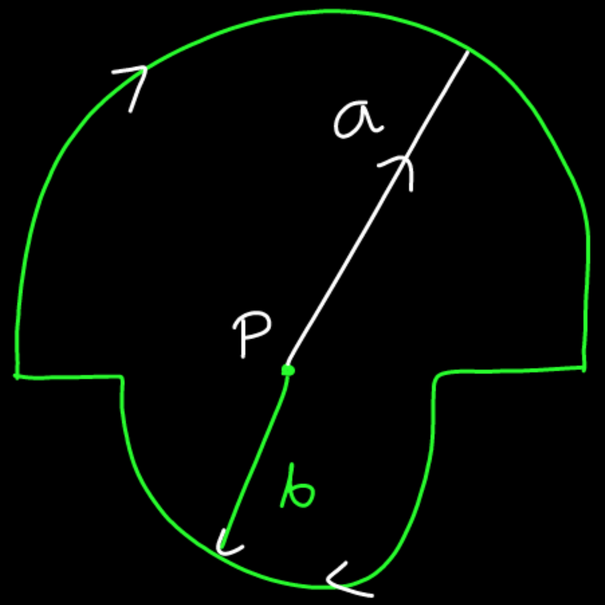
समस्त बिहार, भरेगा हुंकार
HUNKAR
2025
में आपका स्वागत हैं

(I)





