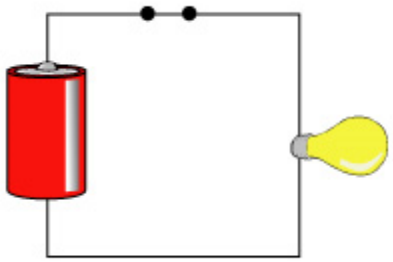
Power and Circuits

Remember that Power is the **rate** at which *energy* is used or produced

$$\text{Power} = \frac{Energy}{time} \qquad \frac{Joules}{Seconds} \qquad Watts$$

Power is an important value while studying circuits because we often want to know the rate at which energy is being used by an element in a circuit or how much energy is being produced by the power source.



How does Power relate *to current, voltage* and *resistance*?

$$\text{Power} = I\,V = \frac{Charge}{time} \; x \; \frac{Energy}{Charge} = \frac{Energy}{time} \qquad \left(\frac{Joules}{Seconds}\right) \; Watts$$

Combine $P = I\,V$ with $V = IR$ (Ohms Law) and we get:

$$P = I^2R$$

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

Comprehension Questions:

1. What are the units for power *in terms of* Joules?

2. What is the common unit for power that is equivalent to J/s?

3. If a toaster has 3 amps running through it and a resistance of 2 ohms, what is the power it is using?

4. The voltage used by a ipod is 0.023 Volts, if it has a resistance of 0.1 ohms, determine the power it needs to operate.

5. Combine $P = I\,V$ with $V = IR$ (Ohms Law) to prove that $P = I^2R$ and $P = \frac{V^2}{R}$