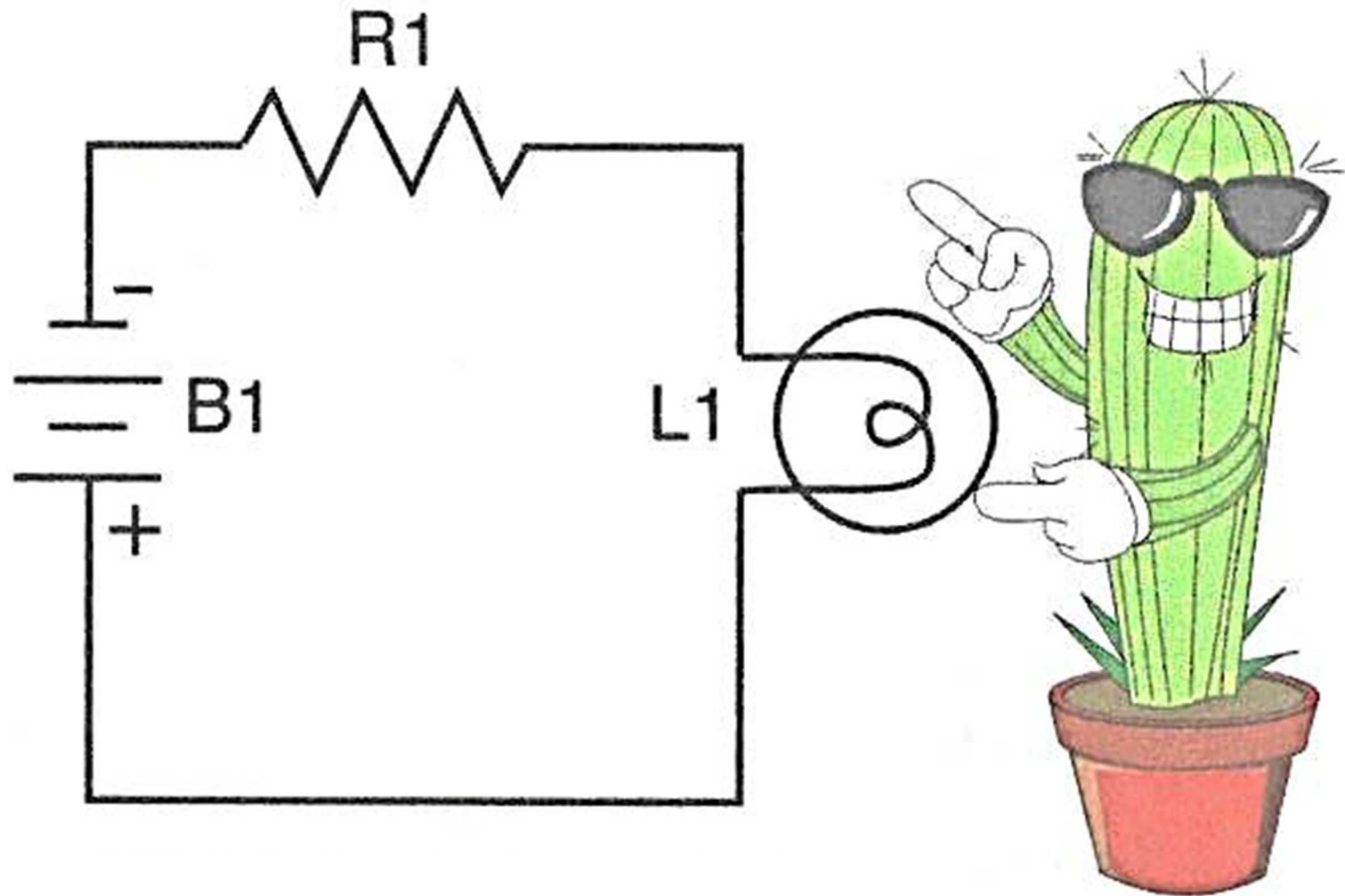


Static = Charge does not move or flow.

