Aya ♡ Doa'a ♡ 01 : 01

Subject　　　　　　　　　　　　Date　　　　　　　No.

$$K = \frac{1}{2} m v^2$$

$$V_{max} = \frac{qBR}{m} \rightarrow$$ نصف قطر الـ Dees

$$\boxed{K = \frac{q^2 B^2 R^2}{2m}}$$ $\leq 20\ MeV$

CH 30 sources of the magnetic field

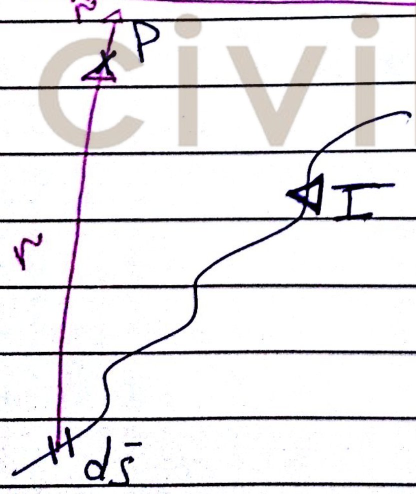
Biot - savart law

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

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

$$\mu_0 = 4\pi \times 10^{-7} \frac{T \cdot m}{A}$$

Permenbilty of free space



ds باتجاه الـ I

الإبهام مع ds باتجاه الـ I

الاصابع باتجاه الـ $\hat{r}$ تكابج

عند الكف هو المجال المغناطيسي.

NOTEBOOK

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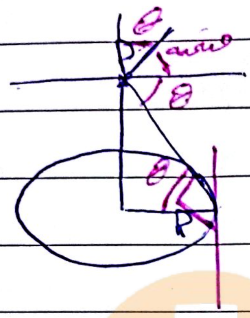
$$B_y = \int dB \cos\theta \qquad dB = \frac{\mu_0 I}{4\pi}\,\frac{ds \times \hat{r}}{r^2}$$

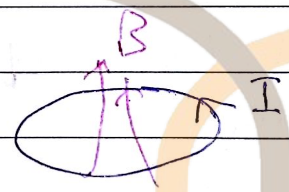
$$\boxed{ds \perp \hat{r}}$$



$$dB = \frac{\mu_0 I\, ds}{4\pi (R^2 + y^2)}$$

$$B = \hat{j}\left(\int \frac{\mu_0 I\, ds\, R}{4\pi (R^2 + y^2)^{3/2}}\right)$$

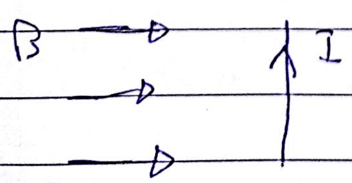
$$B = \frac{\mu_0 I R^2}{2 (R^2 + y^2)^{3/2}}\,\hat{j}$$



if $y = 0$

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

Magnetic force between two parallel



$$F = I \bar{L} \times \bar{B}$$

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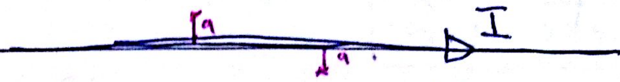
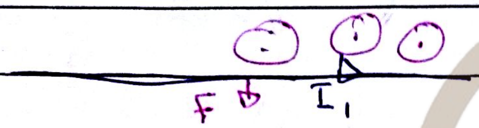
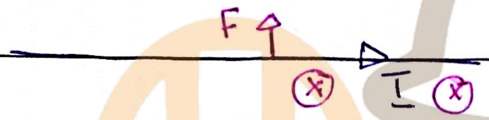
Long straight wire

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



L مع اتجاه التيار





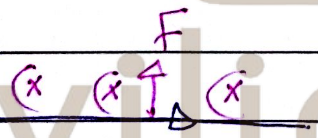
$$\to B_1 = \frac{\mu_0 I_1}{2\pi a}$$

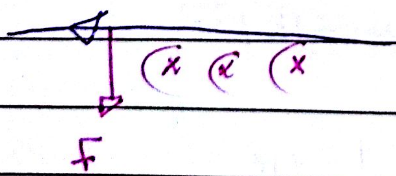
$$F_{on\,2} = I_2 L_2 \times \frac{\mu_0 I_1}{2\pi a}$$

للعنصرين الأول والثاني

$$\frac{F_{on\,2}}{L_2} = \frac{I_1 I_2 \mu_0}{2\pi a} \Rightarrow \frac{F}{L} = \frac{I_1 I_2 \mu_0}{2\pi a}$$

