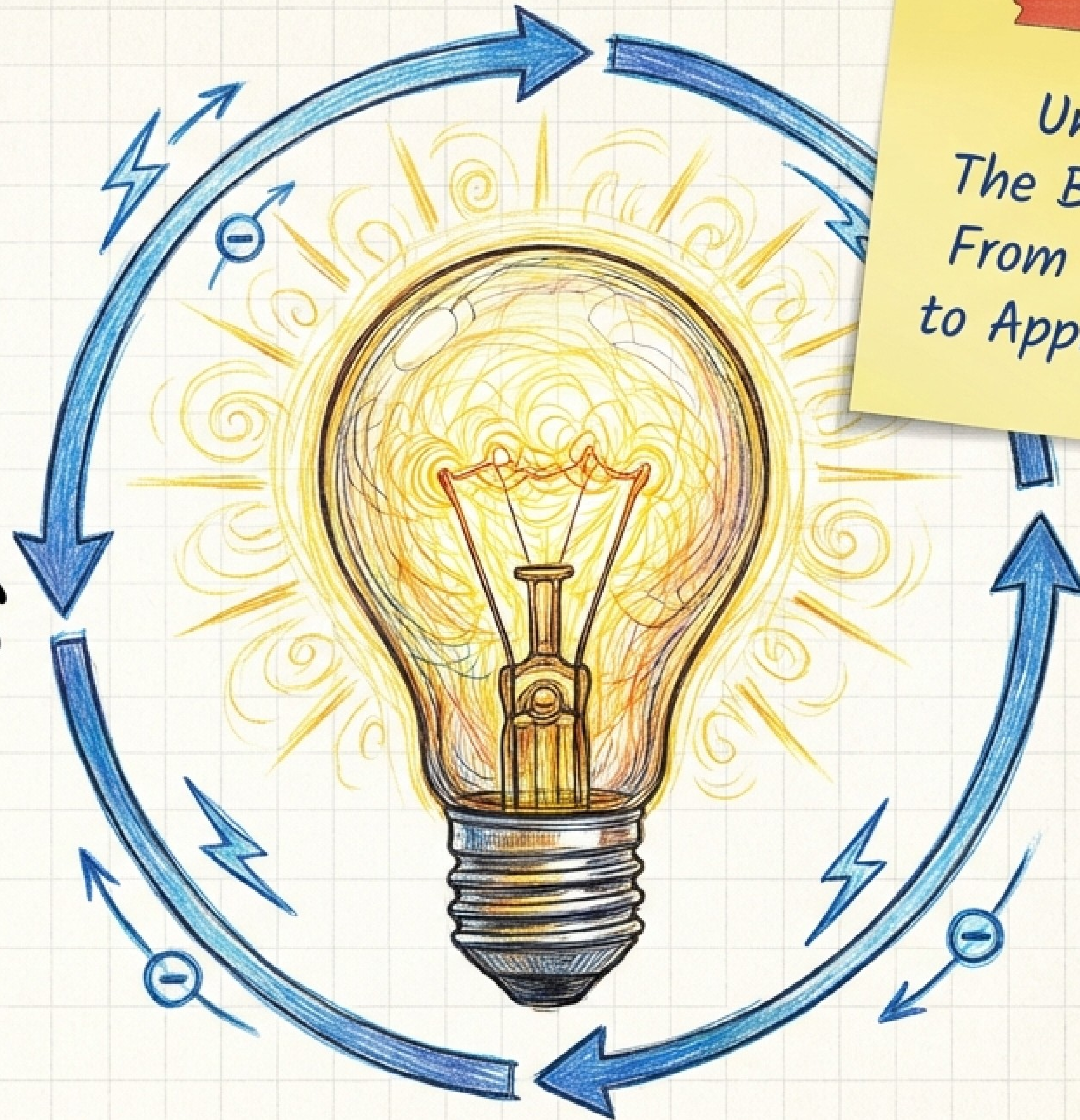


Electricity Master Notes



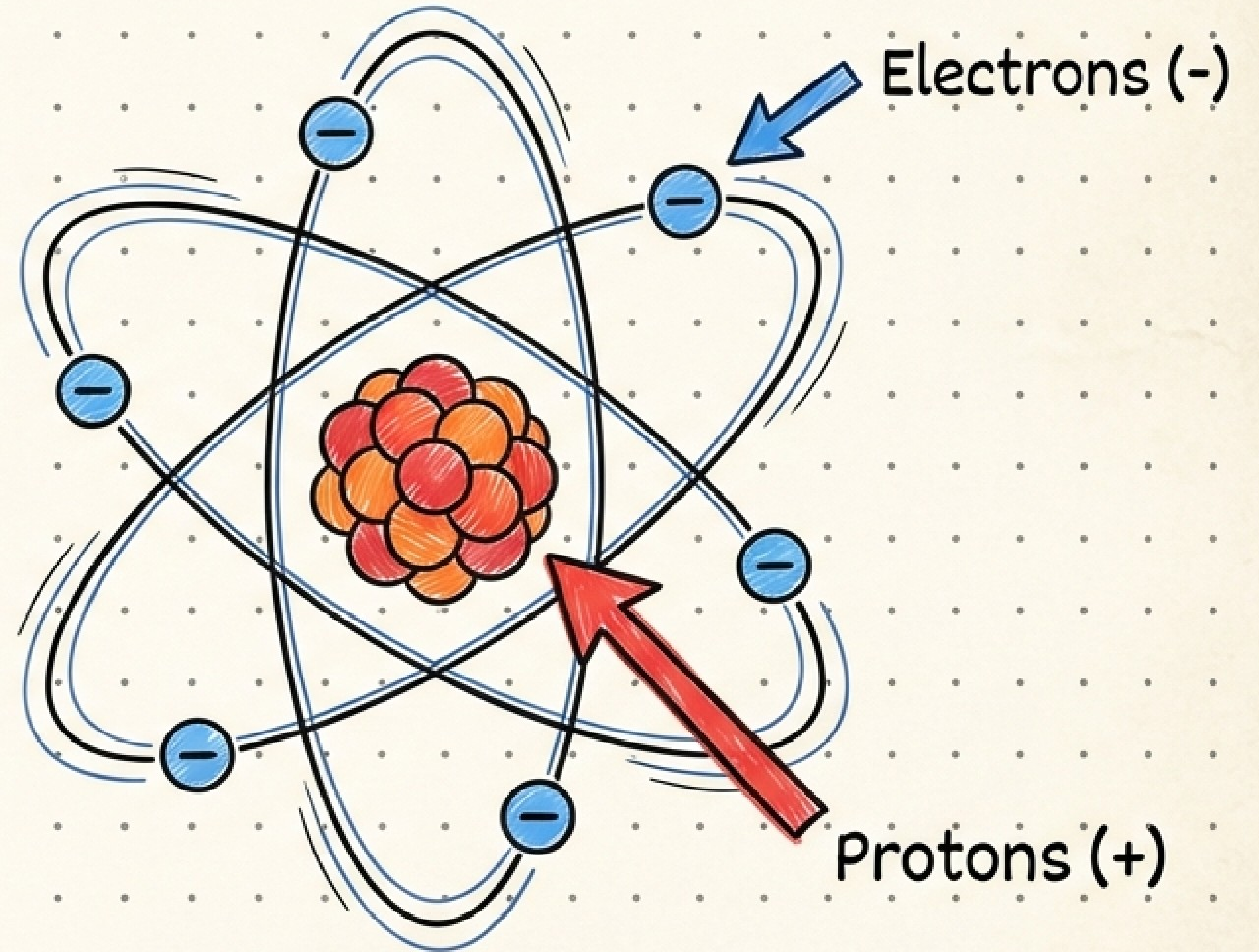
Unit 1:
The Basics -
From Atoms
to Appliances.

