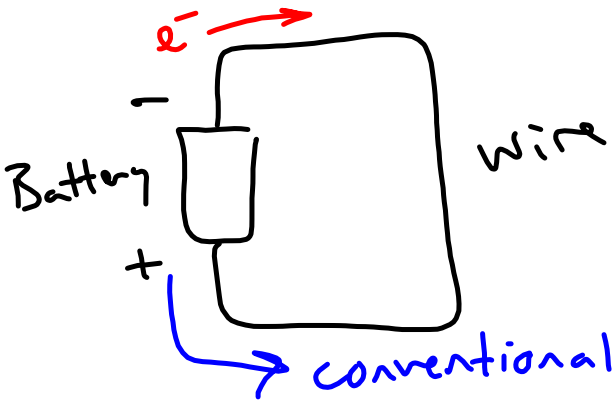
Electric Current

$$i = nA\bar{v}$$

- i → current
- n → mobile electron density
- A → cross-sectional area of the wire
- $\bar{v}$ → average drift speed of electrons



* Don't actually build this!

$$I = |q| n A \bar{v}$$

$$I = \frac{dQ}{dt}$$

- I → conventional current
- Q → total charge
- t → time

Biot-Savart Law of Short Thin Length of Wire:

$$\Delta \bar{B} = \frac{\mu_0}{4\pi} \frac{I \, \Delta \bar{l} \times \hat{r}}{|r|^2}$$

On AP equation sheet:

$$d\bar{B} = \frac{\mu_0}{4\pi} \frac{I \, d\bar{l} \times \hat{r}}{r^2}$$

r = magnitude of $\bar{r}$

Magnetic Field of a Straight Wire

$$B_{wire} = \frac{\mu_0}{4\pi} \frac{LI}{r\sqrt{r^2 + \left(\frac{L}{2}\right)^2}}$$

- Magnetic Field of Loop

$$B_{loop} = \frac{\mu_0}{4\pi} \frac{2\pi R^2 I}{(z^2 + R^2)^{3/2}}$$

HW: P19, P23, P31,
P41, P43