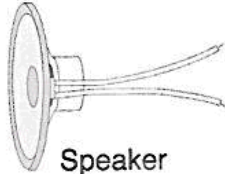


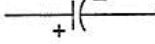
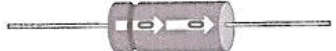
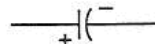

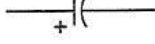

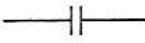
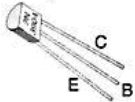
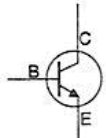
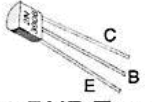
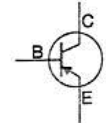
# The Basic Circuit

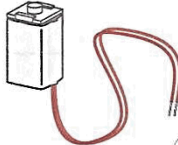
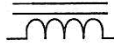
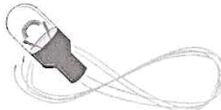

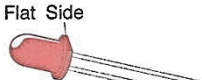

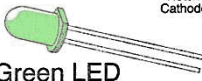



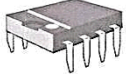
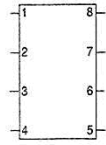
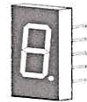
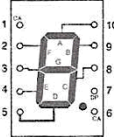




# Basic circuit board




















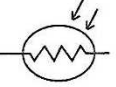

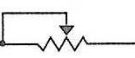
# Parts List, Pages 3 & 4

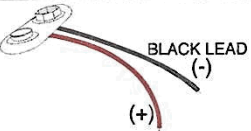
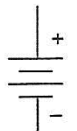
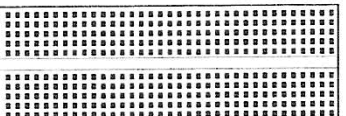
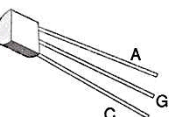
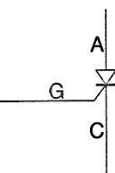

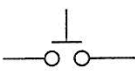

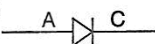
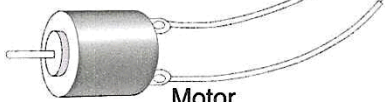

Item	Schematic Symbol
 Speaker	
 1 $\mu$ F Electrolytic Capacitor	
 10 $\mu$ F Electrolytic Capacitor	
 1,000 $\mu$ F Electrolytic Capacitor	
 .01 $\mu$ F Disc Capacitor (103)	
 2N3904 NPN Transistor	
 2N3906 PNP Transistor	

Item	Schematic Symbol
 Electromagnetic Coil	
 Lamp	
 Red LED	
 Green LED	
 Yellow LED	
<p><b>NOTE:</b></p> <p>The cathode (C) of the LED is indicated by a <u>flat side</u> OR a <u>notch</u> in the base of the lens.</p>	
 555 IC	
 7 Segment Display (HP HDSP-7801)	
 Wire	

