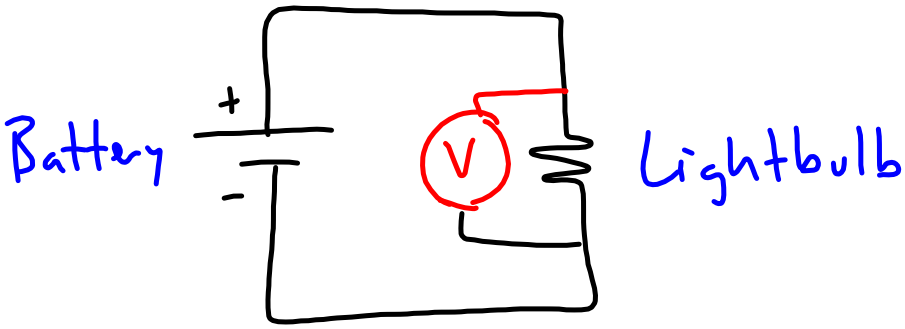
MORE CIRCUITS

- Materials
  - 2 boards
  - 1 battery / battery holder
  - 3 light bulbs / holders
  - wires
  - multimeter with plug-to-clips

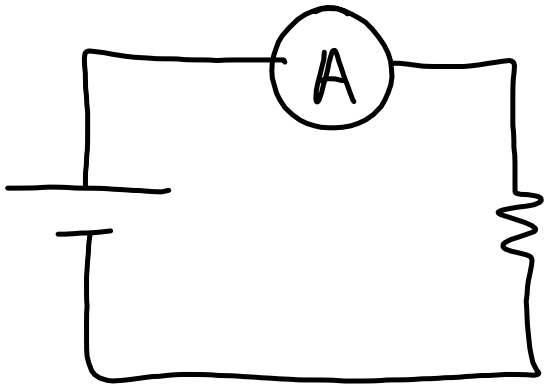
- Simple Series Circuit



Multimeter → $\overline{\overline{2V}}$

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

- Measuring Current
  - Setting → 200 mA



- Electric potential energy
  - Energy stored electrically with the ability to move e^-
  - Hard to measure directly
- Electric potential
  - Much easier to measure, based on definition
  - Known as "voltage"

 - Measure across pieces

- Ohm's Law
  - $V = IR$
  - Electric Potential = (current)(resistance)

- What is the resistance of your lightbulb?

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

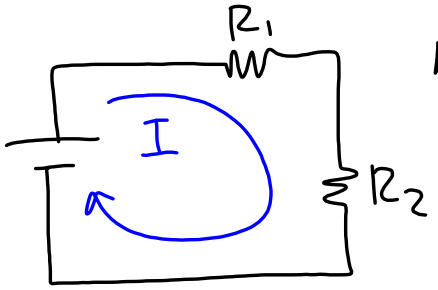
$$= \frac{1.247\,V}{0.06\,A}$$

$$= 20.8\,\Omega$$

- Public Safety Announcement

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

- New circuit



Measure and Calculate

R_1

R_2

V_1

V_2

I

$V_{total} = V_1 + V_2$

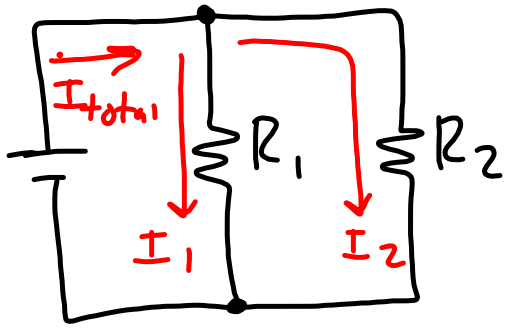
- Equivalent Resistance
  - Way to combine resistors to calculate parts of the circuit
  - Series → $R_{eq} = R_1 + R_2 + \ldots$
  - Parallel → $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$

R_{eq} < Lowest-valued resistor

Ex: $\frac{1}{R_{eq}} = \frac{1}{10\Omega} + \frac{1}{5\Omega}$

$R_{eq} = 3.33\Omega$

- Next circuit



Measure Calculate

V_{total}
V_1
V_2
I_{total}
I_1
I_2

- All electric potentials are the SAME!

- $I_{total} = I_1 + I_2$