



IS FOR POWER

Power is energy converted per unit time. The unit of power is the watt, which is equal to one joule of energy per second. Alternatively, one horsepower is 746W.

$$1W = \frac{1J}{1s} = \frac{1C \cdot V}{1s} \quad \text{One watt is one coulomb-volt per second.}$$

As mentioned in the definition of voltage, you would expend one joule of energy in moving one coulomb of charge through a potential difference of one volt. If you did this once every second, you would expend or release one joule per second, one watt, of power.

$$\begin{aligned} P &= I \times V & \text{Watts are volts times amps. The mnemonic for} \\ W &= V \times A & \text{the second form is 'West Virginia'} \end{aligned}$$

Example 1: A 120V circuit is consuming 5 A. The power is 600W.

Example 2: A 100W bulb is put into a 120V circuit. The current is .83 A. Using Ohm's law, the resistance of the bulb is 144 ohms.

Example 3: A resistor is dissipating 1-W of power and 6.24×10^{18} electrons are known to travelling across it every second. The measured voltage across the resistor would be 1V.

$$P = \frac{V^2}{R} = A^2 R$$

By substitution of quantities in Ohm's law, the above forms can be found. In general, knowing any two of the power, resistance, current, and voltage will allow you to find the remaining two quantities.