

## Science 9

### 8.3: Resistance and Ohm's Law

Resistance is the property of any material that slows down the flow of electrons. At the same time, electrical energy is converted to other forms of energy.

Ex. The filament in a light bulb causes the electrons to slow down, and the energy is converted to light and heat.

The greater the voltage (potential difference) in a circuit, the faster the electrons flow → the greater the current.

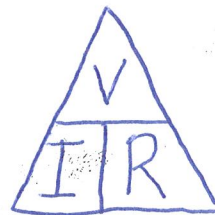
Larger resistance in an object means less current can flow in a circuit.

Ohm's Law:  $V = IR$

V = voltage (V)

I = current (A)

R = resistance ( $\Omega$ )



Ohm's Law can be written like this too:  $R = V/I$  and  $I = V/R$

Ex. What is the resistance of a flashlight bulb if there is a current of 0.75 A when connected to a 3.0 V battery?

(A)

(V)

$$V = IR$$

$$R = \frac{3.0V}{0.75A}$$

$$R = 4\Omega$$

Ex. The resistance of a car headlight is  $15 \Omega$ . If there is a current of  $0.80 \text{ A}$  through the headlight, what is the voltage?

Ex. A  $60 \text{ V}$  potential difference is measured across a load that has a resistance of  $15 \Omega$ . What is the current through this load?

### Converting Prefixes:

\* Sometimes prefixes are used for units:

milli (m)  $\rightarrow$  one-thousandth

kilo (k)  $\rightarrow$  one thousand

mega (M)  $\rightarrow$  one million

\* Prefixes **MUST** be converted **BEFORE** you do the calculation

Ex. What is the voltage across a  $12 \text{ k}\Omega$  load that allows a current of  $6.0 \text{ mA}$ ?