Force per unit Length





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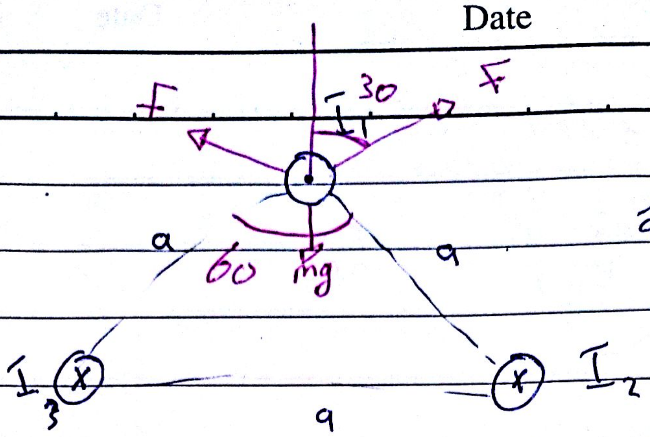
30.4



المركبات السينية تلغي
بعضها والمركبات الصادية
اذا كانت اكبر من mg
يطير اذا اقل يسقط
اذا متساوية يثبت

$I_1 = 100\,A$

$L = 10\,m$ Find I_2 that is just enough to carry I_1

$m_1 = 400\,g$

$a = 1\,cm$

لانهم سلكين

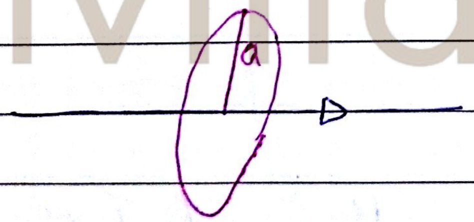
$$m_1 g = 2F\cos\theta$$

$$= \frac{2 I_1 I_2 \mu_0}{2\pi a} L \cos 30$$

$$F_1 = \frac{L_1 \mu_0 I_1 I_2}{2\pi a}$$

$$I_2 = 113\,A$$

* Ampere Law



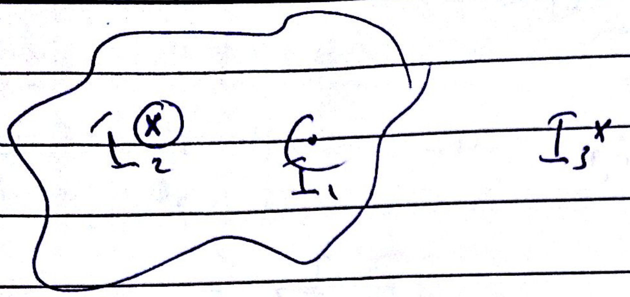
$$B = \frac{\mu_0 I}{2\pi a}$$

على مسار مغلق $\oint \bar{B}\cdot\bar{ds} \rightarrow$ بنفس الاتجاه $= \mu_0 I_{enc} \rightarrow$ التيارات الداخلة في الدائرة

$$\oint B\, ds$$

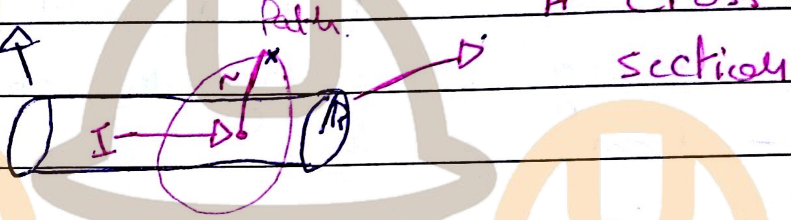
ثابت يطلع $\leftarrow B\oint ds = B\,2\pi a = \frac{\mu_0 I}{\cancel{2\pi a}}\cdot\cancel{2\pi a}$

N O T E B O O K



30.5 I uniformly distributed over A

Find B inside and out side



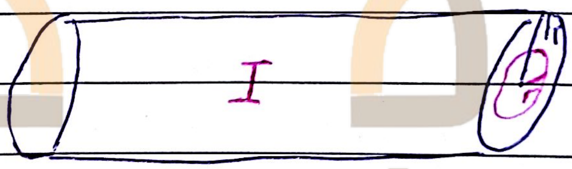
الزاوية بين ds و B صفر

$r > R$

$$\oint B \cdot ds = \mu_0 I_{in}$$

$$B\, 2\pi r = \mu_0 I$$

b) B inside
$r < R$



$$I_{in} = \frac{I}{A} * \pi r^2$$

$$I_{in} = \frac{I}{\pi R^2} \pi r^2$$

$$\oint B \cdot ds = \mu_0 I_{in}$$

$$B\, 2\pi r = \mu_0 \frac{I}{\pi R^2} \pi r^2$$

$$B = \frac{\mu_0 I r}{2\pi R^2}$$

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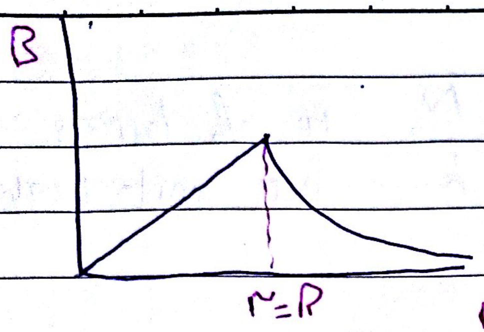


