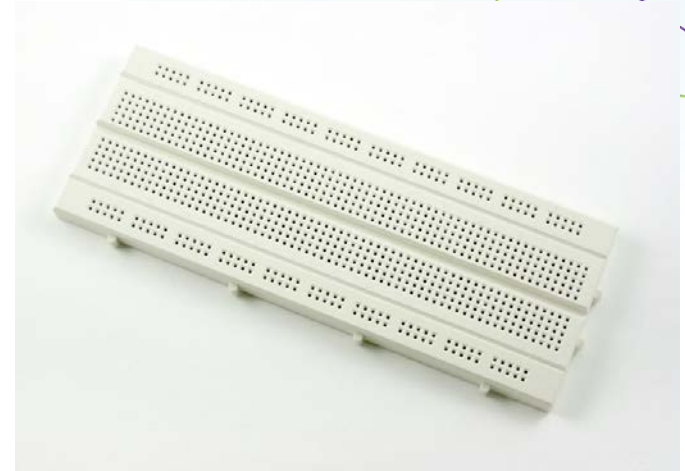
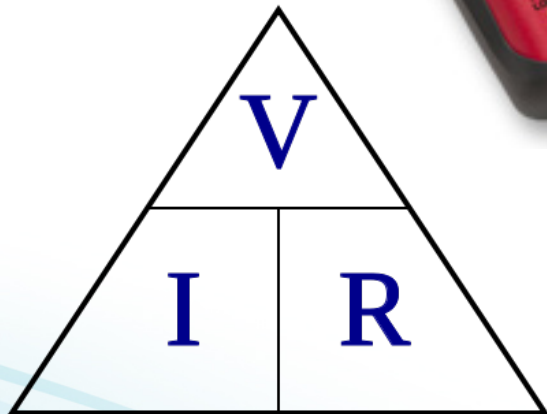


# Lab4: Instrumentation lab



PHY 2049L General Physics Lab II, Spring2016

# Outline

## ➤ Theory behind the experiment

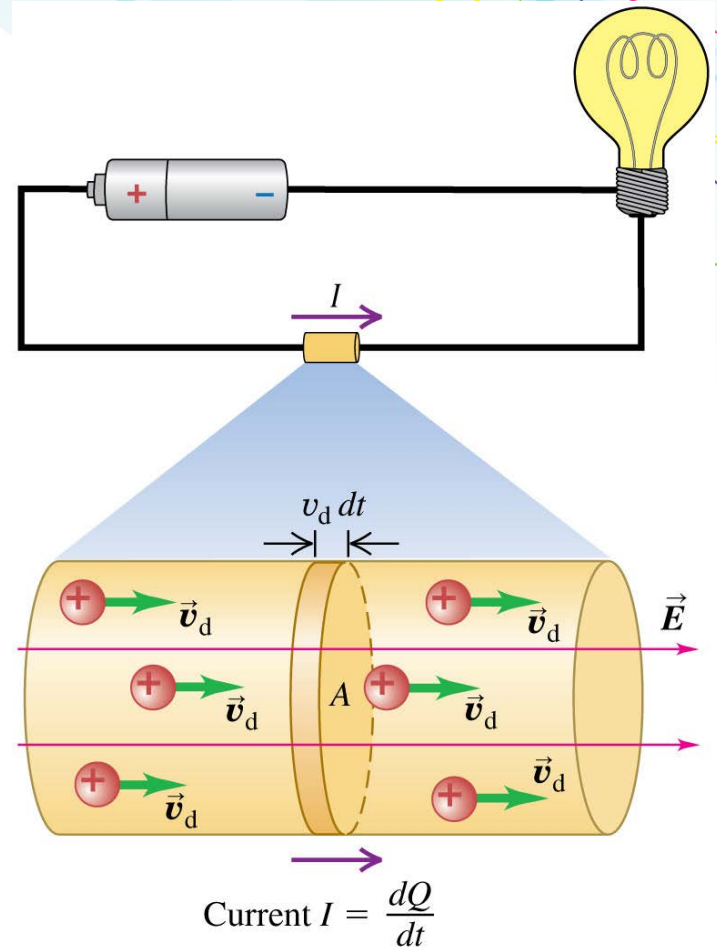
- Ohm's law
- Resistance ( $R$ ), potential difference ( $\Delta V_{dc}$ ), and current ( $I_{dc}$ ) measurement.

## ➤ Learning activities

- How does a breadboard work?
- $R$ ,  $\Delta V_{dc}$ , and  $I_{dc}$  measurement using multimeters
- data analysis using LINEST function and percent difference.

