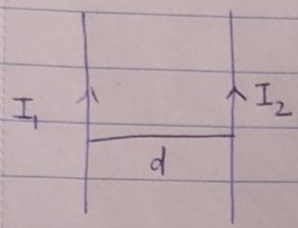
$$B = \frac{\mu_0 I}{4\pi} \int_{\theta_1}^{\theta_2} \frac{\cancel{\cos^2\theta}}{s^{\cancel{2}}} \cdot \frac{\cancel{s}}{\cancel{\cos^2\theta}} \, d\theta \, . \cos\theta .$$

$$= \frac{\mu_0 I}{4\pi s} \int_{\theta_1}^{\theta_2} \cos\theta \cdot d\theta = \frac{\mu_0 I}{4\pi s} \left[\sin\theta_2 - \sin\theta_1 \right]$$

For two straight current carrying wires (parallel).



Force on (2) due to 1 = $\int (I \times B) \, dl$

$$B_{12} = \frac{\mu_0 I_1}{4\pi d} \left[\sin\theta_2 - \sin\theta_1 \right] \qquad \theta_1 = -\pi/2 \quad \theta_2 = \pi/2$$

$$= \frac{\mu_0 I_1}{2\pi d}$$

$$\therefore \quad F = I_2 \frac{\mu_0 I_1}{2\pi d} \int dl$$

Similarly for anti-parallel wires, they experience force of repulsion

So the loop's lower horizontal end experiences a repulsive force while the loop's upper horizontal end experiences an attractive force.

At the bottom $\quad B = \frac{\mu_0 I}{2\pi s} \quad F = \left(\frac{\mu_0 I}{2\pi s} \right) I . a = \frac{\mu_0 I^2 a}{2\pi s}$ (up)

At the top $\quad B = \frac{\mu_0 I}{2\pi (s+a)} \quad F = \frac{\mu_0 I}{2\pi (s+a)} \cdot I . a = \frac{\mu_0 I^2 a}{2\pi (s+a)}$ (down)

So the net force is $= \frac{\mu_0 I^2 a}{2\pi} \left(\frac{1}{s} - \frac{1}{s+a} \right)$

$$= \frac{\mu_0 I^2 a^2}{2\pi s (s+a)} \quad \text{(up)}$$