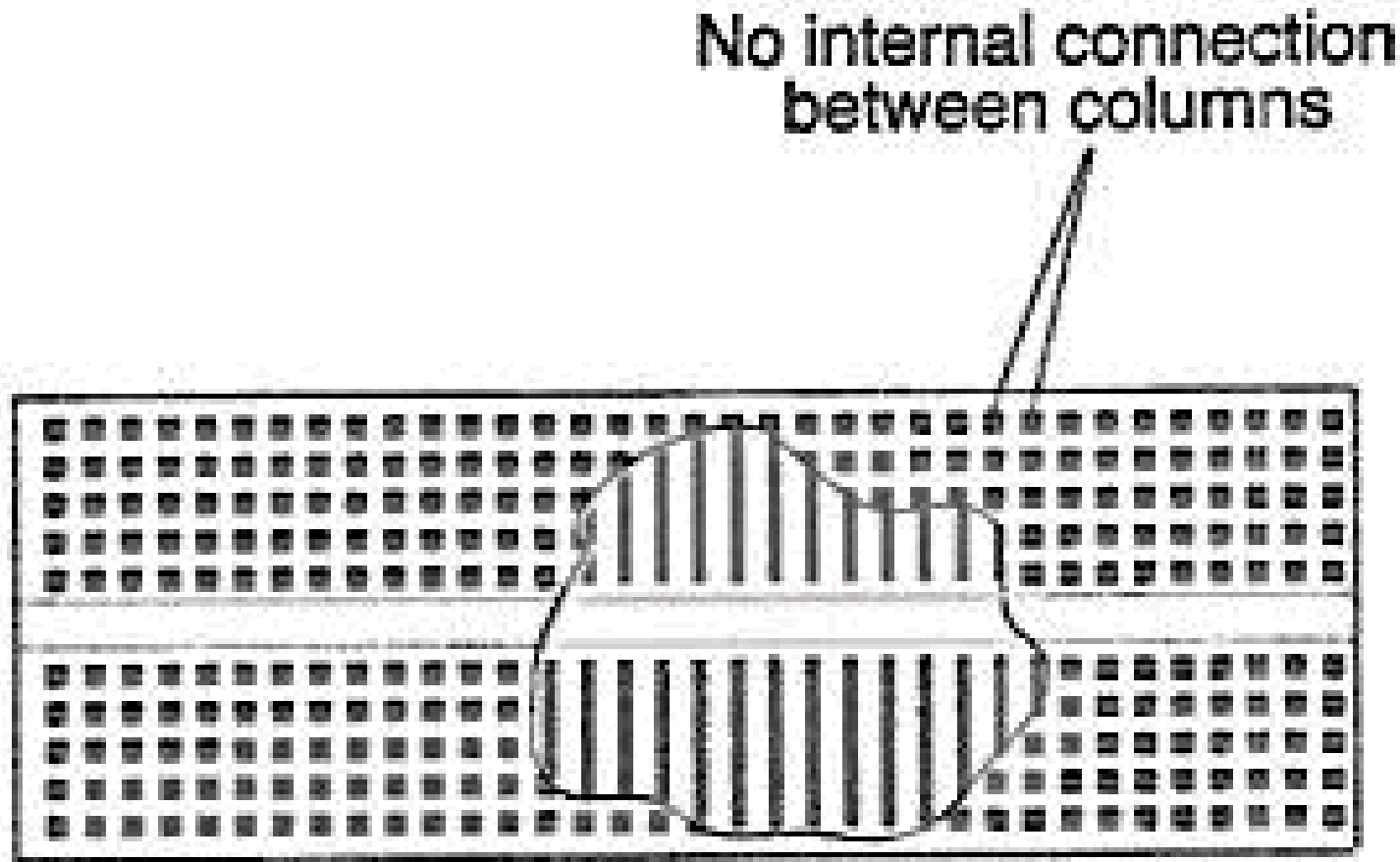


# Parts List, Pages 5 & 6

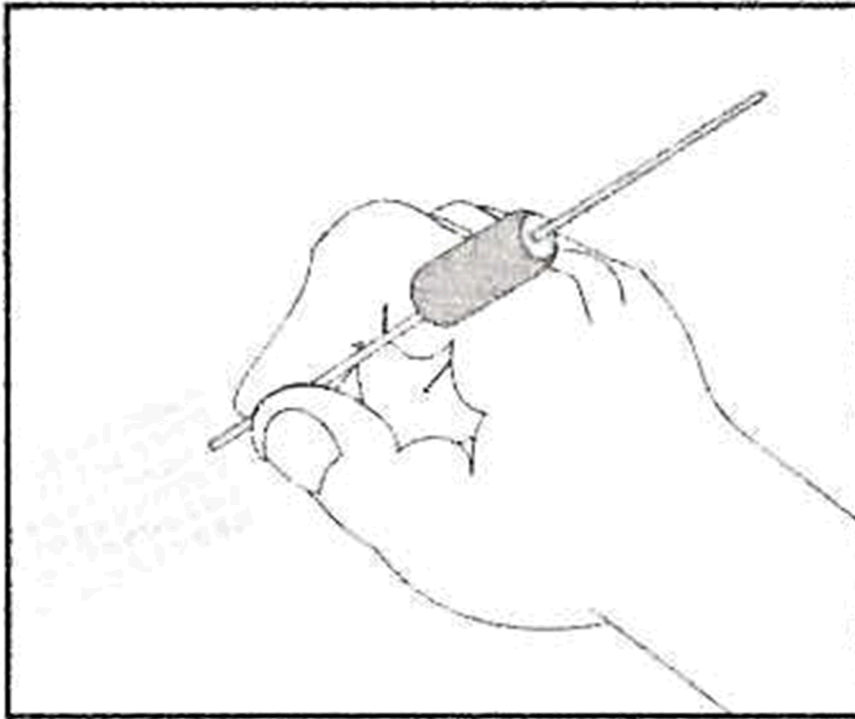
Item	Schematic Symbol
 Resistor-12Ω (brown, red, black)	
 Resistor-100Ω (brown, black, brown)	
 Resistor-1KΩ (brown, black, red)	
 Resistor-4.7KΩ (yellow, violet, red)	
 Resistor-15KΩ (brown, green, orange)	
 Resistor-100KΩ (brown, black, yellow)	
 Resistor-620KΩ (blue, red, yellow)	
 Resistor-10MegΩ (brown, black, blue)	
 CDS Cell	
 50KΩ Potentiometer	

