

# RESISTANCE

---

- ❑ Electrical conductors (metals) have low resistance.
- ❑ Electrical insulators (nonmetals) have high resistance.

- 
- Resistance is measured in *Ohms* ( $\Omega$ )
  - The symbol for resistance is “**R**”

# OHM'S LAW

---

- Ohm's Law defines the relationships between (I) current, (E) voltage, and (R) resistance.
- One ohm is the resistance value through which one volt will maintain a current of one ampere.

---

Ohm is in honor of Georg Ohm , a German physicist in the 1800s who conducted experiments after Volta's electrochemical cell.

# Remember:

---

- **Current refers to the flow of electrons**
- **Measured in Amps** (named after André-Marie Ampère, French physicist who discovered electromagnetism in early 1800s)
- **Voltage is the *Electrical* potential**
- **Measured in Volts** (named after Alessandro Volta, Italian physicist who developed the first battery in the late 1700s)

	<u>symbol</u>	<u>unit</u>
Current	(I)	amperes (A)
Voltage	(E)	volts (V)
Resistance	(R)	ohms ( $\Omega$ )

$$I = E/R$$

---

$$\text{CURRENT} = \frac{\text{VOLTAGE}}{\text{RESISTANCE}}$$

# $I = E/R$

**Example:** How much current does a headlight use with a 12-volt battery if it has a resistance of 3 ohms?

G       $E = 12V$        $R = 3\Omega$

U       $I = ?$

E       $I = E/R$

S       $I = (12V) / (3\Omega)$

S       $I = 4A$



$$I = E/R$$

**Example:** How much current flows in a light bulb with 110V of electricity when the filament in the bulb has a resistance of  $220\Omega$ ?

G       $E=110V$        $R=220\Omega$

U       $I=?$

E       $I = E/R$

S       $I = (110V) / (220\Omega)$

S       $I = 0.5A$