* Best used for review & sharing!

1. Electric Charge: The Spark of Matter

The basic property of matter responsible for electric forces.

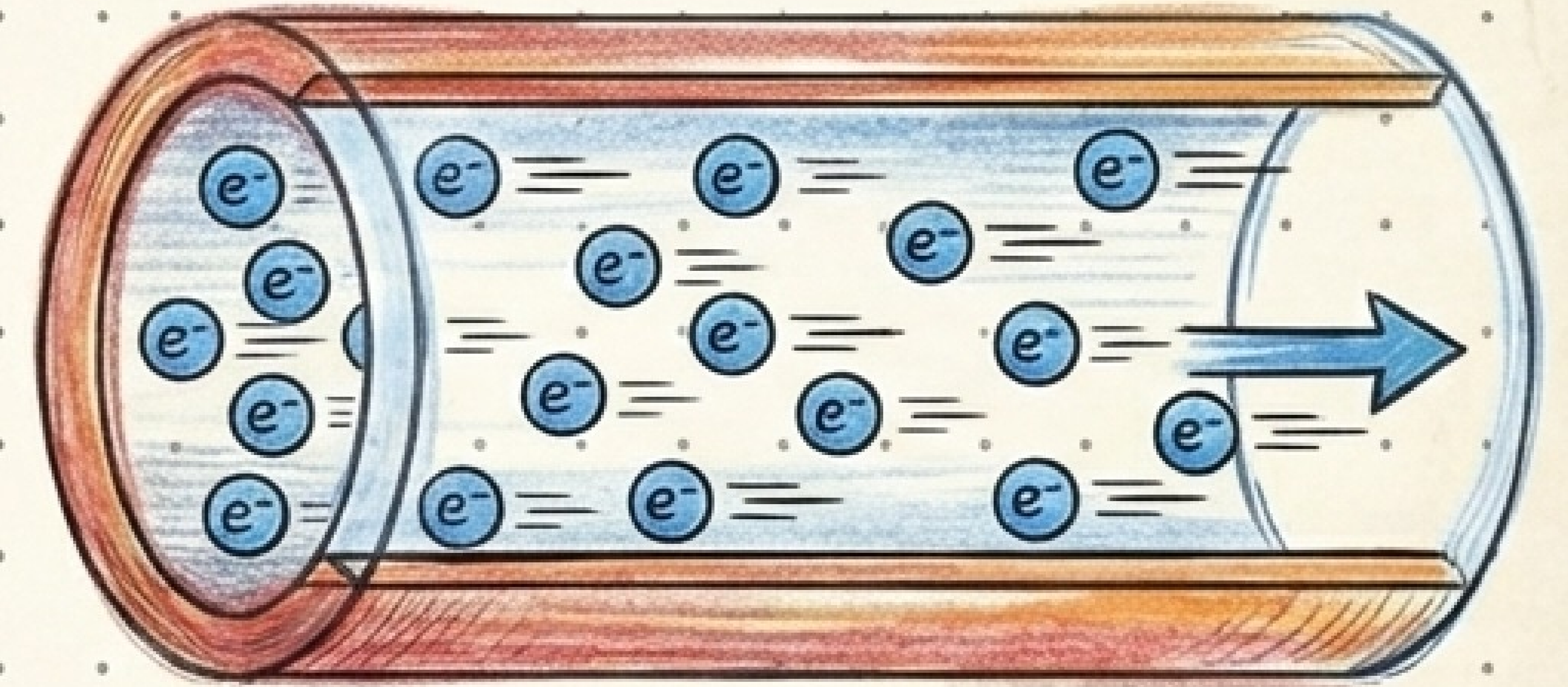
Unit: Coulomb (C)



Pro Tip: Opposites attract! The electron's negative charge is the star of our show.

2. Electric Current: The Flow

The continuous flow of electric charge.



Current
(Unit: Ampere / A)


