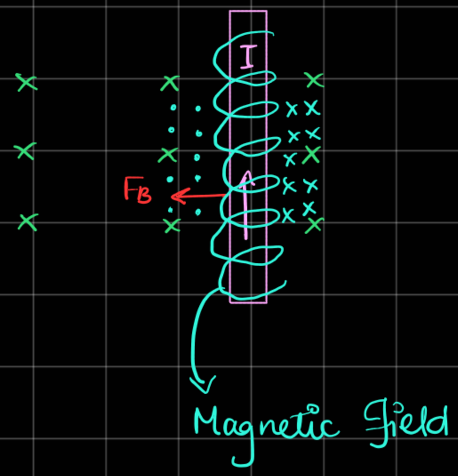
Sources of Magnetic Field



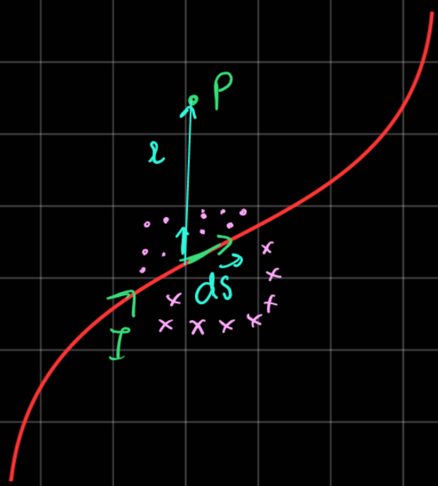
$F_B = I\vec{L} \times \vec{B}$

$$\vec{B} = \boxed{\frac{\mu_0 I}{4\pi} \int \frac{d\vec{s} \times \hat{r}}{r^2}}$$

r^2 → distance from small length to the point

↳ Biot Savart Law

Permiability → Ability of material to become magnet



$\vec{B}$ is $\perp$ $\vec{r}$ & $d\vec{s}$

Magnetic field for straight wire

$$B = \frac{\mu_0 I}{4\pi a} \left(\sin\theta_1 - \sin\theta_2 \right)$$

Magnetic field for very long straight wire

$$B = \frac{\mu_0 I}{2\pi a}$$

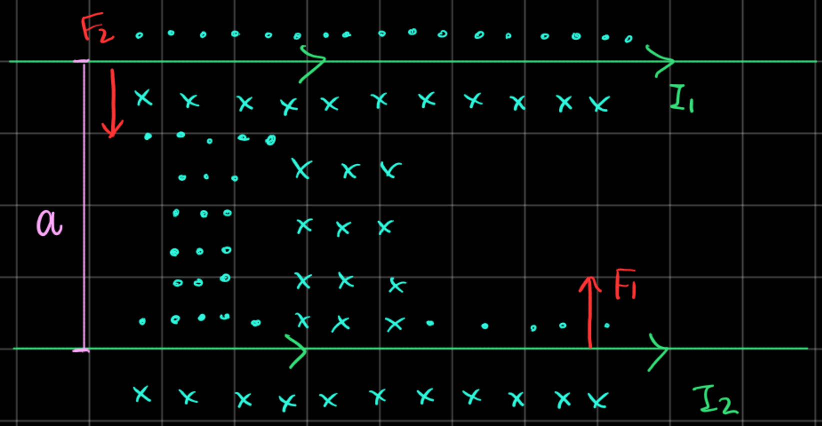
Magnetic field for curved wire

$$B = \frac{\mu_0 I}{4\pi a} \theta$$

Magnetic field at the centre of a circular loop

$B = \mu_0 I$

$$B = \frac{\mu_0 I}{2a}$$



$$F_1 = F_2 = \frac{\mu_0 I_1 I_2}{2\pi a} \ell \ (N) \Rightarrow \frac{F_1}{\ell} = \frac{\mu_0 I_1 I_2}{2\pi a} \ (N/m)$$

Ampere's Law

$$\oint \vec{B} \cdot d\vec{s} = \mu_0 I$$

Magnetic flux

$$\Phi_B = \int \vec{B} \cdot d\vec{A}$$

Φ_B for any closed surface $= 0$