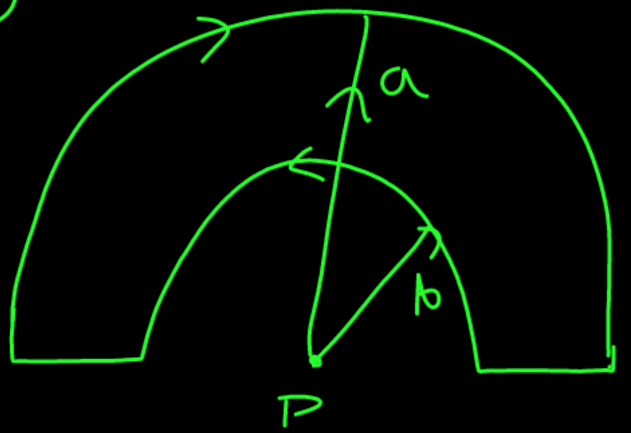

$$B = \frac{\mu_0 i}{4R}$$

$$B_1 = \frac{\mu_0 i}{4a}$$

$$B_2 = \frac{\mu_0 i}{4b}$$

$$B_{net} = \frac{\mu_0 i}{4a} + \frac{\mu_0 i}{4b}$$

$$= \frac{\mu_0 i}{4}\left(\frac{1}{a} + \frac{1}{b}\right)$$



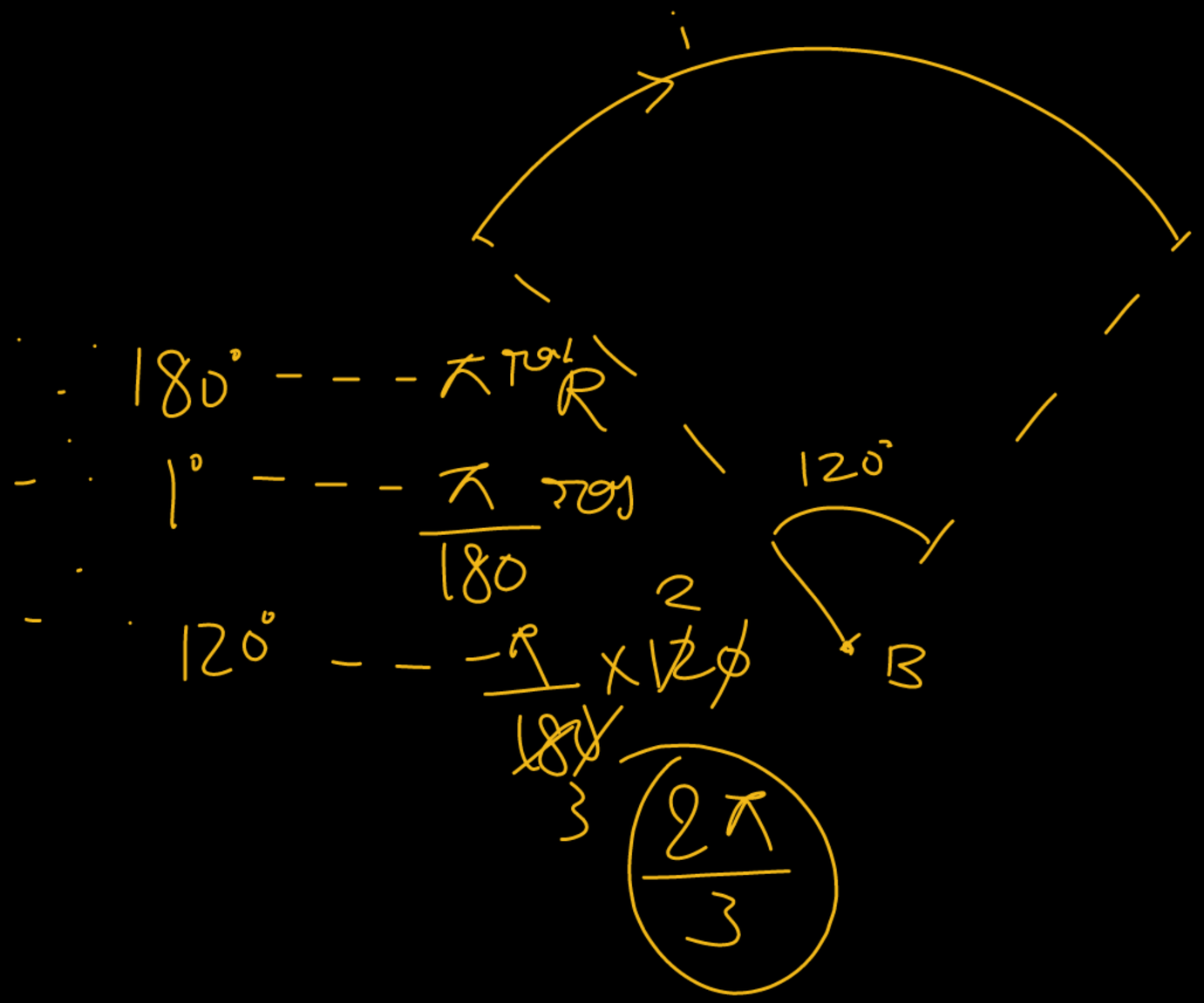
(II)




$$B_1 = \frac{\mu_0 i}{4a} \otimes$$

$$B_2 = \frac{\mu_0 i}{4b} \odot$$

$$B_{net} = \frac{\mu_0 i}{4}\left(\frac{1}{b} - \frac{1}{a}\right)$$



$180^\circ \text{ --- } \pi \text{ rad}$

$1^\circ \text{ --- } \frac{\pi}{180} \text{ rad}$

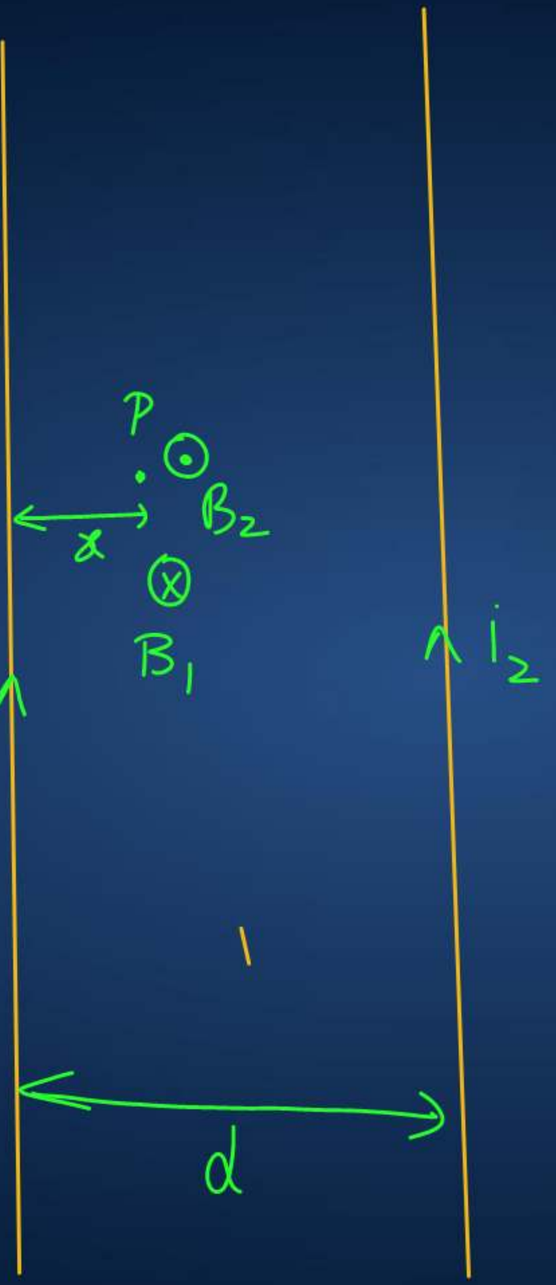
$120^\circ \text{ --- } \frac{\pi}{180} \times 120 = \frac{2\pi}{3}$