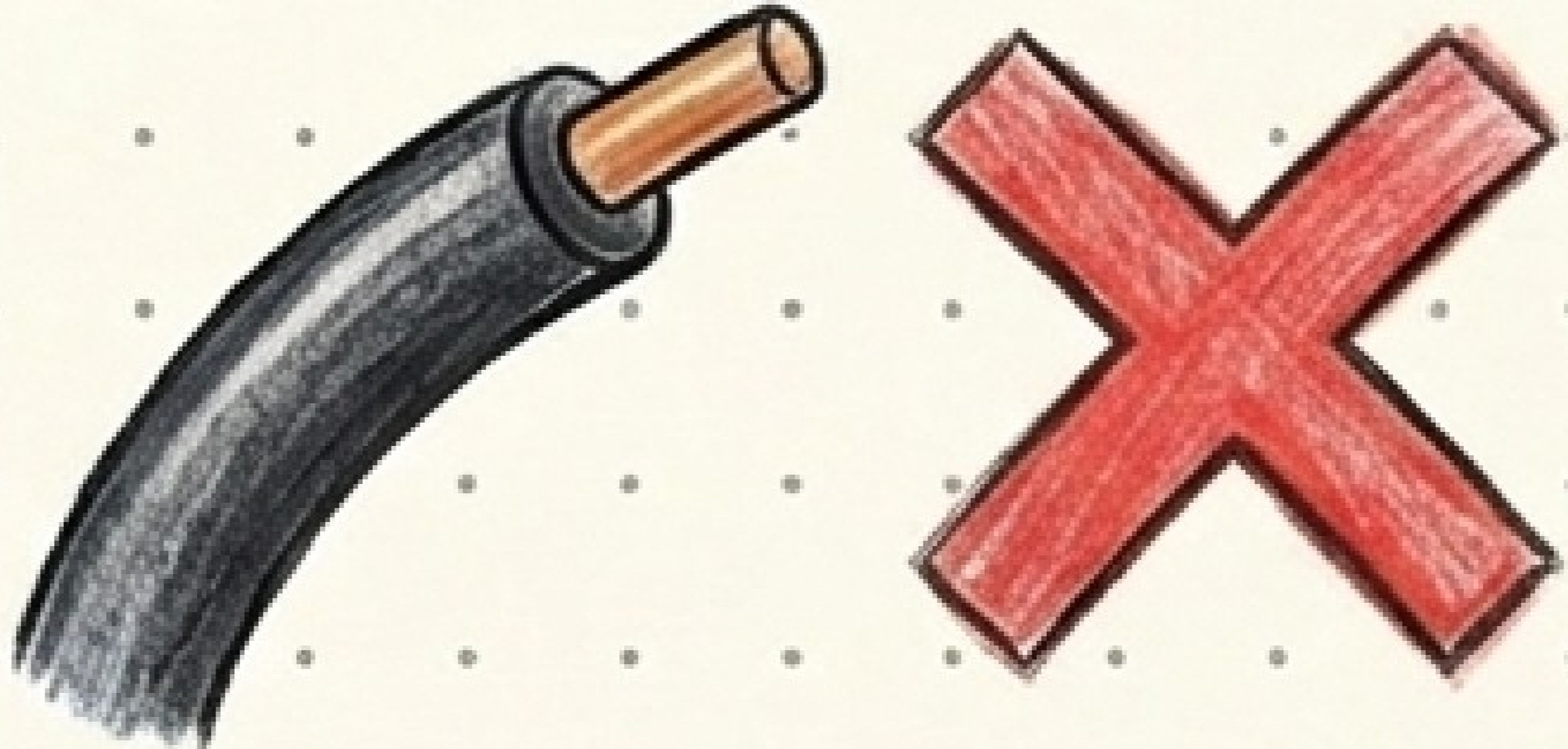
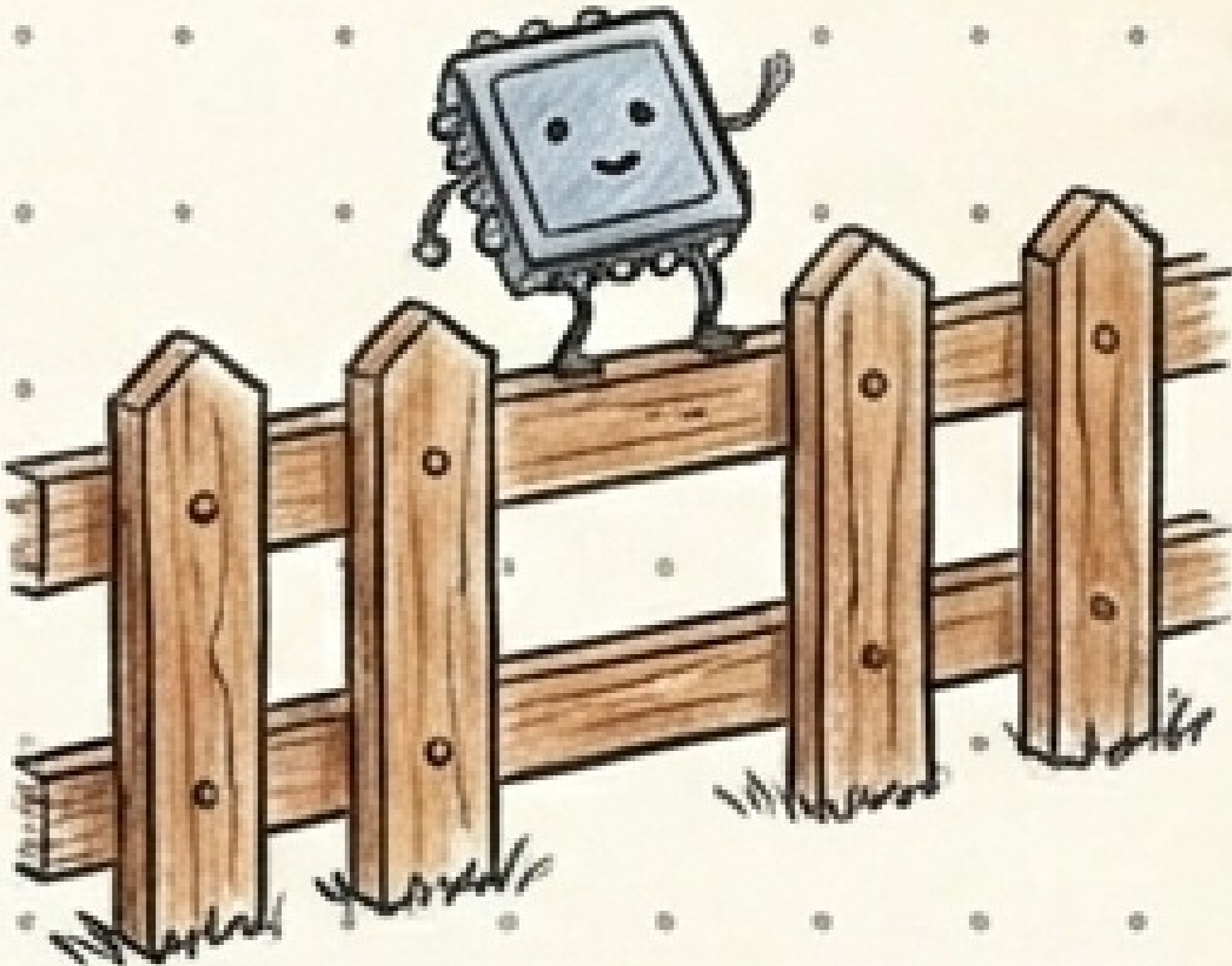
$$I = \frac{Q}{t}$$

Charge (Coulombs)

Time

Think of it like a river. Current is the speed of the water (electrons) flowing past a single point!

3. The Gatekeepers: Conductors vs. Insulators

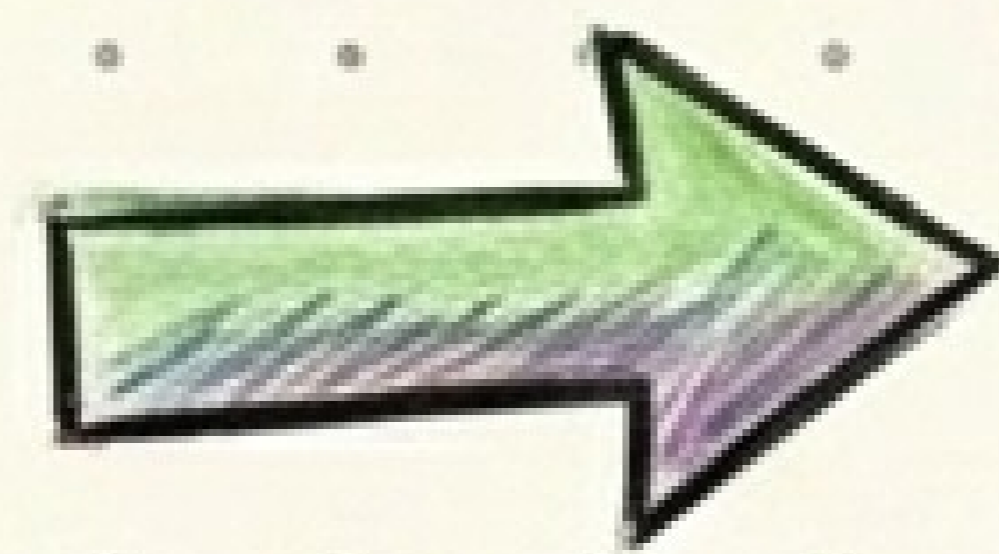
Conductors (The Open Road)	Insulators (The Brick Wall)	Semiconductors (The Bridge)
 <p>Allows current to pass easily. Examples: Copper, Aluminium.</p>	 <p>Blocks the flow of current entirely. Examples: Rubber, Plastic.</p>	 <p>Conditional flow. Examples: Silicon, Germanium.</p>