Item	Schematic Symbol
 Battery Snap	 (Battery)
 Breadboard	
 X0602 SCR	
 Pushbutton Switch	
 1N4001 Diode	
 Motor	 DC MOTOR

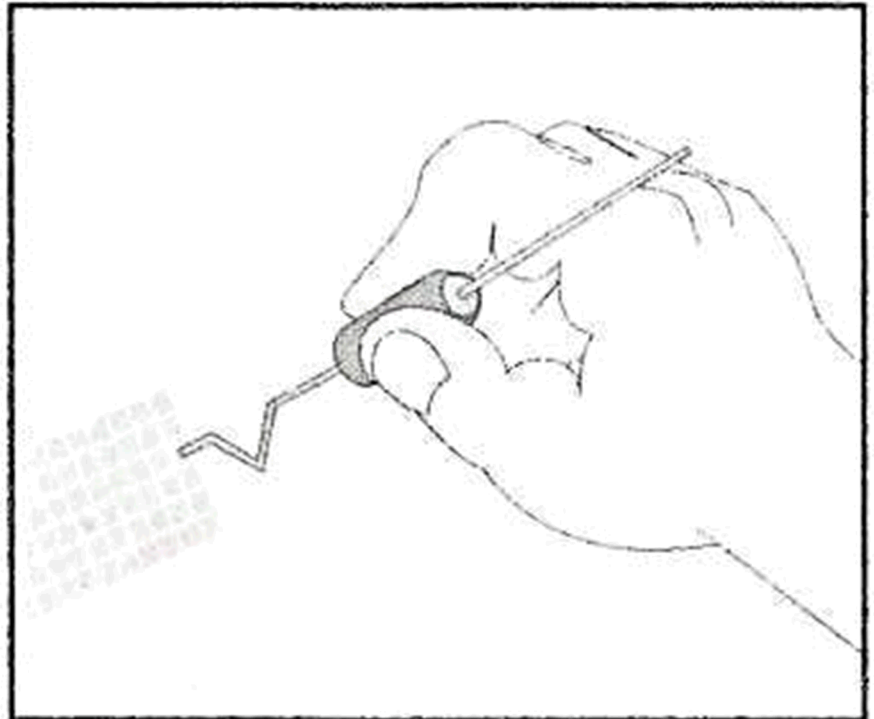
# Cutaway view of a universal breadboard