$$B = \frac{\mu_0}{4\pi} \frac{i}{R} \cdot \theta$$

$$= \frac{\mu_0}{4\pi} \frac{i}{R} \times \frac{2\pi}{3}$$

$$= \frac{\mu_0 i}{6R}$$

Q. Find the magnetic field at P




$$B_{net} = B_1 - B_2$$

$$\frac{\mu_0 i_1}{2\pi x} - \frac{\mu_0 i_2}{2\pi(d-x)}$$

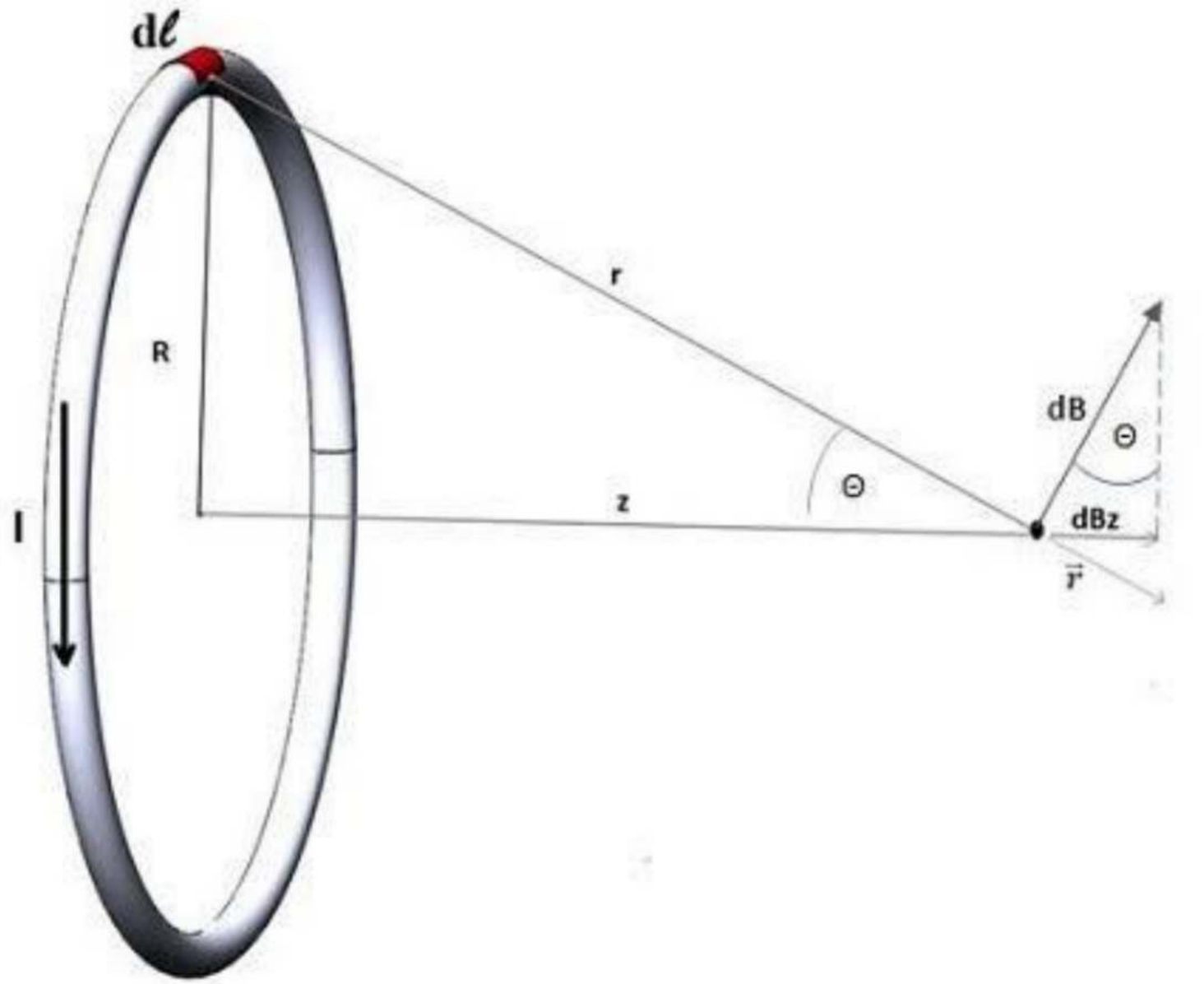
$$\frac{\mu_0}{2\pi}\left(\frac{i_1}{x} - \frac{i_2}{d-x}\right)$$