4. Voltage: The Pusher (Potential Difference)

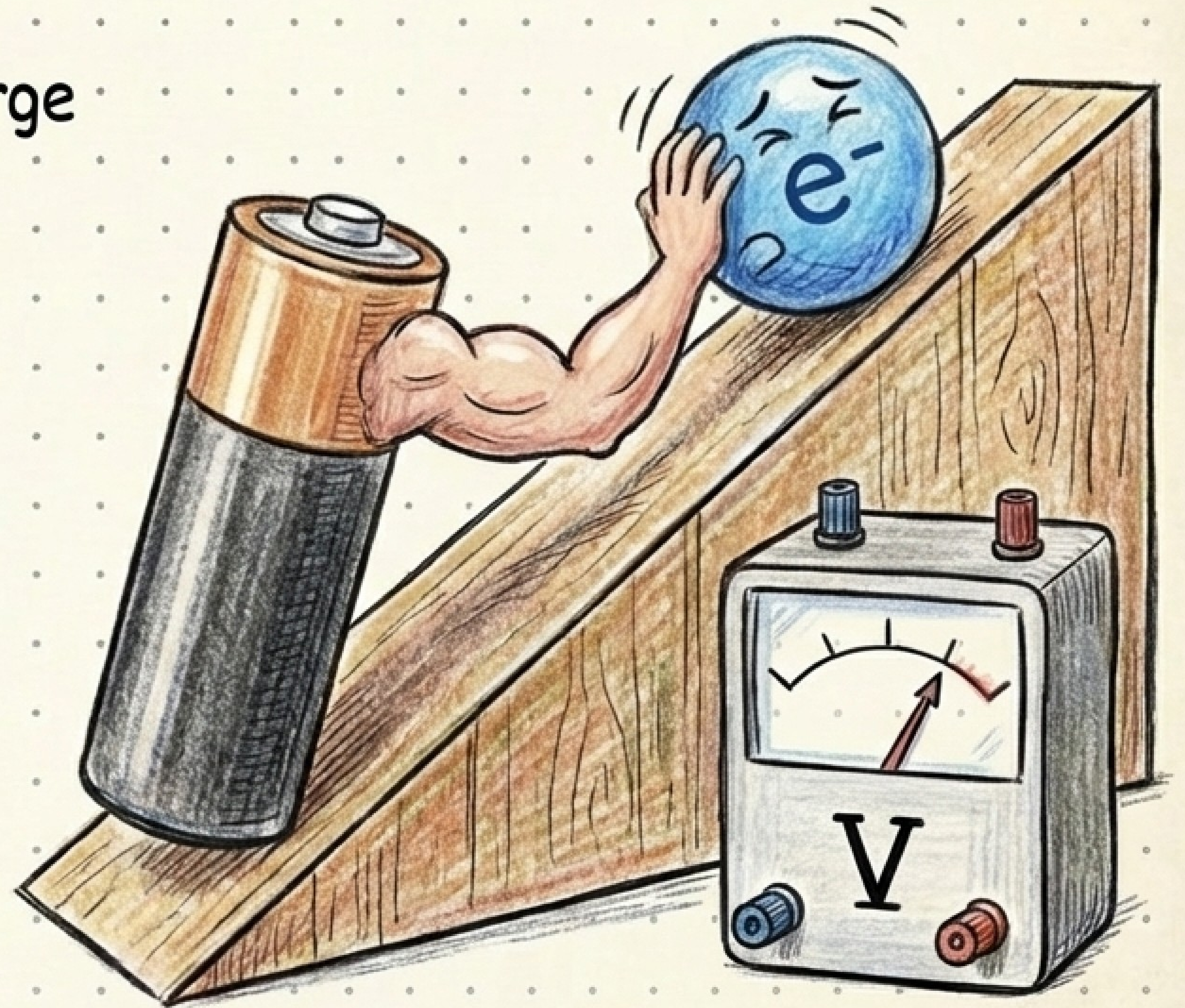
The actual work done to move a charge from one point to another.

Unit: Volt (V)

Measured using a
Voltmeter!

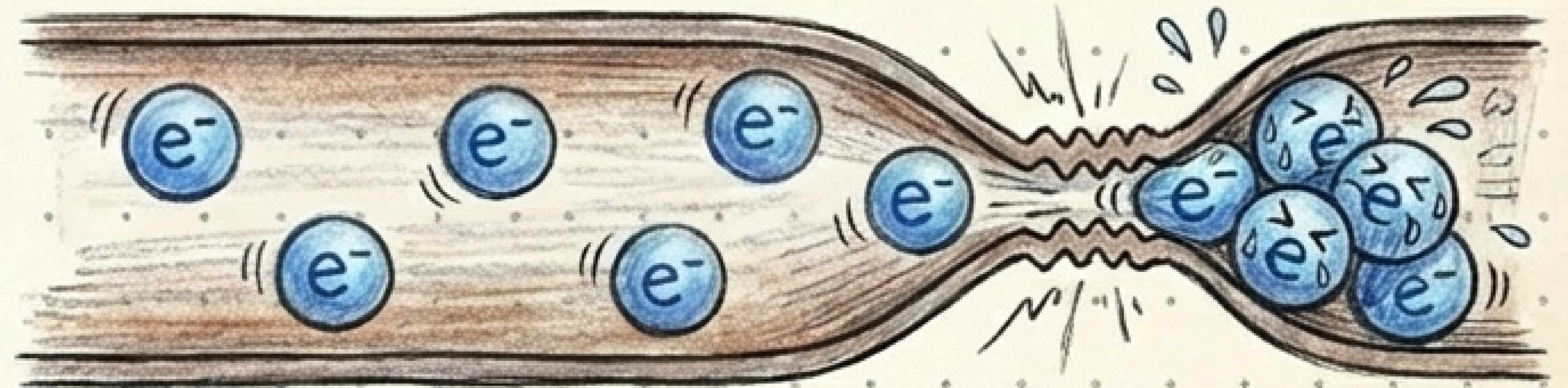


Batteries don't supply electrons,
they supply the PUSH!



5. Resistance: The Obstacle

Opposes the flow of electric current.

