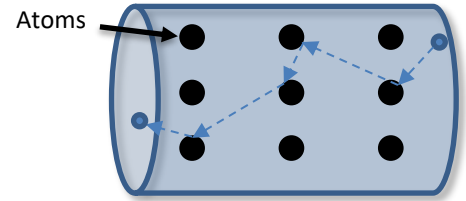


CONCEPT: RESISTANCE AND OHM'S LAW

- Electrons collide with atoms as they pass through a conductor
 - There is “internal friction” that **resists** current



- For a conductor with a voltage V , the CURRENT through it is $\rightarrow i = \underline{\hspace{2cm}}$
 - R is called the $\underline{\hspace{2cm}}$ $\rightarrow$ Units: OHMS, Ω
 - The larger the R , the [**LARGER** | **SMALLER**] the i

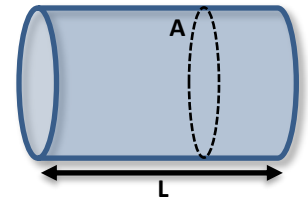
- OHM'S LAW states:

$$V = \underline{\hspace{2cm}}$$

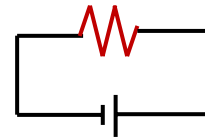
EXAMPLE: A conductor has a voltage of 10V across it, and $6\mu\text{C}$ of charge flows through it every 1.5 seconds. What is the resistance of this conductor?

CONCEPT: RESISTIVITY & RESISTORS IN CIRCUITS

- A material has an inherent resistance called the RESISTIVITY, ρ (UNITS = Ωm)
 - The RESISTANCE of a material is given by $\rightarrow R = \underline{\hspace{2cm}}$
 - RESISTIVITY depends *ONLY* upon the material ($\rho_{\text{lead}} = 2.2 \times 10^{-7} \Omega \cdot \text{m}$)



- A RESISTOR is a circuit element that has some resistance
 - In circuits, always consider wires to have $\underline{\hspace{2cm}}$ resistance



EXAMPLE: A wire 25.1m long and 6.00 mm in diameter has a resistance of 15.0m Ω . A potential difference of 23.0 V is applied between the ends. (a) Calculate the resistivity of the wire material. (b) What is the current in the wire?

PRACTICE: RESISTANCE OF AN UNKNOWN RESISTOR

A resistor has a current through it of 5A. If the EMF across the resistor is 10V, what is the resistance of this resistor?

EXAMPLE: CURRENT THROUGH UNKNOWN RESISTOR

A cylindrical resistor is made of lead, whose resistivity is $2.2 \times 10^{-7} \Omega\text{m}$, with a radius of 5 mm and a length of 2 cm. If the EMF across this resistor is 5V, what is the current through the resistor?

PRACTICE: CURRENT THROUGH RESISTORS

Two resistors are made of the same material, one twice as long as the other. If the current through the shorter resistor is 5 A, what is the current through the longer resistor if they both have the same potential difference and cross-sectional area?