$$B = \frac{\mu_0 i}{2\pi z}$$

$$B_1 = \frac{\mu_0 i_1}{2\pi x}$$

$$B_2 = \frac{\mu_0 i_2}{2\pi(d-x)}$$

# APPLICATION OF BIOT SAVART LAW



# APPLICATION OF BIOT SAVART LAW

Magnetic field due to a current carrying circular wire loop at an axial point.

वृताकार धारावाही पाश के अक्षीय बिंदु पर चुम्बकीय क्षेत्र

Consider a circular current carrying loop of radius $R$ having current $i$, we have to find magnetic field at it's axial point $P$ which is at $Z$ distance from center of the ring by using BIOT- SAVART law. To Find magnetic field consider a small element of current carrying wire that is $dl$ and position vector of point P with respect to $dl$ which is $\vec{r}$ . Angle between $\overrightarrow{dl}$ and $\vec{r}$ is 90°.

By applying BIOT-SAVART law.

माना कि एक वृत्ताकार धारावाही चालक तार है जिसकी त्रिज्या $R$ है तथा जिसमें $i$ धारा है हमें इसके केंद्र से $Z$ दूरी पर इसके अक्ष पर किसी बिंदु $P$ पर बायोट सवर्त के नियम से चुंबकीय क्षेत्र का मान ज्ञात करना है इसके लिए हम इस वृत्ताकार धारावाही तार पर एक छोटा टुकड़ा $dl$ मानते हैं और इससे बिंदु $P$ को मिलाने वाला एक स्थिति सदिश $\vec{r}$ मानते हैं। $\overrightarrow{dl}$ *तथा* $\vec{r}$ के बीच का कोण 90° है अब बायोट सवर्त के नियम का उपयोग करते हैं।