# How to insert a component into the universal breadboard

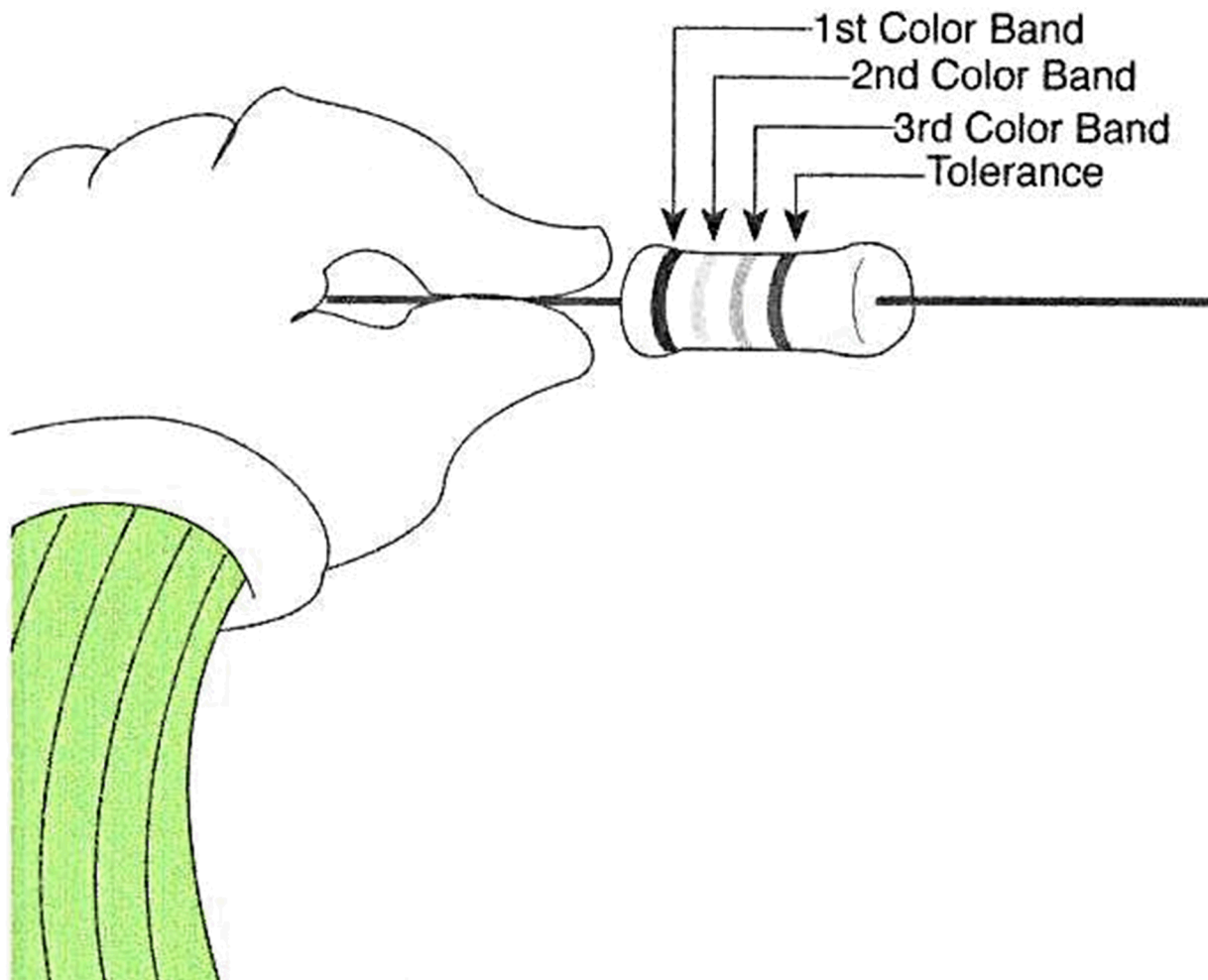


RIGHT

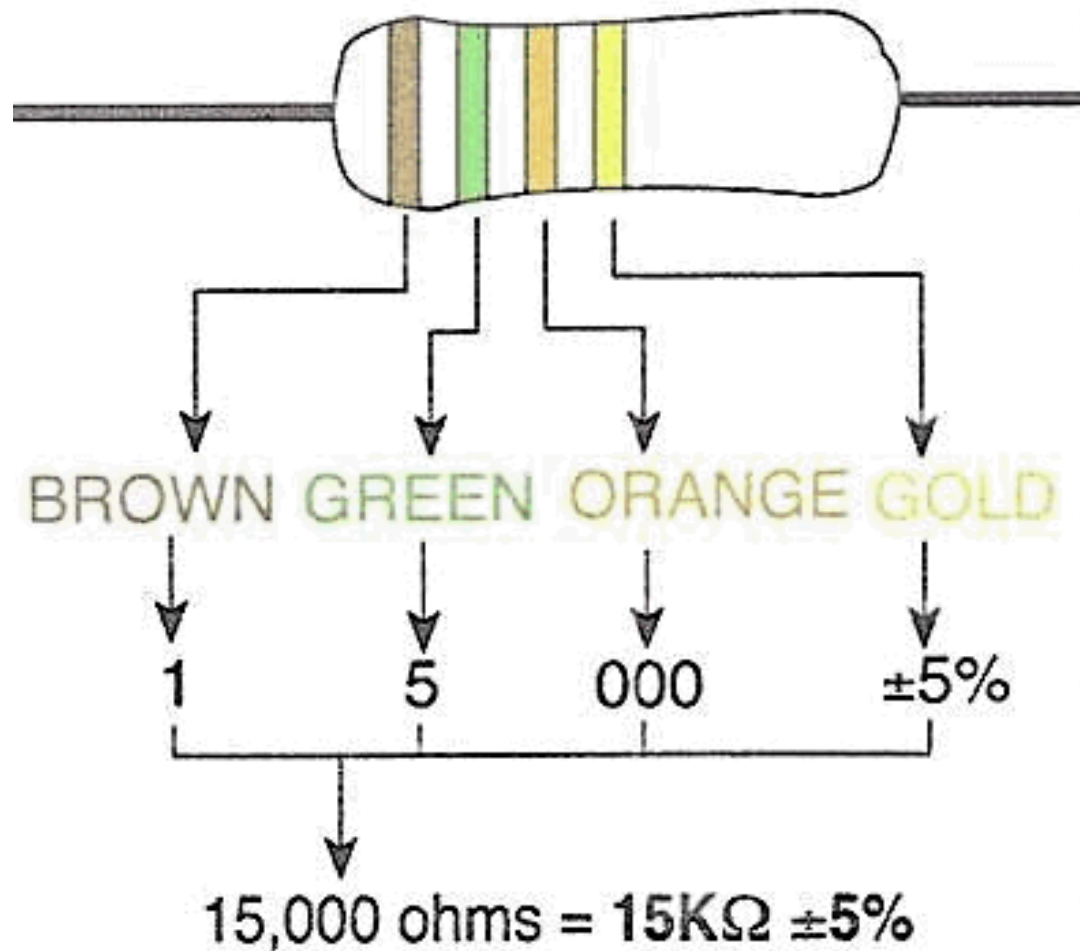


WRONG

# The proper way to hold a resistor for reading



# 15K resistor decoding



# Ohm's Law

$$I(\text{current}) = \frac{E(\text{voltage})}{R(\text{resistance})}$$

$$I = \frac{E}{R} \quad I = \frac{9}{112} \quad I = 80\text{ma}$$

# Resistor Decoding Chart

## RESISTOR COLOR CODE

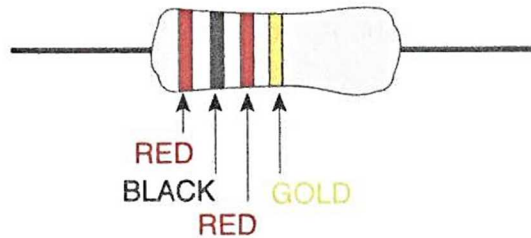