# Electric current

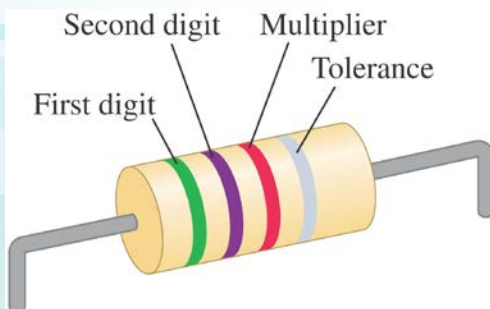
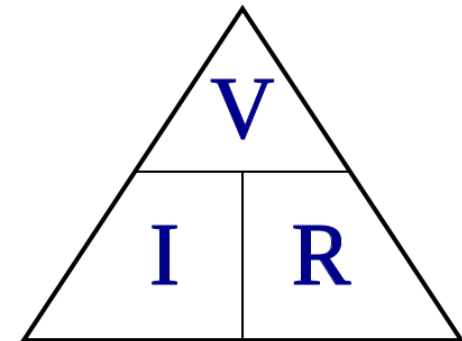
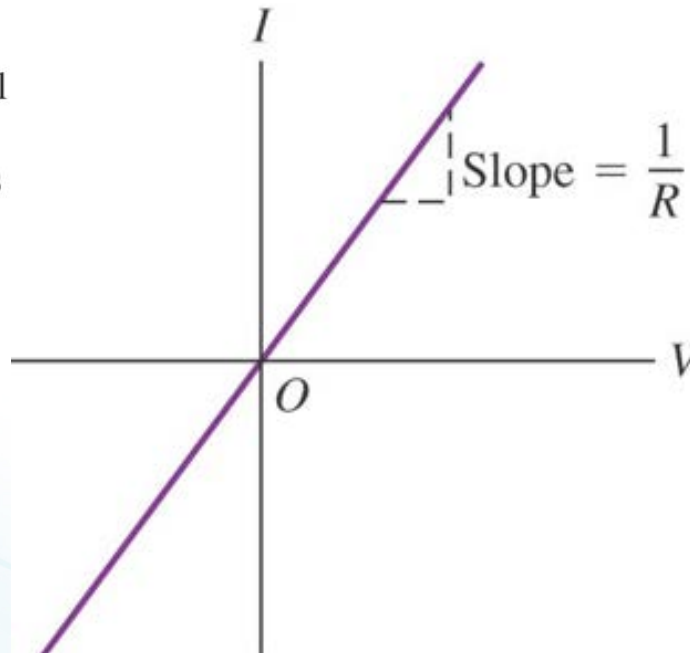
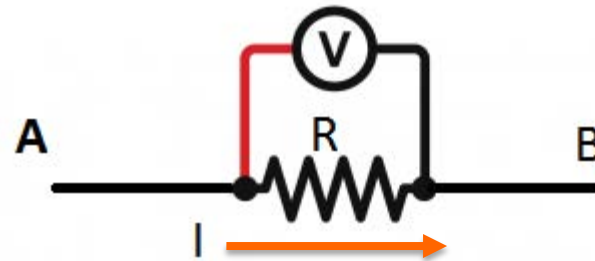
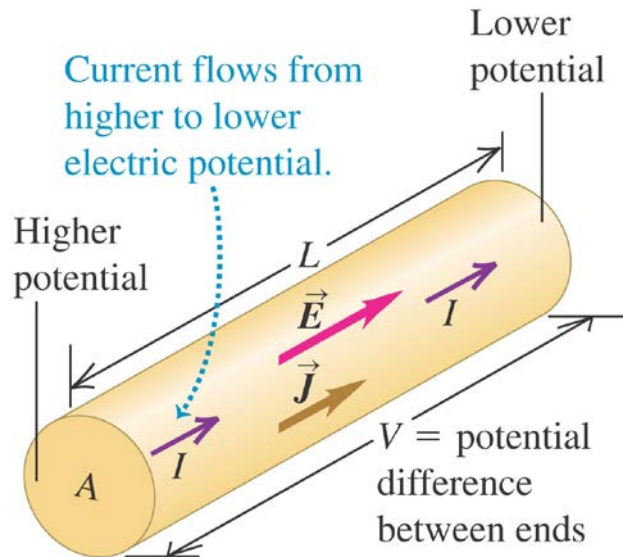
- electric currents flow through light bulbs.
- electric circuits contain charges in motion.
- positive charges moving in the direction of the electric field.



H.D. Young et al, University Physics with modern physics 11<sup>th</sup> ed.,2011

# Ohm's law

An electric current in a metal wire is proportional to the potential difference  $V$  applied to its two end.



Color code resistor

# Data/analysis

## Lab 4: Instrumentation lab

Group #.....

1).....

2).....

3).....

4).....

### **Bulding a simple circuit (50 pts)**

### **Data analysis to verify Ohm's law (50 pts)**

Measured resistance ( $R_{\text{theory}}$ ) = \_\_\_\_\_  $\Omega$ ,  $R_{\text{exp}}$  from data analysis = \_\_\_\_\_  $\Omega$

$$\text{percent difference} = \frac{|\text{theoretical} - \text{experimental}|}{\text{theoretical}} \times 100 = \underline{\hspace{2cm}}$$

No.	Voltage (v)	Current (mA)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

### I-V plot of a simple circuit

The graph shows a coordinate system for plotting current versus voltage. The vertical axis is labeled 'Current (mA)' and has tick marks at 0.0000, 0.2000, 0.4000, 0.6000, 0.8000, 1.0000, and 1.2000. The horizontal axis is labeled 'Voltage (V)' and has tick marks at 0.000, 0.200, 0.400, 0.600, 0.800, 1.000, and 1.200.

R =		Ohm.
%diff. =		%