$$B = 2\frac{\mu_0}{4\pi}\frac{i\pi R^2}{(R^2+z^2)^{3/2}}$$

$i\pi R^2$ = Magnetic dipole moment

= चुम्बकीय द्विध्रुव आघूर्ण

$$z \gg R$$

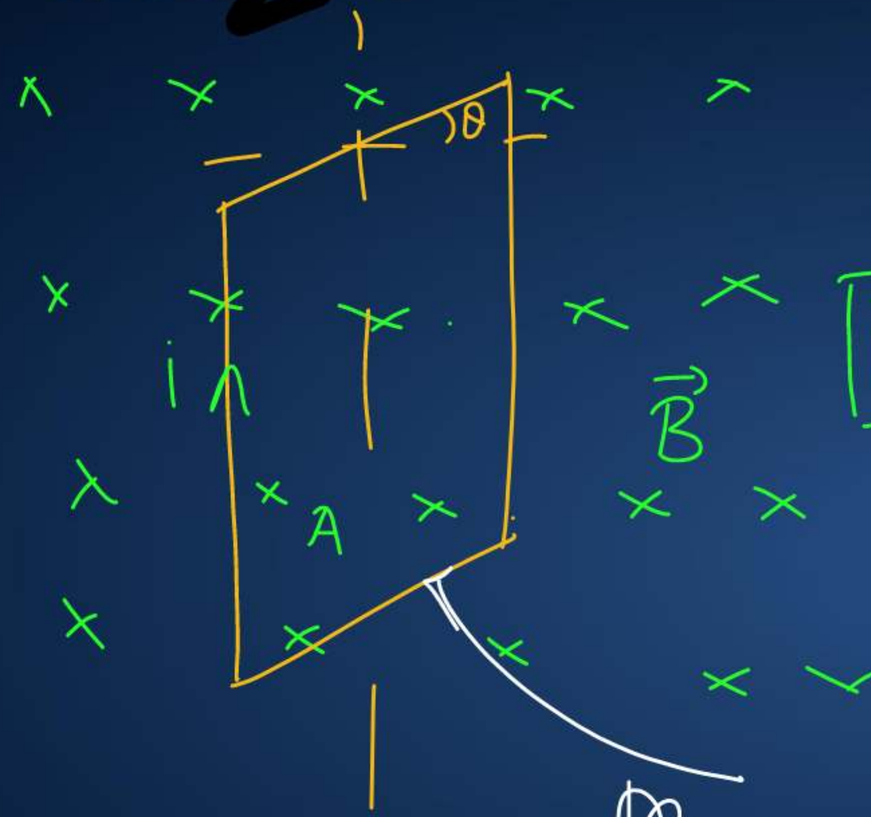
$$B = 2\frac{\mu_0}{4\pi}\left\{\frac{i(\pi R^2)}{z^3}\right\}$$