COLOR	1ST DIGIT	2ND DIGIT	MULTIPLIER
	0	0	1.
	1	1	10.
	2	2	100
ORANGE	3	3	1,000 (K)
YELLOW	4	4	10,000
	5	5	100,000.
	6	6	1,000,000. (M)
	7	7	10,000,000.
GRAY	8	8	100,000,000.
WHITE	9	9	1,000,000,000.

TOLERANCE: NO COLOR 20%, SILVER 10%, AND GOLD  $\pm 5\%$ .



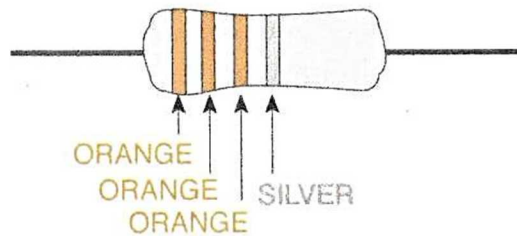
# Decode the following resistors.

1.



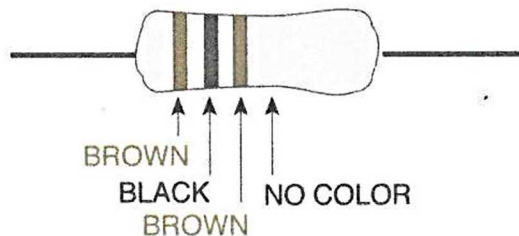
value \_\_\_\_\_  
tolerance \_\_\_\_\_

2.