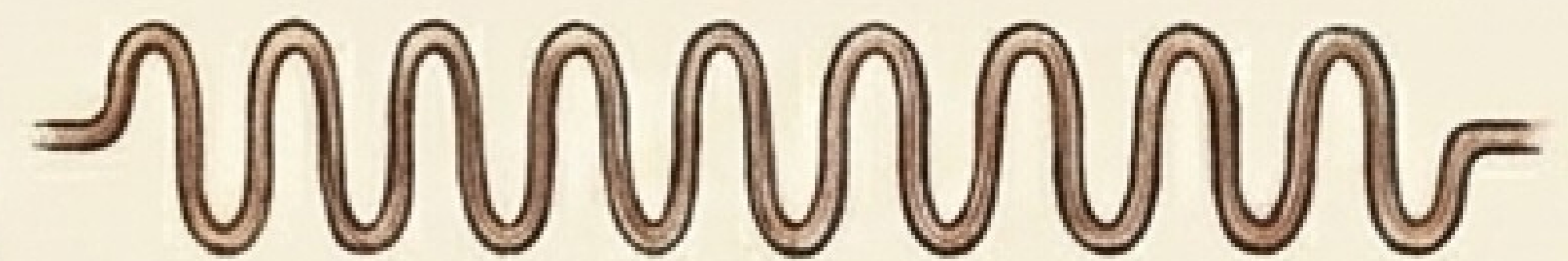


Unit: Ohm



What changes Resistance?

• Length:
Longer wire = More R



• Area:
Thin wire = More R



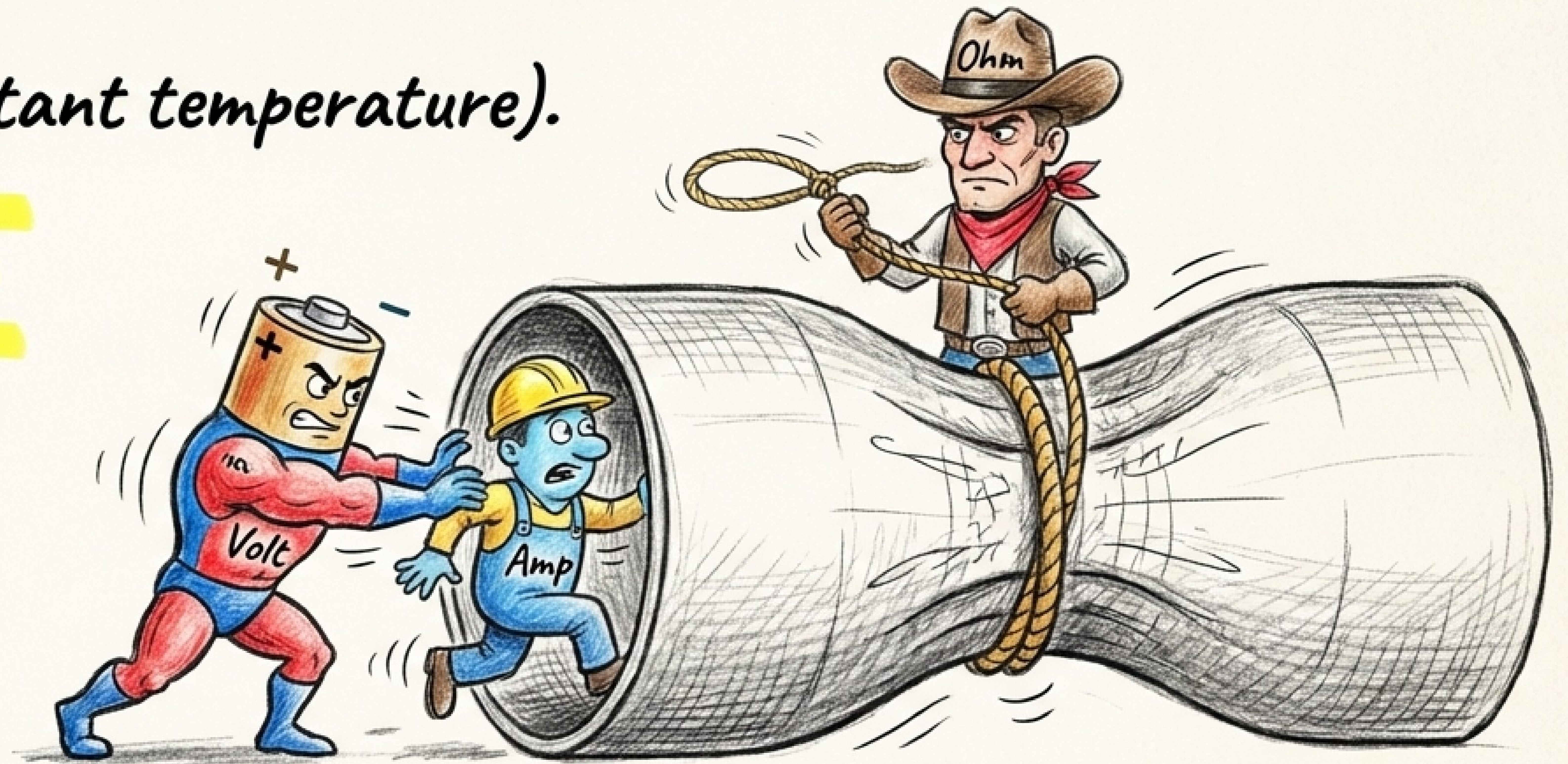
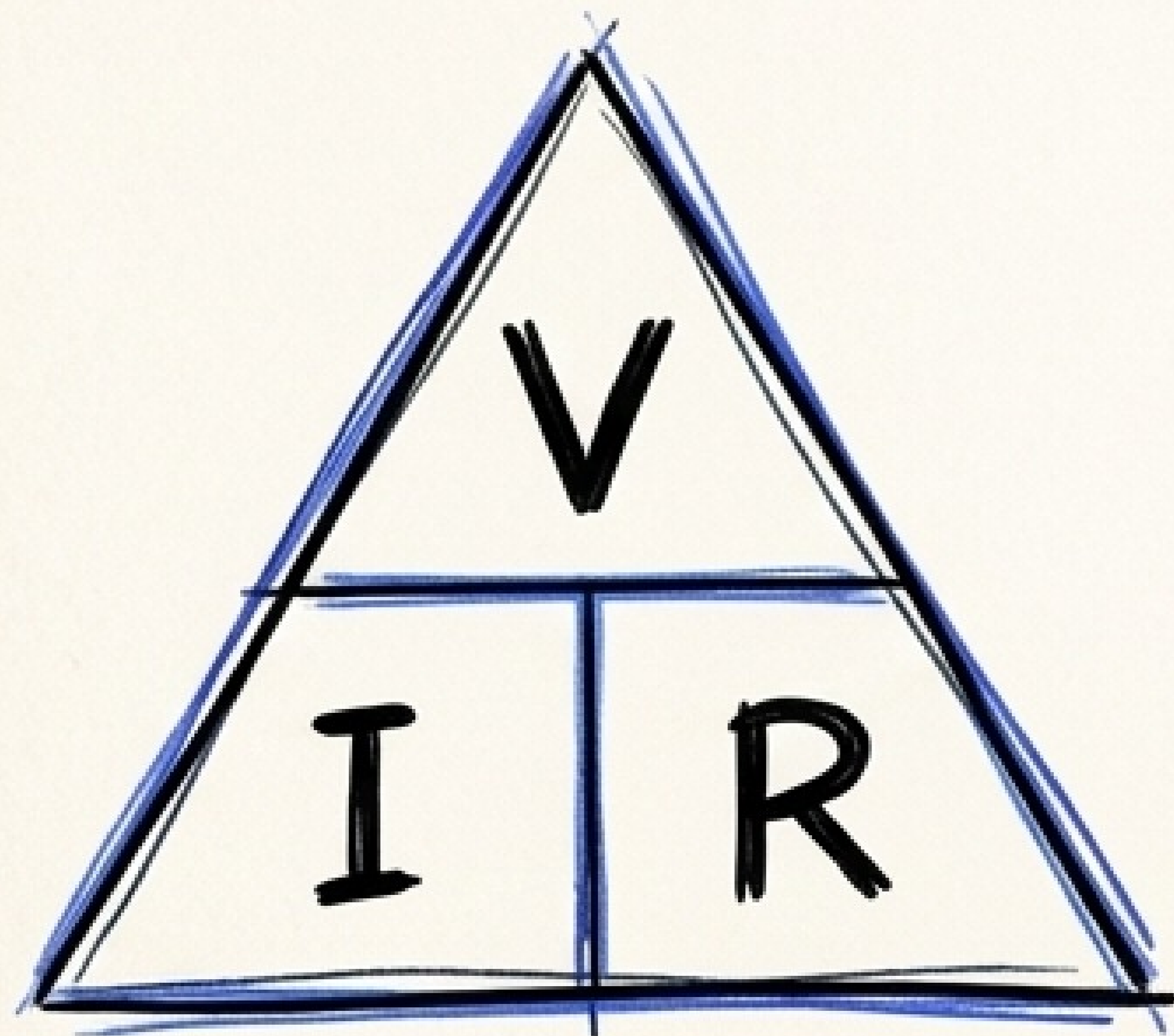
• Material:
Copper vs Rubber



