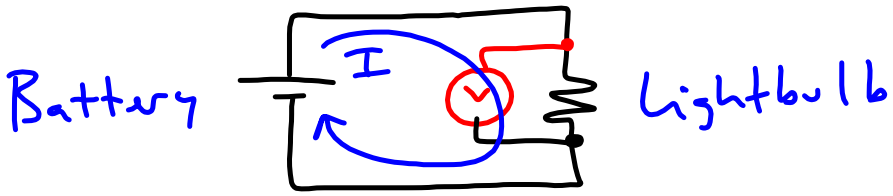
More Circuits

- Materials
  - 2 boards
  - 1 battery/holder
  - 3 light bulb/holders
  - wires (red and black)
  - multimeter with plug-to-clips

- Simple Series Circuit

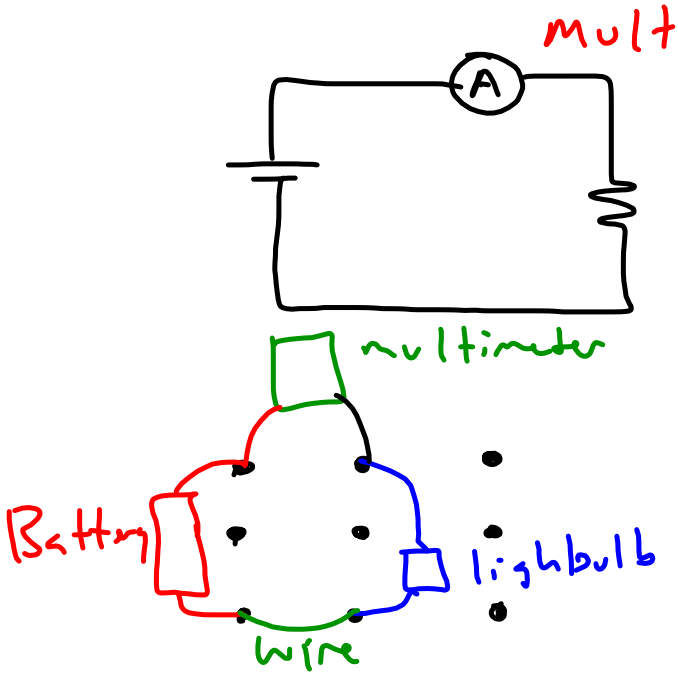


Multimeter (orange device) → $\overline{\overline{\overline{2\,V}}}$

- Red lead in V·Ω·mA·Temp plug
- Black in COM

- Electric Potential Energy
  - Energy stored electrically with the ability to move e^-
  - Hard to measure directly
- Electric Potential
  - Much easier to measure, based on defition
  - Known as "voltage"
  - ★ - Measure ACROSS pieces

- Measuring Current
  - Setting → 200 mA



BEFORE CHANGING SETTINGS, UNCLIP LEADS

- Ohm's Law
  - $V = IR$
  - Electric potential = (current)(resistance)
- What is the resistance of your lightbulb?

calculated

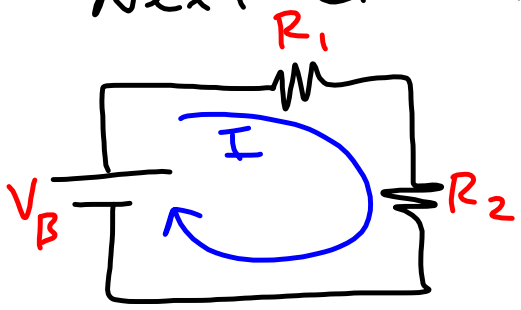
$$R = \frac{V}{I} = \frac{1.3\,V}{0.06\,A} = 21.7\,\Omega$$

measure R

- Public Safety Announcement

$$I = \frac{V}{R}$$

- Next circuit



	Measure	Calculate
I	0.055 A	
V_1	0.67 V	
V_2	0.63 V	
V_B	1.3 V	

$$V_B = V_1 + V_2$$

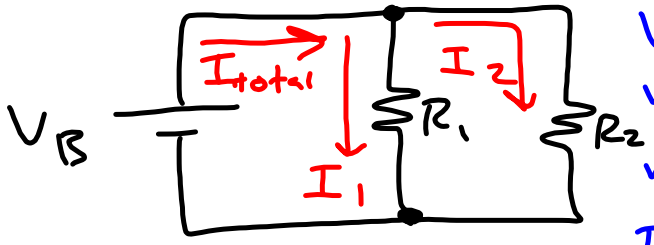
- Equivalent Resistance:
  - Way to combine resistors to calculate parts of a circuit
  - Series → $R_{eq} = R_1 + R_2 + \dots$
  - Parallel → $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots$

R_{eq} < lowest-valued resistor

$$\frac{1}{R_{eq}} = \frac{1}{10\Omega} + \frac{1}{5\Omega} \Rightarrow R_{eq} = 3.33\Omega$$

- Next Circuit

Measure Calculate



V_B
V_1
V_2
I_{total}
I_1
I_2

$$V_B = V_1 = V_2$$

$$I_{total} = I_1 + I_2$$