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9.7

$a = 0,1 \text{ m}$ $I = 100 \text{ A}$ $L = 1 \text{ m}$

$dF = I B L \sin \alpha$

$F = I B L \sin \alpha$

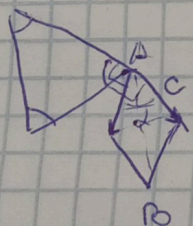
$B = \frac{\mu_0 I_0}{2\pi a}$

$F = I B L \sin \alpha$

$F = \frac{\mu_0 I_0 \cdot I L}{2\pi a}$

$F' = \frac{\mu_0 I^2 \cdot L}{2\pi a}$

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



$\alpha = 60^\circ + 90^\circ - 90^\circ = 60^\circ$

$AB = a \cdot C \cdot \frac{\sqrt{3}}{2} = \sqrt{3}C$

$B = B' \cdot \sqrt{3} = \frac{\sqrt{3} \mu_0 I}{2\pi a}$

$F = \frac{\sqrt{3} \mu_0 I^2 \cdot L}{2\pi a} = \frac{\sqrt{3} \cdot 4\pi \cdot 10^{-7} \cdot 10^4 \cdot 1}{2\pi \cdot 0,1}$

$= 3,4641 \cdot 10^{-2} \frac{\text{N}}{\text{m}}$

4.12 $\epsilon = 55 \cdot 10^{-6} \frac{\text{Cm}}{\text{m}}$

$$\frac{A}{\epsilon} = 55 \cdot 10^{-6} \frac{\text{Cm}}{\text{m}}$$

$$I_2 dA = \int F(r) dr$$

I_1

$r(b)$

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

$$F = \frac{\mu_0 I_1 I_2 L}{2\pi b}$$

$$dA = \int \frac{\mu_0 I_1 I_2 L}{2\pi r} dr \quad \frac{\mu_0 I_1 I_2 L}{2\pi} \int \frac{1}{r} dr$$

$$A = \frac{\mu_0 I_1 I_2 L}{2\pi} (\ln 2r - \ln r) =$$

$$= \frac{\mu_0 I_1 I_2 L}{2\pi} \ln 2$$

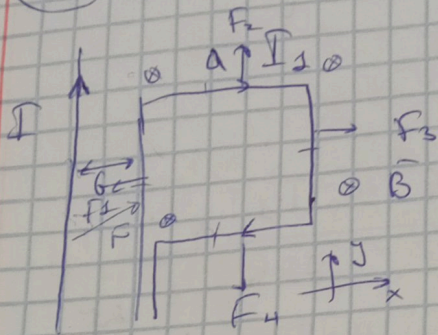
$$\frac{A}{L} = \frac{\mu_0 I_1 I_2}{2\pi} \ln 2$$

$$\frac{A}{L} = \frac{\mu_0 I^2}{2\pi} \ln 2$$

$$I = \sqrt{\frac{55 \cdot 10^{-6} \cdot 2\pi}{4\pi \cdot 10^{-7} \ln 2}} = 19.9 \text{ A}$$

realme

9.13) $a = 0,5 \text{ m}$ $I = 5 \text{ A}$ $I_0 = 1 \text{ A}$ $b = 0,1 \text{ m}$



$$F_2 = \frac{\mu_0 I I_0 a}{2\pi b}$$

$$F_2 = F_4 = \frac{\mu_0 I I_0 a}{2\pi(b)}$$

$$F_2 = -F_4 \quad F_3 = \frac{\mu_0 I I_0 a}{2\pi(a+b)}$$

$$F = F_1 + F_2 + F_3 - F_4 = F_3 - F_1 =$$

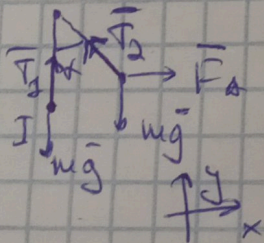
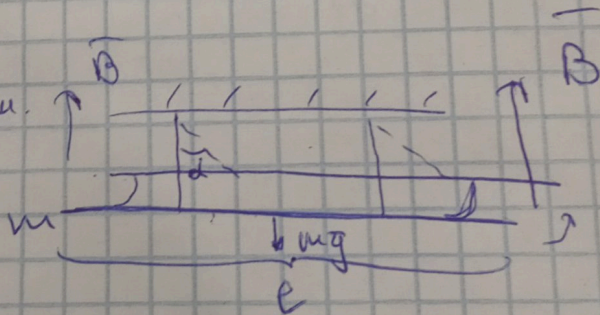
$$= \frac{\mu_0 I I_0 a}{2\pi} \left(\frac{1}{a+b} - \frac{1}{b} \right) =$$

