Work (or energy)

Because electricity is a form of energy, this energy is measured using the standard unit of work or energy, the *joule* (J).

Power

The unit of power is the *watt* (W), and the symbol for power is P. One watt is equal to one joule per second and is calculated by:

$$\text{power } (P) = W/t \qquad \text{therefore, energy } (W) = Pt$$

(Where W is energy or the work done in joules, P is the power in watts and t is the time in seconds.)

Charge

The unit of charge is the *coulomb* (C), and the symbol for charge is Q. One coulomb is equal to one ampere second:

$$\text{charge } (Q) = It$$

(Where Q is the charge in coulombs, I is the current in amperes, and t is the time in seconds.)

Electrical potential (and emf)

The difference in potential between two points in a conductor or electric circuit is called *electrical potential.* A change in that electrical potential is called a *potential difference.* The unit of electrical potential is the *volt* (V), and the symbol is V. One volt is equal to one joule per coulomb. Voltage is calculated as follows:

$$\text{volts } (V) = P/I \qquad \text{therefore, power } (P) = IV$$

(Where V is the voltage in volts, P is the power in watts, and I is the current in amperes.)

Electromotive force (emf), symbol E, is also measured in volts.

Resistance

Opposition to the flow of electrical current is called *resistance*. Its unit is the *ohm* (Ω), and the symbol for electrical resistance is R. As one ohm equals one volt per ampere, resistance is calculated by:

$$\text{resistance } (R) = V/I \qquad \text{therefore, } V = IR \text{ and } I = V/R$$

(Where R is the resistance in ohms, V is the potential difference in volts across the resistance and I is the current in amperes flowing through the resistance. The above is called *Ohm's law.*)

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