Ohm's Law / Watt's Law

Ohm's Law (I = V/R) states the relationship between voltage, current and resistance. Given the relationship between these three elements, once you know any two of them, it is possible to calculate the third.

Watt's Law (P = I*V) states the relationship between power, voltage and current. Given the relationship between these three elements, once you know any two of them, it is possible to calculate the third.

According to Ohm's Law :   Volts = Current multipied by Resistance **V = I x R**
Current = Volts divided by Resistance **I = V / R**
Resistance = Volts divided by Current **R = V / I**

Real world example
Calculating the resistor to use with an LED: *(Resistance = Volts / Amps)*
For a typical LED, the LED consumes 1.7 volts leaving an operating voltage from a 5 volt source of 3.3 volts. The typical current is 10 milliamps (.010 amps) so:
3.3 / .01 = 330 therefore 330 ohms.

According to Watt's Law :   Power (watts) = volts multiplied by current (amps) **(P = I * V)**
Real world example
 Suppose you wanted to figure out how many 500-watt lighting instruments you could plug into a circuit without blowing a fuse.
First, you would need to know how much current can be drawn through the circuit. Most homes have 15 amp circuits installed. At MassArt, most of the circuits are on 20 amp circuit breakers. So the total power available would be:

P = V x I   **(Watts = Volts times Amps)**
or   ? = 120   times 20

We multiply the volts times the amps (which are known quantities) and see that:
120v x 20amps = 2400 watts
-So whatever we plug into our circuit has to be less than 2200 watts, because that's all the power available in this circuit.

Answer: **You could safely plug four 500-watt lights into the circuit (or two 1000 watt lights)** without popping any circuit breakers (leaving a 400 watt safety margin.)