$$= \frac{4\pi \cdot 10^{-7} \cdot 0,5 \cdot 5}{2\pi} \left(\frac{1}{0,1+0,5} - \frac{1}{0,1} \right) = -4,17 \cdot 10^{-6} \text{ N}$$

9.16) $B = 0,5 \text{ T}$

$m = 0,03 \text{ kg}$ $l = 0,4 \text{ m}$

$I = 1,2 \text{ A}$



$$F = IBl$$

$$\text{Ox: } F_A - T \sin \alpha = 0$$

$$\text{Oy: } T \cos \alpha - mg = 0$$

$$\begin{aligned} T \sin \alpha &= F_A \\ T \cos \alpha &= mg \end{aligned}$$

$$\tan \alpha = \frac{F_A}{mg}$$

10.7

$$P = IS$$

$$T = \frac{1}{f} =$$

$$I = \frac{dq}{dt}$$

$$P = 2\pi$$

10.9

$$e = \frac{1}{s}$$

$$\frac{1}{s} =$$

$$\begin{aligned} \sin \alpha &= \frac{F_a}{mg} \\ \cos \alpha &= \frac{F_g}{mg} \end{aligned}$$

$$\tan \alpha = \frac{F_a}{F_g}$$

$$\tan \alpha = \frac{IBL}{mg}$$

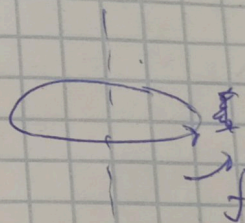
$$\alpha = \arctan \left(\frac{1,2 \cdot 0,5 \cdot 0,49}{0,03 \cdot 9,8} \right) = \frac{\pi}{4}$$

$$\frac{I_0 I_0 a}{2\pi(a+b)}$$

10.7

$$P = IS \bar{w}$$

$$T = \frac{1}{f} = \frac{1}{15} \text{ s}$$



$$R = 0,08 \text{ m}$$

$$\tau = 10 \cdot 10^{-9} \text{ s}$$

$$f = 10 \text{ MHz}$$

$$\frac{e}{f} = \frac{e}{15}$$

$$\tau = \frac{q}{e}$$

$$\frac{dq}{dt} = \frac{q}{\tau}$$

$$I = \frac{dq}{dt} = \frac{q}{\tau} = \frac{\tau \cdot 2\pi R}{T} = 2\pi R f$$

$$P = 2\pi R \tau \cdot f \cdot \pi R^2 = 2\pi^2 R^3 \tau f$$

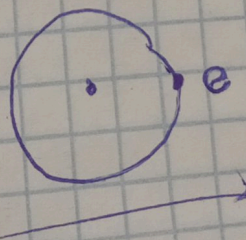
$$= 2\pi^2 \cdot (0,08)^3 \cdot 10^{-8} \cdot 15 = 1,5 \cdot 10^{-9} \text{ A} \cdot \text{m}^2$$

$$\begin{aligned} P &= IS \bar{w} \\ M &= PBL \sin \alpha \end{aligned}$$

10.9. $r = 53 \cdot 10^{-12} \text{ m}$

$$B = 0,1 \text{ T}$$

$$\vec{B}$$



$$e = 1,6 \cdot 10^{-19} \text{ C}$$

$$\frac{I}{S} = e \cdot n \cdot u$$

$$I = e n u S = \frac{q}{t}$$

$$q = e \cdot n \cdot S \cdot \frac{u \cdot t}{e} = e n u S t$$