$\boxed{30.6}$ Toroid

turns closely spaced

B insid uniform

B outside $\approx$ zero

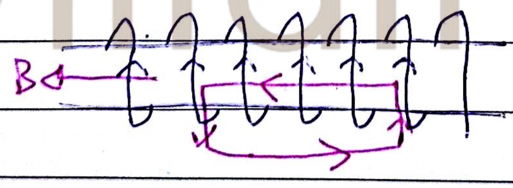
السلك ملفوف محيط الـ

$$\oint B \cdot ds = \mu_0 I_{enc}$$

$$B \, \underbrace{2\pi r}_{\text{محيط}} = \mu_0 I n \rightarrow \text{\# of turns.}$$

$$B = \frac{\mu_0 I n}{2\pi r}$$

$\boxed{30.4}$ Solenoid



B out $\approx$ zero

$$\oint B \cdot ds = \mu_0 I_{enc}$$

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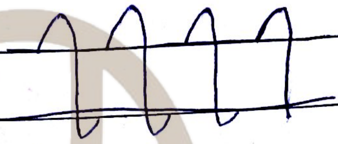
$Bl = \mu_0 NI$

$B = \frac{\mu_0 NI}{l}$ $\quad n = \frac{N}{l}$ # of turns per unit length

$$\boxed{B = \mu_0 n I}$$



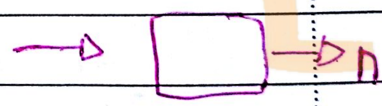
30.5 Gauss's law in magnetism

$$\phi_B \overset{\text{flux}}{=} \int \vec{B} \cdot da$$

if B is uniform and A is flat

$\phi = BA\cos\theta$

RoleLN JJ



unit Weber

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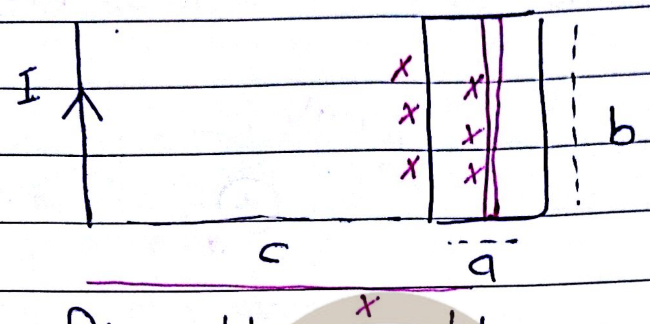
30.7



Find ϕ_B flux through the area

B غير منتظم حيث انه
يضعف بالابتعاد عن السلك

$$\phi = \int B \cdot da = \int B\, da$$

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

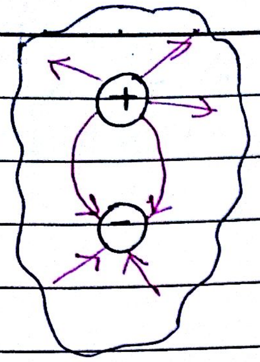
$$da = b\, dx$$

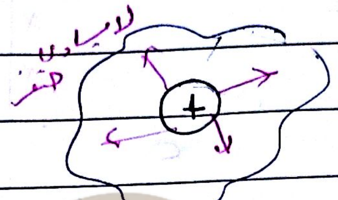
$$\phi = \int \frac{\mu_0 I}{2\pi x} b\, dx$$

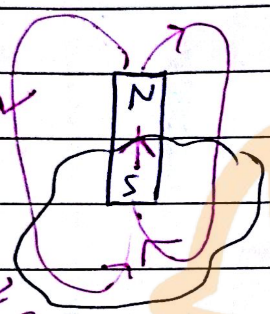
$$\phi = \frac{\mu_0 I b}{2\pi} \ln \left| \frac{a+c}{c} \right|$$

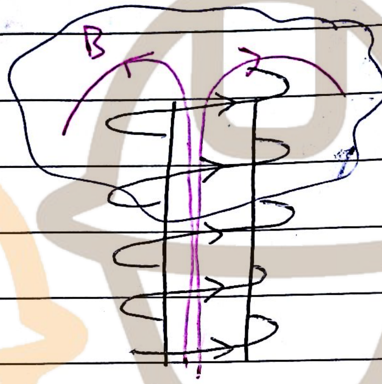
Subject cont. Date No.

* التدفق للـ dipole يساوي صفر









$$\oint \vec{B} \cdot d\vec{a} = 0$$ ⇒ There is No magnetic monoPole for now.

* في الشحنات الكهربائية اذا كان عنا DiPole يكون التدفق على السطح المغلق يساوي صفر ~~لأنه في التدفق المغناطيسي~~ لكن اذا كان عنا شحنة واحدة فقط monoPole لا يساوي صفر لكن اذا كان تدفق مغناطيسي فدائمًا يكون التدفق يساوي صفر سواء كان السطح المغلق يحاوط الجسم او قطب واحد.

N O T E B O O K