1 | Resistance

So, let's figure out resistance.

We know that... $V = \frac{J}{C}$, per KBhPHYS201Voltage, and we also know that resistance would equal a unit $\frac{Vs}{c}$ given that $I = \frac{C}{s} = \frac{\Delta V}{Resistance}$ (see KBhPHYS201Current Current). Plugging in the definition of voltage, we get that resistance is measured in $\frac{Js}{C^2}$. We call this unit Ohms, or Ω .

Resistance Ω {A value measured in $\frac{Js}{C^2}$ that measures the resistance to current}

1.0.1 | Calculating resistance

- So, let's think. With a wire of length L and with a wire of area A, if we increase L, the resistance in the wire would increase; if we increase area A, the resistance in the the wire would decrease.
- $Resistance = \frac{L}{A}*ResistivityOfMaterial$ with units $\frac{m}{m^2}(\Omega \times m)$.

Sometimes its easier to think about conductivity.

and, indeed, resistivity of materials are measured in $\Omega \times m$, which also makes sense intuitively.

1.0.2 | Heat of resistance

$$I = \frac{c}{s} \quad V = \frac{J}{c}$$

$$P = \frac{J}{s} \quad IV = \frac{J}{s} = W_{BH}$$

Figure 1: KBe20phys250srcHeatFromResistors.png

2 | Ohm

$$\Omega = \frac{\mathsf{V}}{\mathsf{A}} = \frac{1}{\mathsf{S}} = \frac{\mathsf{W}}{\mathsf{A}^2} = \frac{\mathsf{V}^2}{\mathsf{W}} = \frac{\mathsf{S}}{\mathsf{F}} = \frac{\mathsf{H}}{\mathsf{S}} = \frac{\mathsf{J} \cdot \mathsf{S}}{\mathsf{C}^2} = \frac{\mathsf{kg} \cdot \mathsf{m}^2}{\mathsf{s} \cdot \mathsf{C}^2} = \frac{\mathsf{J}}{\mathsf{s} \cdot \mathsf{A}^2} = \frac{\mathsf{kg} \cdot \mathsf{m}^2}{\mathsf{s}^3 \cdot \mathsf{A}^2}$$

(Wikipedia)