PHYSICS

# 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 x $10_{18}$ 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 volt = 1 ________ / 1 ________ ]

- **Current = Electric Flow** (measured in *amperes* or *amps*: "a")
  - ________ flows when there is a potential difference between the two charges.
  - 1 ________ = 1 ________ / ________

- **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 ________ = 1 ________ / 1 ________

- **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]**


| 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)