

Electric Current

• **Review:**

- _____ : inverse square law, depends on two bodies, has constant, $f = Gm_1m_2 / d^2$.
- _____ : inverse square law, depends on two *charges*, has constant, $f = kq_1q_2 / d^2$.
- _____ is measured as: 1 coulomb = 6.25×10^{18} electrons
- The electric _____ : is force per charge, which is E. It has *magnitude* and *direction*. [$E = f / q$]
- *Electric* _____ *Energy* is due to the location of a charge. Electric potential is *voltage*.
- Electric potential = electric potential energy / charge. [$1 \text{ volt} = 1 \text{ _____} / 1 \text{ _____}$]

• **Current = Electric Flow** (measured in *amperes* or *amps*: "a")

- _____ flows when there is a potential difference between the two charges.
- $1 \text{ _____} = 1 \text{ _____} / \text{_____}$

• **Voltage = Electric Potential** (measured in *volts*: "v")

- Sources: piezoelectric (grill lighters), chemical (batteries), biological (us, electric eels), heat (bimetals)
- Voltage is like electrical _____ or an electrical _____ .
- $1 \text{ _____} = 1 \text{ _____} / 1 \text{ _____}$

• **Resistance = just what it says ... Electrical _____** (measured in *ohms*: "Ω")

• **Ohm's Law:**

current (I) = voltage (E) / resistance (R) ... or
 amperes (a) = volts (v) / ohms (Ω) ... or
 [$I = E / R$]

A hand-drawn blue circle containing the equation $E = I \cdot R$. The letter 'E' is positioned above a horizontal line, and 'I' and 'R' are positioned below the line, separated by a vertical bar.

Current	Effect
0.001a	can be felt
0.005a	painful
0.010a	muscle spasms
0.015a	lose muscle control
0.070a	if through heart, probably fatal if more than 1 sec

• **Direct vs. Alternating Current**

- DC – _____ ... AC – back & forth
- we generally use _____ v, 60Hz AC (where Hz are Hertz or cycles)
- Many circuits convert AC to DC using _____ – especially personal electronics.

• **Power = how much electricity you are using**

Power (P) = _____ (I) x _____ (E) ...
 watts (w) = _____ (a) x _____ (v) ...
 [$P = I * E$]

• **Circuits**

- _____ ... in one line
- _____ ... in parallel lines
- _____ ... a home is usually many parallel circuits for safety.
- _____ ... in addition, fuses or circuit breakers turn off high currents (15 or 20a)