6. Ohm's Law (The Golden Rule)

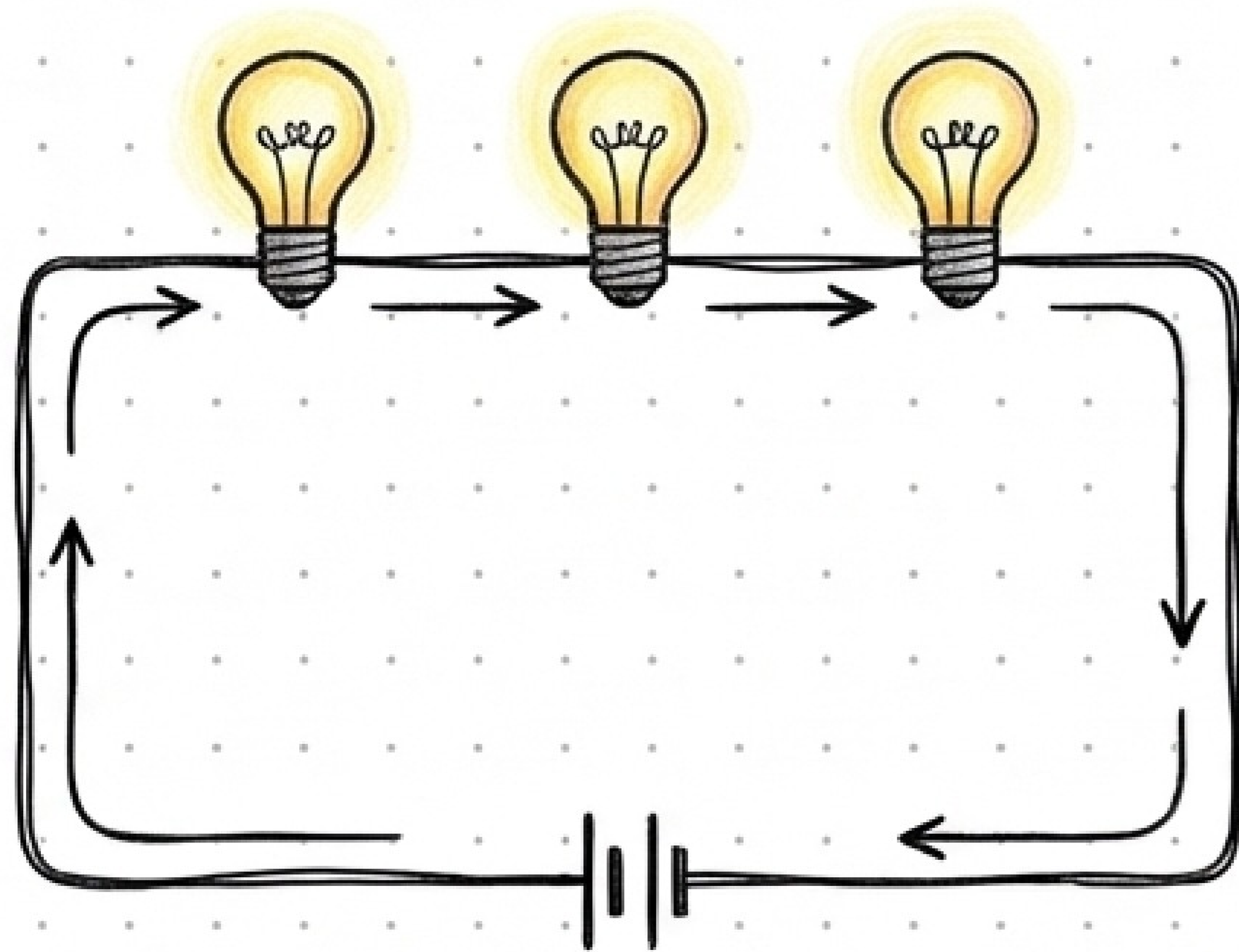
$V \propto I$ (at a constant temperature).