value \_\_\_\_\_  
tolerance \_\_\_\_\_

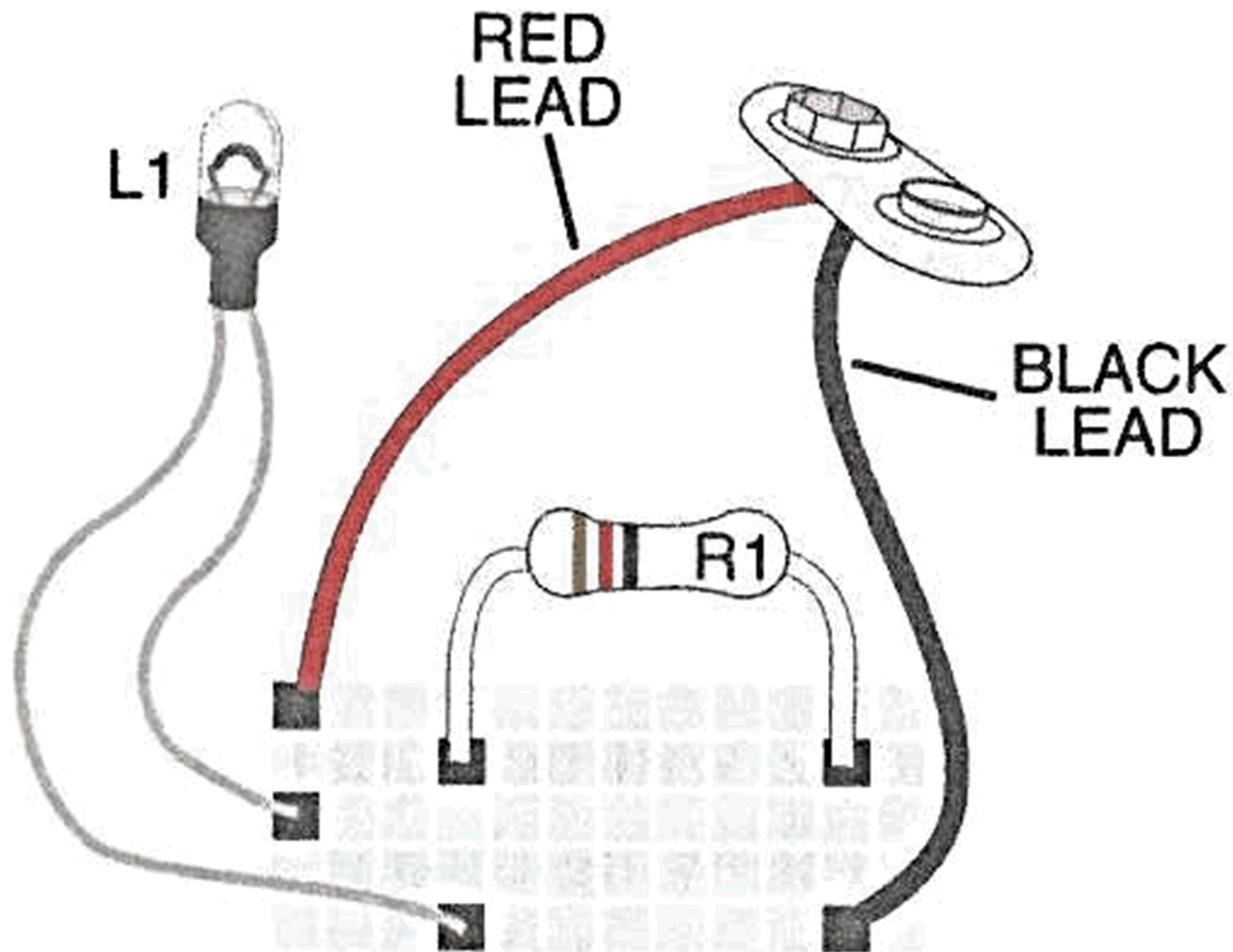
3.



