

QUANTITATIVE vs. QUALITATIVE ANALYSIS

OBJECTIVES:

- 1. Understand the Difference Between Quantitative and Qualitative Methods**
- 2. Interpretation and Usage of Electronic Symbols Within Circuit Diagrams**
- 3. Simple Circuit Creation Using:**
 - *Circuit Bread Boards*
 - *Discrete Electrical Components*
- 4. Simple Circuit Measurement:**
 - *Ohm-Meters*
 - *Volt-Meters*
 - *Amp-Meters*

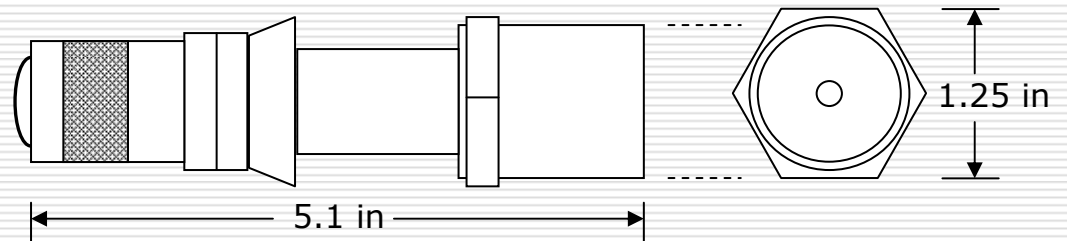
QUALITATIVE vs. QUANTITATIVE

- **Qualitative Approach:** Observational methods in which raw data exists in non-numerical form. Involves the analysis of data such as words (e.g., from interviews), pictures (e.g., video), or objects (e.g., an artifact).
- **Quantitative Approach:** Observational methods in which raw data exists in numerical form. Involves the analysis of numerical data.


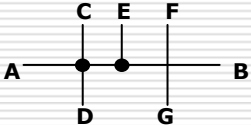
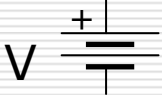

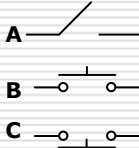

FLASHLIGHT: A QUANTITATIVE APPROACH

SUREFIRE Z2 Flashlight - Specification:



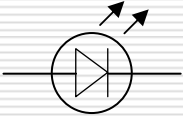

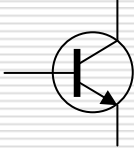
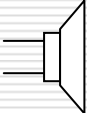
- Length: 5.1 inches
- Diameter
 - Body: 1.0 inch
 - Bezel: 1.25 inch
- Weight: 5.25 ounces
- Battery Type: 3V Lithium
- Number Required: Two (2)
- Lamp Assembly: Xenon P60
- Lens: Polycarbonate, Scratch resistant
- Switch: Tail Cap type, Rotation/Pressure Activation
- Body Type: Aircraft Grade Aluminum
- Power Output: P60 – 65 Lumens
- Run Time: 60 Minutes



SYMBOLIC ELECTRONIC COMPONENTS

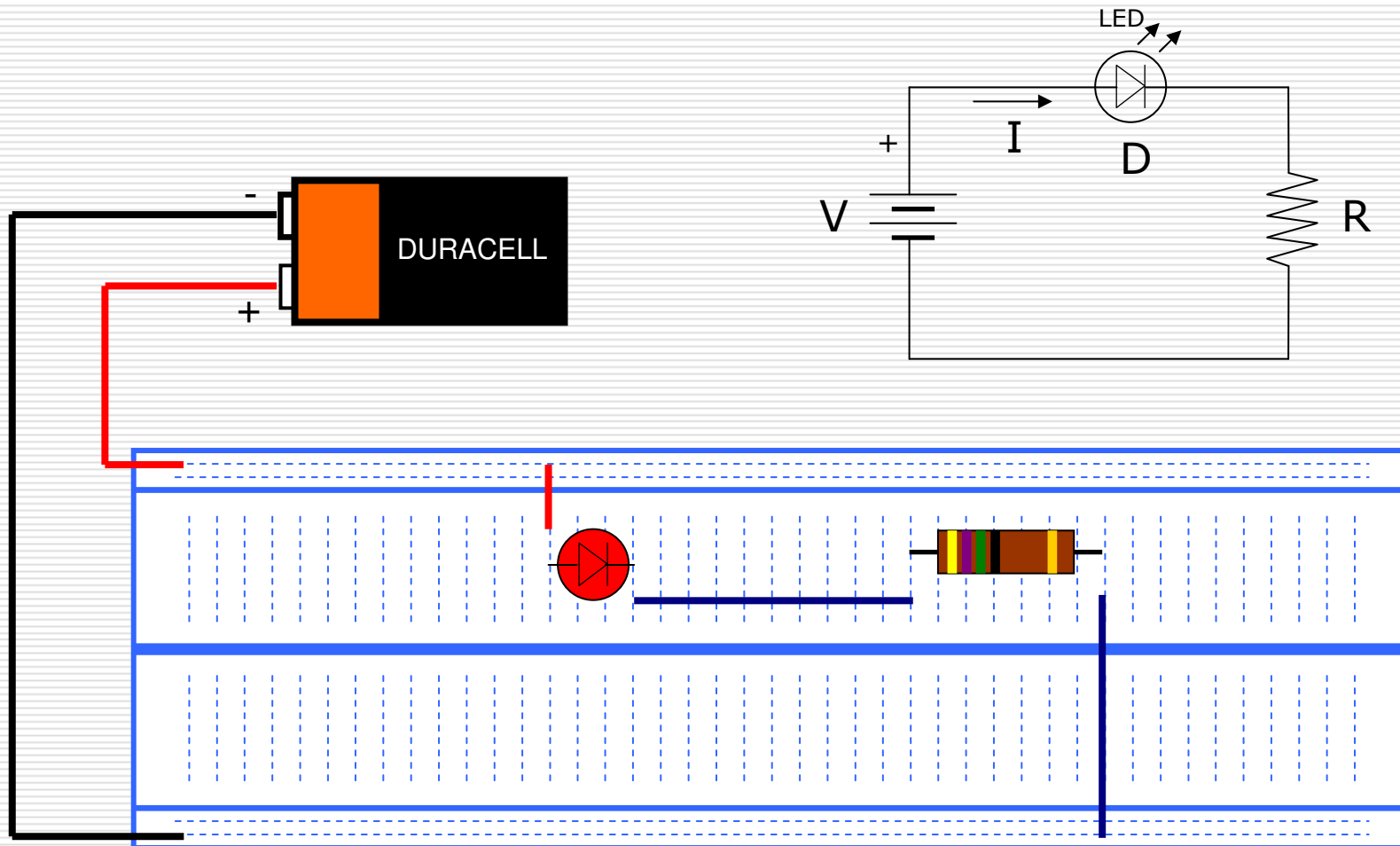
COMPONENT	CIRCUIT SYMBOL	FUNCTION
WIRE		Passes current from one part of circuit to another.
WIRE INTERSECTION		A "blob" is used to indicate wire connectivity.
BATTERY/CELL		Supply of electrical energy.
GROUND/Common		Represents a connection to earth, or common connection point. Usually references zero (0) volts.
SWITCHES		Allows current to flow only if the switch condition is met.
RESISTOR		Restricts the flow of current.