$$V = I \times R$$



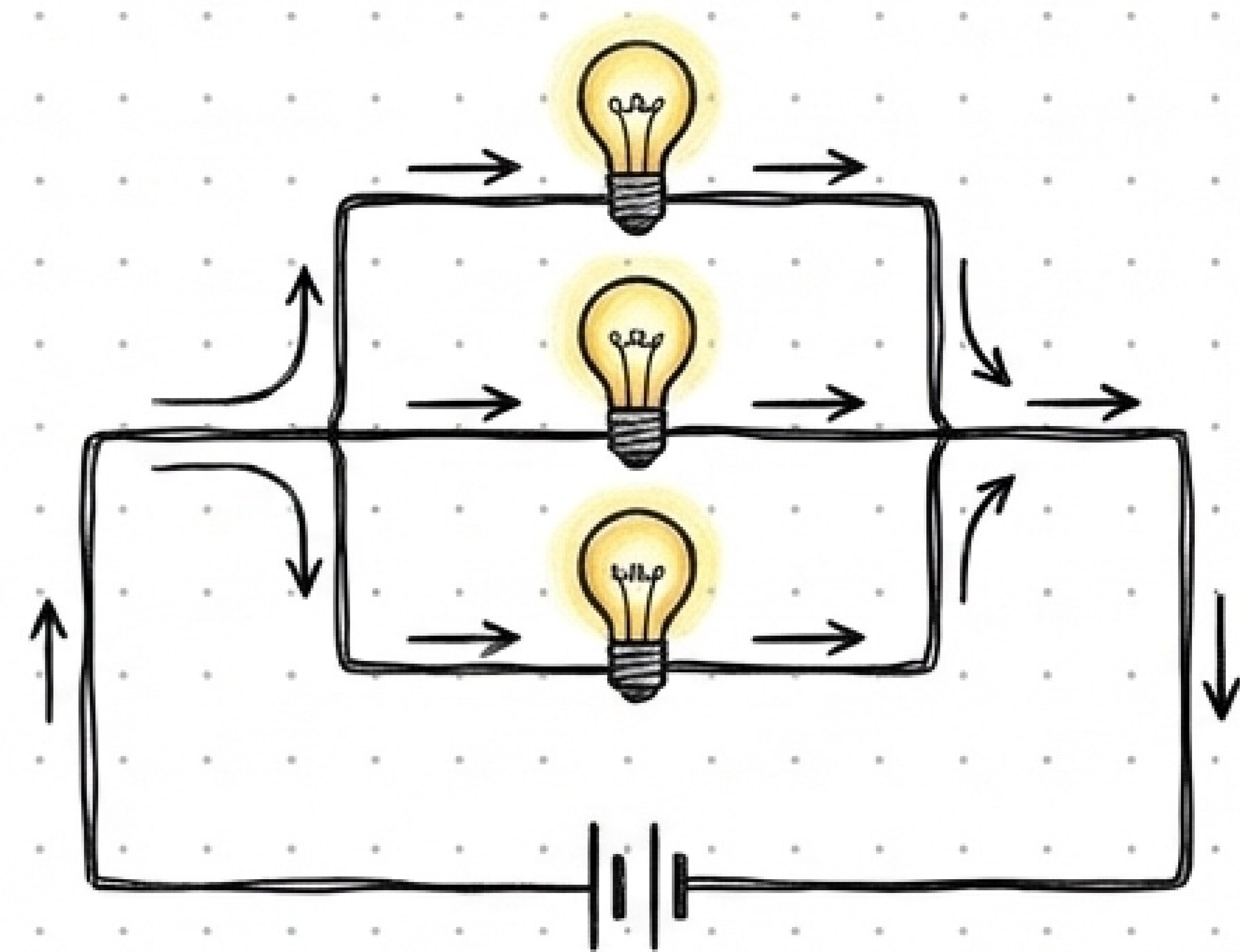
If the resistance stays the same, increasing the voltage (push) directly increases the current (flow)!

7. Circuit Blueprints: Series vs. Parallel



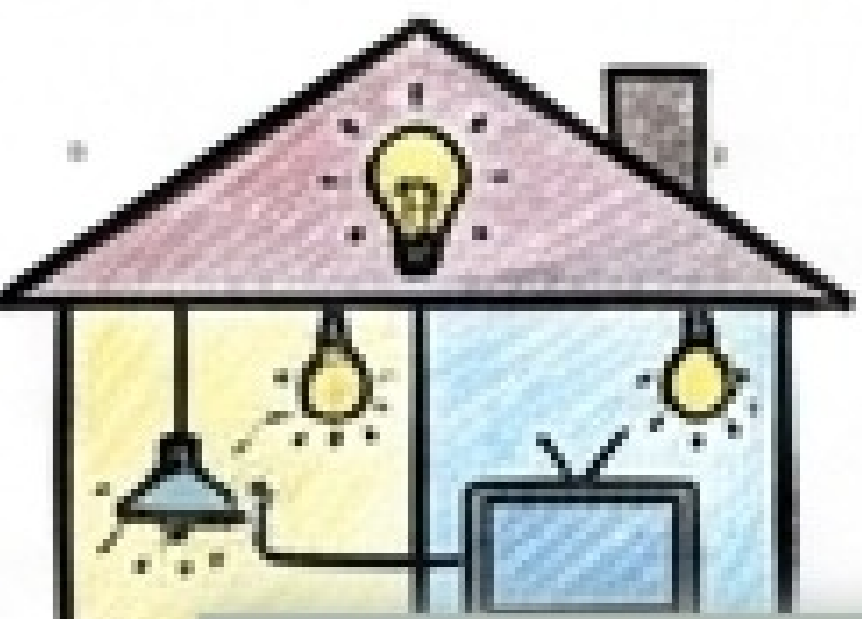
- Single Path.
- Current (I) is the SAME everywhere.
- $R_{total} = R_1 + R_2 + R_3$

Example: Old decorative fairy lights.
(If one bulb breaks, they ALL go out!)



- Multiple Paths.
- Voltage (V) is the SAME across branches.
- $1/R_{total} = 1/R_1 + 1/R_2 + 1/R_3$

Example: Household wiring. (Turn off the kitchen light, the TV stays on!)



8. Heating Effect: Friction in the Wires

When current flows through resistance, electric energy turns into HEAT.

