magnetic field and magnetic force

moving q_s (including I_s or a magnet) unit for q = C unit for I = A = C/s scalars	$\vec{B}$ forms loops that encircle I_s. Don't curl your fingers. Put your thumb in the location of I_s and your fingers in the location of $\vec{B}$. thumb: dir I_s finger pads: dir $\vec{B}$ → Ampere's law for steady current: $\oint \vec{B} \bullet d\vec{s} = \mu_0 I_{\text{encircled}}$ Line current: $\dot{B} = \frac{\mu_0 I_s}{2\pi r}$ (r = distance from wire) Center of current loop: $\dot{B} = \frac{\mu_0 I_s}{2r}$ (r = radius of loop) Current sheet: $\dot{B} = \frac{1}{2}\mu_0 J_s$ (units for J_s = A/m) Inside a solenoid: $\dot{B} = \mu_0 n I_s$ (units for n = 1/m = loops/m) Outside a solenoid: $\vec{B}$=0 $\mu_0 = 4\pi \times 10^{-7}$ N/A^2	$\vec{B}$ at a point in space "magnetic field" unit = T vector	Don't curl your fingers. finger tips: dir $q_0\vec{v}_\perp$ or $I_{0\perp}$ palm: dir $\vec{B}$ thumb: dir $\vec{F}_B$ → Force on moving charge: $\dot{F}_B = \dot{q}_0 \dot{v}_\perp \dot{B}$ $= \dot{q}_0 \dot{v} \dot{B} \sin\theta$ ($v_\perp$ is the component of $\vec{v}$ that is perpendicular to $\vec{B}$; θ is the angle between $\vec{B}$ and $\vec{v}$) Force on current-carrying wire: $\dot{F}_B = I_{0\perp} L \dot{B}$ $= I_0 L \dot{B} \sin\theta$ ($I_{0\perp}$ is the "component" of the current that is perpendicular to $\vec{B}$; θ is the angle between $\vec{B}$ and the current)	$\vec{F}$ on moving q_0 (including I_0, or a magnet, or magnetic material) "magnetic force" unit = N vector

You must use S.I. units in all the formulas in this chart.