It is important to understand the difference between resistance, resistivity, resistors, inductance, self-inductance, and inductors.

- *Resistance* is an opposition to current. *(concept)*
    - The units for resistance are ohms, Ω.
    - The resistance of a circuit is often assumed to be zero. (self-resistance?)
    - A *resistor* is a circuit element with a specific resistance. *(physical object)*
        - "R" is the resistance of a resistor.
        - A resistor is made of a material with a material property called *resistivity*, ρ.
            - The units for resistivity are ohm meters, Ω•m.
        - A resistor can be added to a circuit to change the resistance of the circuit.
        - A resistor can be added to a circuit diagram to model the resistance of the circuit itself.

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

$$\rho = \frac{RA}{L}$$

- *Inductance* is an opposition to changes in current. *(concept)*
    - The units for inductance are henrys, H.
    - The opposition of a circuit to the change in the current in that circuit is called *self-inductance. (concept)*
        - The self-inductance of a circuit is often assumed to be zero.
    - An *inductor* is a circuit element with a specific inductance. *(physical object)*
        - "L" is the inductance of an inductor.
        - A typical shape for an inductor is a small, ideal solenoid.
            - There is no material property called "inductivity" because the inductance of an inductor is mostly caused by the shape, not the material, of the inductor. A magnetic material in its core can affect the inductance through its magnetic permeability, but not the material of the wire coil.
        - An inductor can be added to a circuit to change the inductance of the circuit.
        - An inductor can be added to a circuit diagram to model the self-inductance of the circuit itself.

$$L = -\frac{\varepsilon_L}{dI/dt}$$