$$H = I^2 R t$$

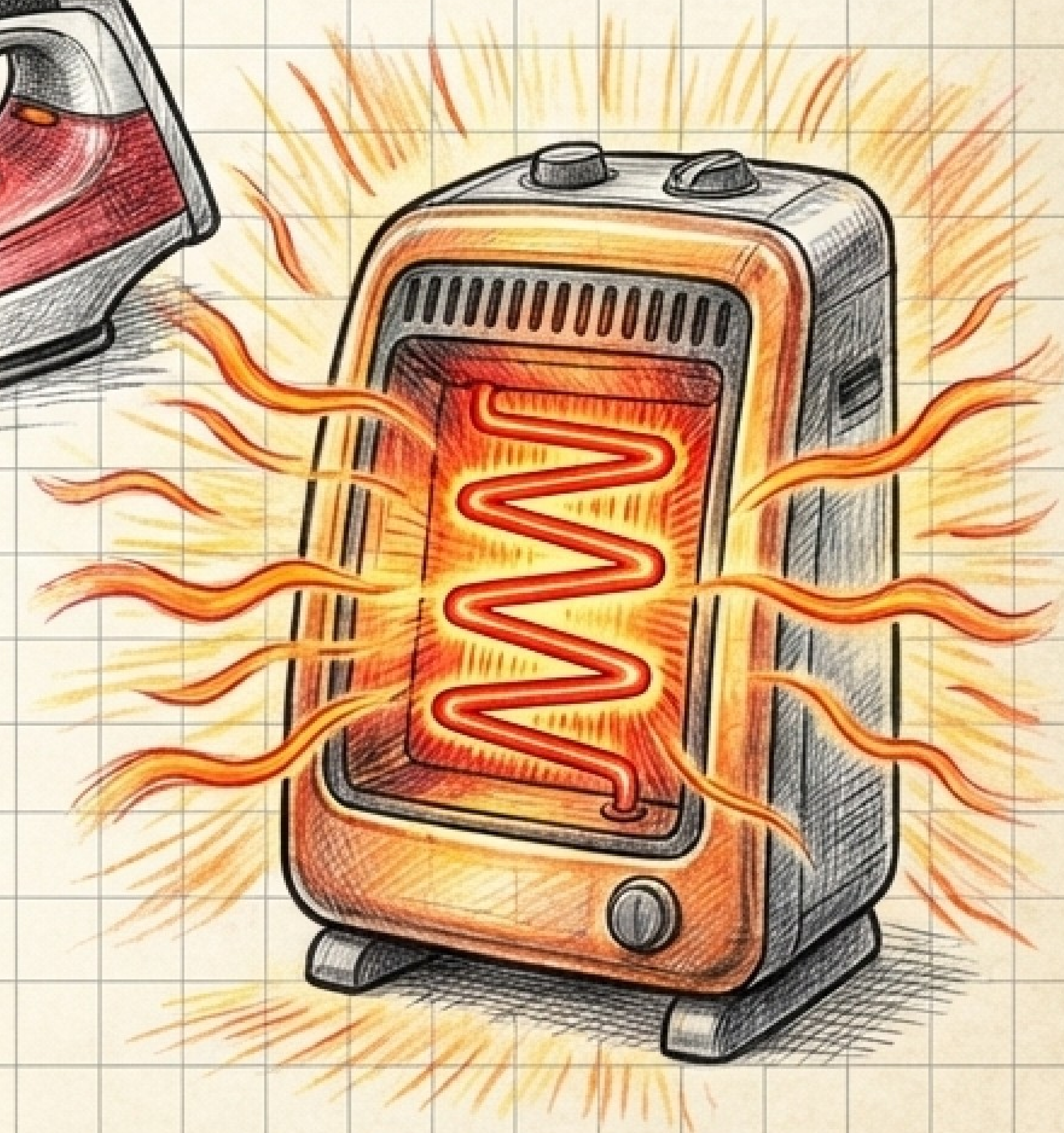
Heat produced

Current squared

Resistance

Time

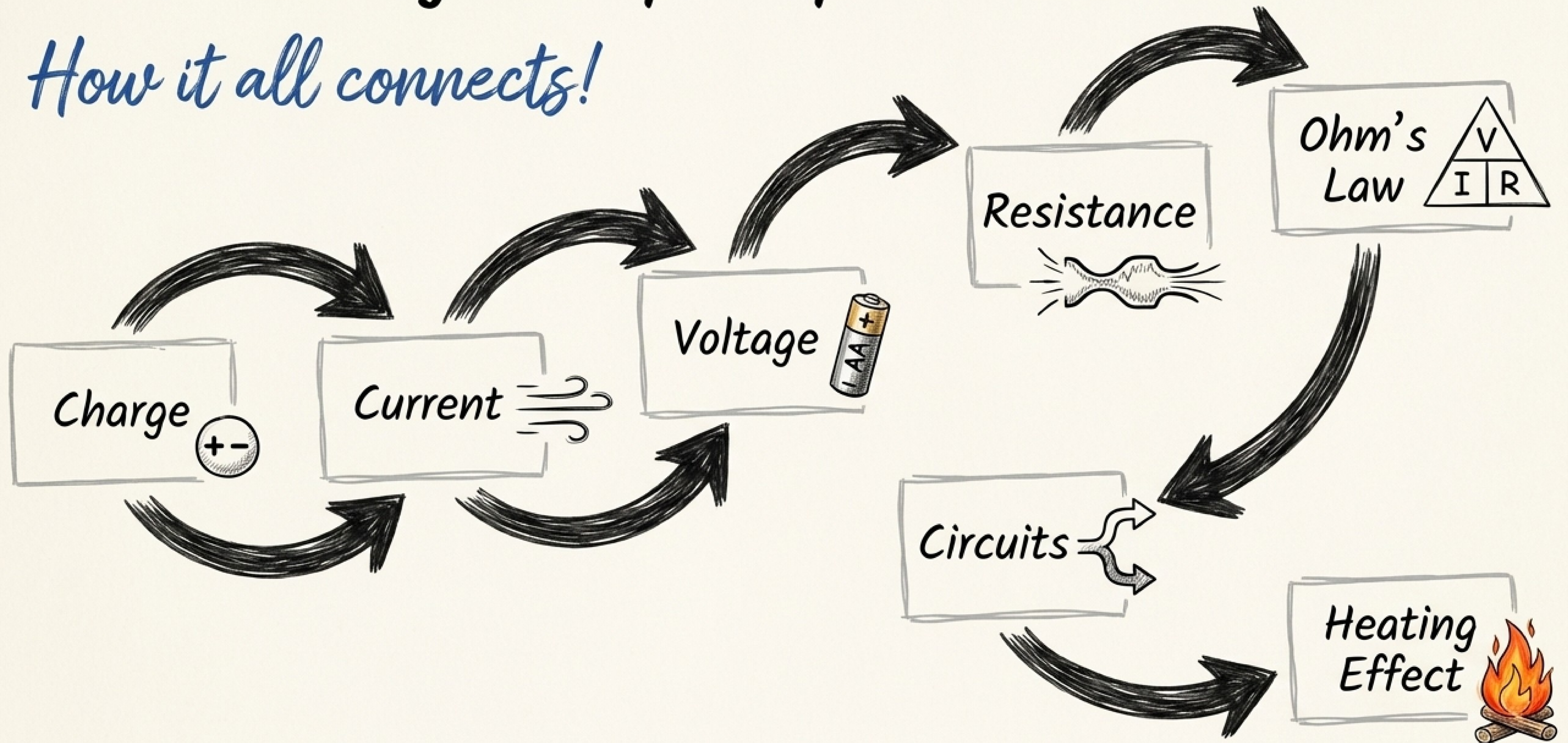
Current has a MASSIVE impact on heat!



- Real-world Examples:
 - Electric heater
 - Iron box

The Electricity Concept Map

How it all connects!



Pop Quiz! (Test Your Knowledge)

1. Unit of current is:

- (a) Volt (b) Ampere
(c) Ohm (d) Coulomb

3. Resistance unit is:

- (a) Volt (b) Ampere
(c) Ohm (d) Watt

2. Ohm's Law formula is:

- (a) $V=IR$ (b) $I=VR$
(c) $R=VI$ (d) None

4. Heat produced depends on:

- (a) I^2 (b) R
(c) t
(d) All