$$B = 2\left(\frac{\mu_0}{4\pi}\right)\frac{M}{z^3}$$

$$B = \frac{2KM}{z^3}$$

$$E = \frac{2KP}{z^3}$$

# Magnetic dipole & dipole moment






$$\tau = (iA)(B)\sin(\theta)$$

$$\vec{M} = i\vec{A}$$ → Magnetic Dipole moment

iA

B

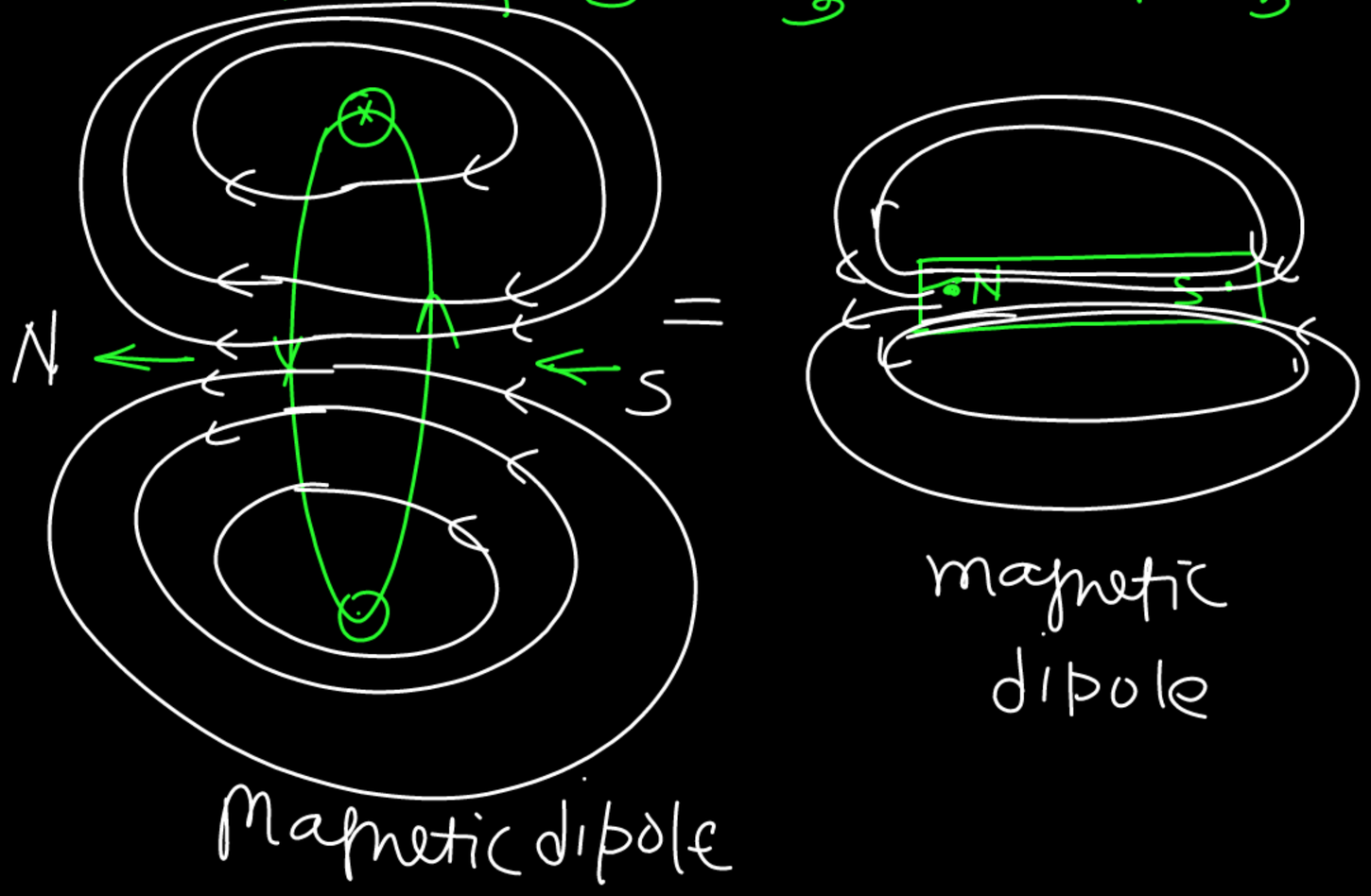
θ

Unit → $A\,m^2$

Magnetic dipole चुम्बकीय द्विध्रुव

# Loop as a magnetic dipole.

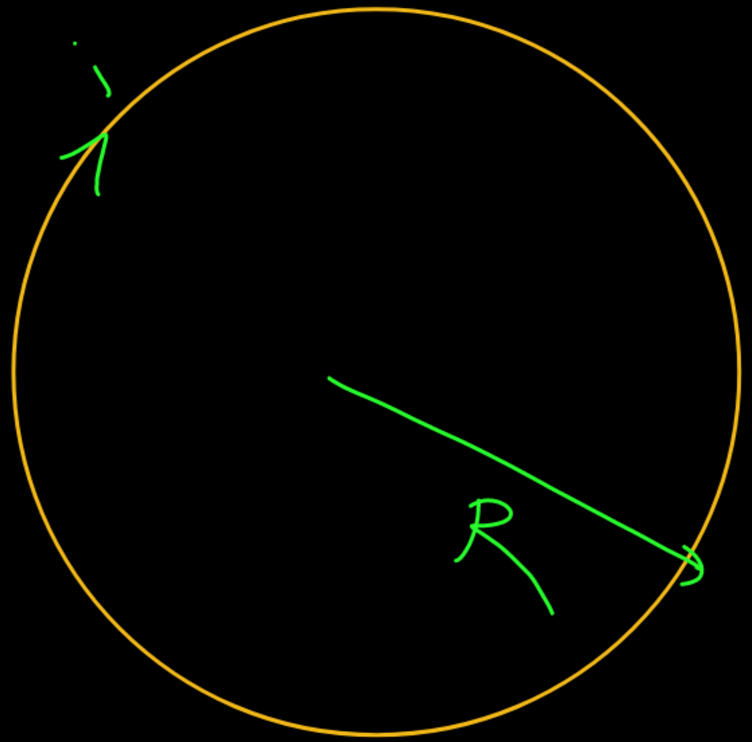
## धारावाही लूप चुम्बकीय द्विध्रुव के जैसा.




Magnetic dipole

magnetic dipole

चुम्बकीय द्विध्रुव
magnetic dipole




$$\vec{M} = i A$$

$$\boxed{\vec{M} = i \pi R^2}$$