SYMBOLIC ELECTRONIC COMPONENTS

COMPONENT	CIRCUIT SYMBOL	FUNCTION
LAMP (LIGHTING)		Converts electrical energy to light, primarily for illumination.
LAMP (INDICATOR)		Converts electrical energy to light, primarily as an indicator.
DIODE (LED)		Only allows current to flow in one direction. Specialized Diodes used to emit light (LED).
CAPACITOR		Stores an electric charge.
TRANSISTOR		Electronic switch used to amplify current, or as a switching circuit.
LOUD SPEAKER		Converts electrical energy to sound.

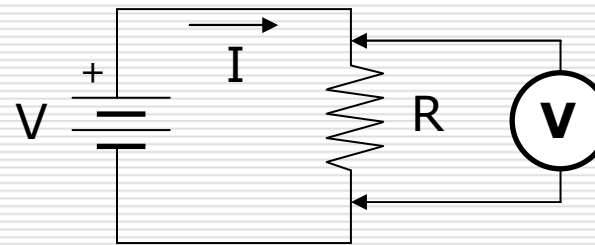
<http://www.kpsec.freeuk.com/symbol.html>

SCHEMATIC vs. PHYSICAL IMPLEMENTATION

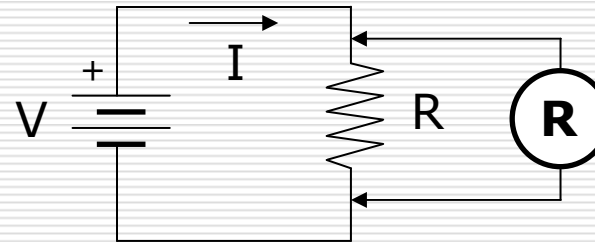


Simple Circuit Measurement

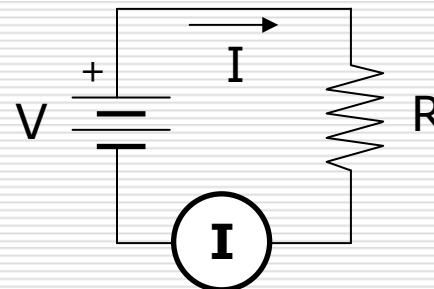
Measuring Voltage:



Measuring Resistance:



Measuring Current:



Resistor Color Coding

4 – Band Code:

560K Ohms



COLOR	1 st BAND	2 nd BAND	3 rd BAND	MULTIPLIER	TOLERANCE
Black	0	0	0	1	
Brown	1	1	1	10	+/- 1%
Red	2	2	2	100	+/- 2%
Orange	3	3	3	1K	
Yellow	4	4	4	10K	
Green	5	5	5	100K	+/- 0.5%
Blue	6	6	6	1M	+/- 0.25%
Violet	7	7	7	10M	+/- 0.10%
Grey	8	8	8		+/- 0.05%
White	9	9	9		
Gold				0.1	+/- 5%
Silver				0.01	+/- 10%

5 – Band Code:

237 Ohms



Reading Resistor Color Coding

1. Turn Resistor so that the gold, silver or lone stripe is at the right end of the resistor. If the resistor has only three stripes, all three should be on the left side.
2. Look at the color of the first two stripes on the left end. Using the previous table, this determines the first two digits of the resistor value.
3. Look at the third stripe from the left. This determines the Multiplier of the resistor, as defined in the previous table.
4. Multiply the two digit number obtained from step two by the number from step 3 (the Multiplier). This is the value of the resistor in Ohms.
5. The stripe all of the way to the right indicates the accuracy or tolerance of the resistor (e.g., a gold stripe means the value of the resistor may vary by 5% from the reflected resistor value).