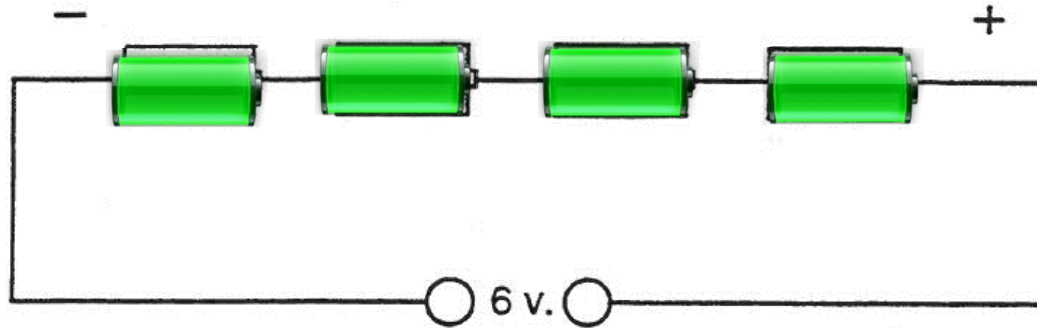
value \_\_\_\_\_  
tolerance \_\_\_\_\_



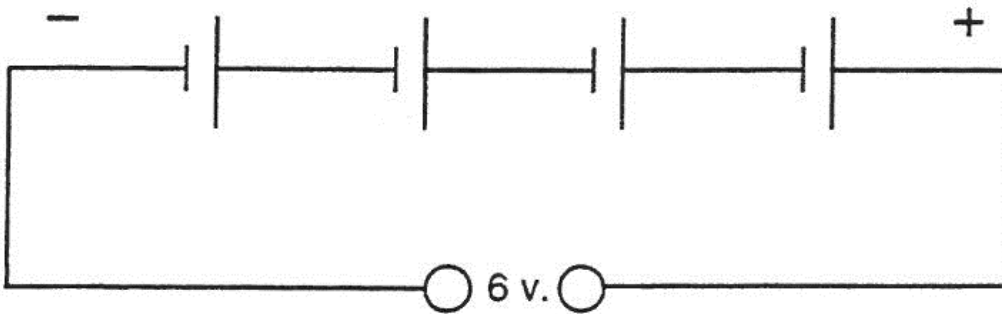
# Physical hookup of a basic electronic circuit



# Pictorial/Schematic diagram of a battery connected in *Series*

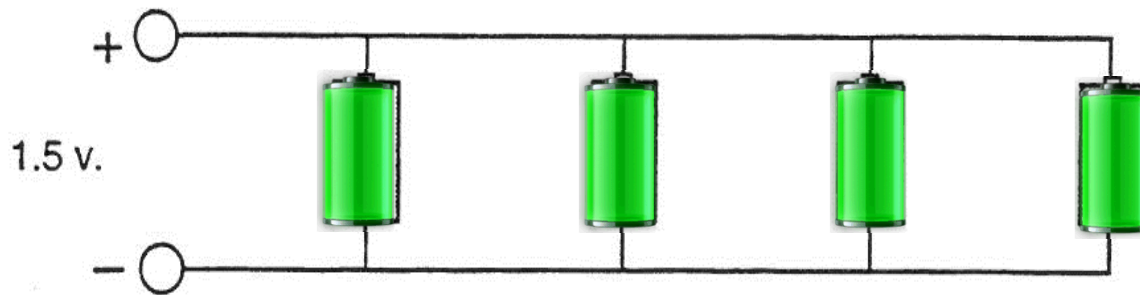


**Pictorial**

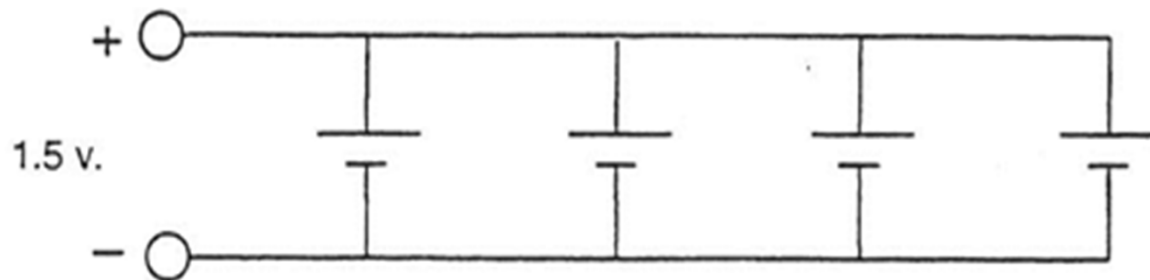


**Schematic**

# Pictorial/Schematic diagram of a battery connected in *Parallel*



**Pictorial**



**Schematic**