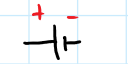
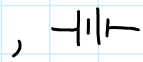
Current Electricity

Friday, May 12, 2017 8:35 AM

A Basic Circuit

- A source of energy: Battery, Cell (dry: 1.5V battery; wet: car battery),  , 
- path for electrons: wire
- A device that uses the energy: resistor
  : light 

Battery - source of energy (makes the electrons move)
- units volts
- Potential Difference
- Electromotive Force, $\mathcal{E}$mf, $\mathcal{E}$

Resistors - uses the energy < heat / light
- measured in ohms, Ω, 25Ω

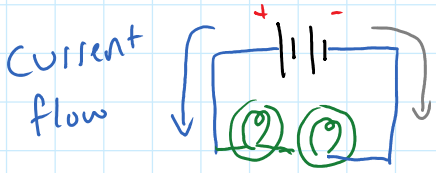
Current: the number of electrons flowing past a point in a given time.

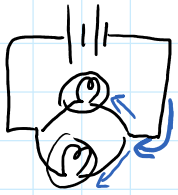
: $Q = ne$ (# of electrons x 1.6×10^{-19} C)

: $I = \frac{Q}{t}$ units $\frac{C}{s}$, 1 Ampere = 1Amp = 1A

: Conventional current flows from the positive terminal of the battery, through the circuit, to the negative terminal.

: Electrons flow from negative to positive

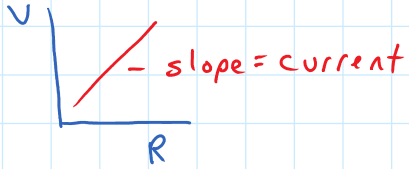




flow V flow

Ohm's Law

$V = IR$, $I = \frac{V}{R}$



Power : the rate at which electrical work is done

: watts (w)

: $P = VI$ power output from a source

$= (I \cdot R) I$ ex ($V = 3.0v$, $I = 200mA = .2A$)

$P = (3.0)(.2) = .6w$

$P = I^2 R$ ← power used by a device (light, resistor)

Energy = $E = P \cdot t$

units → $= (w \cdot s) = J$

→ $= (kw \cdot H) = kw \cdot H$

ex: A 12v car battery transfers 48C of charge in 8.0s.

a) $I = \frac{Q}{t} = \frac{48c}{8s} = 6.0\,A$

b) $R =$, $V = IR$ $R = \frac{V}{I} = \frac{12v}{6.0A} = 2\Omega$

c) Power out put of the battery $P = V \cdot I = (12v)(6A)$

$= 72w$

ex: A 1400w microwave is used for 45min per day in a cafe.

Energy used → $P \cdot t = (1400w)(2700s) = 3.78 \times 10^6 J$

→ $P \cdot t = (1.4kw)(.75Hr) = 1.05\,kw \cdot H$

~ $10¢/kw \cdot H$

Hw. p.180 #1-3, 184 #1-4