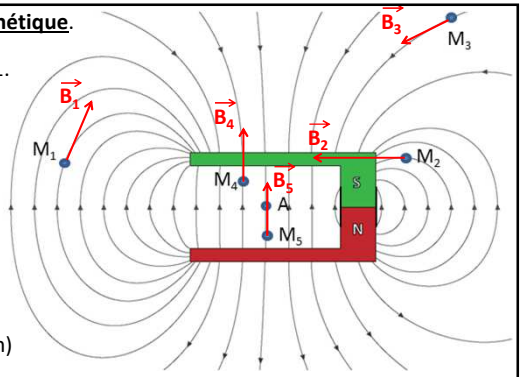
Correction exercices : champ magnétique.

Exercice 1:

1.



2.

$B_1 = \frac{1,00.10^{-3}}{AM_1} = \frac{1,00.10^{-3}}{4,1} = 2,4.10^{-4}$ T

$B_2 = \frac{1,00.10^{-3}}{AM_2} = \frac{1,00.10^{-3}}{2,95} = 3,4.10^{-4}$ T

$B_3 = \frac{1,00.10^{-3}}{AM_3} = \frac{1,00.10^{-3}}{5,3} = 1,9.10^{-4}$ T

3. 1,00 cm ↔ $1,00.10^{-4}$T

(B_1→ 2,4 cm B_2→ 3,4 cm B_3→ 1,9 cm)

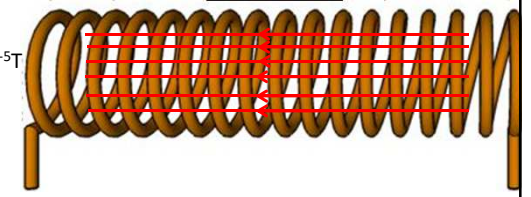
4.a. Le champ est uniforme à l'intérieur de l'aimant car les lignes de champ sont parallèles donc $B_5 = B_4 = 2,0.10^{-4}$T

Exercice 2:

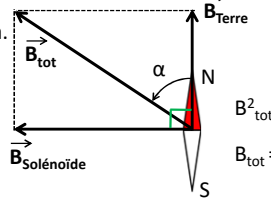
1. À l'intérieur du solénoïde, les lignes de champ sont parallèles sauf aux bords (d'après l'énoncé).

2.

$B = \frac{\mu_0.N.I}{L} = \frac{4.\Pi.10^{-7}x17x0,350}{22.10^{-2}} = 3,4.10^{-5}$T



3.a.

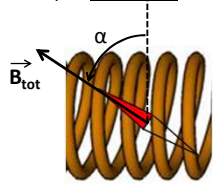


$B^2_{tot} = B_T^2 + B_S^2$

$B_{tot} = \sqrt{B_T^2 + B_S^2} = \sqrt{(20.10^{-6})^2 + (3,4.10^{-5})^2} = \underline{\mathbf{3,9.10^{-5}T}}$

3.b. $\tan\alpha = \frac{B_S}{B_T} = \frac{3,4.10^{-5}}{20.10^{-6}} = 1,7$ donc $\alpha = 60°$

3.c.



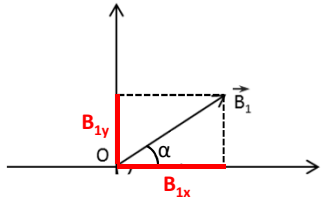
Exercice 3:

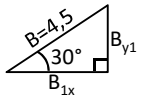
1.

SOH CAH TOA

$\sin\alpha = \frac{opp}{hyp}$

$\cos\alpha = \frac{adj}{hyp}$

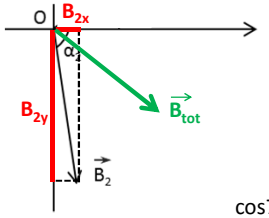


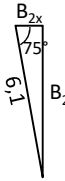


$\cos30° = \frac{B_{x1}}{4,5}$ $B_{1x} = 4,5x\cos30 = 3,9$

$\sin30° = \frac{B_{y1}}{4,5}$ $B_{1y} = 4,5x\sin30 = 2,3$

$\vec{B_1}$ | $B_{1x} = 3,9$ mT ; $B_{1y} = 2,3$ mT





$\cos75° = \frac{B_{2x}}{6,1}$ $B_{2x} = 6,1x\cos75 = 1,6$

$\sin75° = \frac{|B_{2y}|}{6,1}$ $|B_{2y}| = 6,1x\sin75 = 5,9$

$\vec{B_1}$ | $B_{1x} = 1,6$ mT ; $B_{1y} = -5,9$ mT

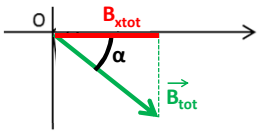
2.

$\vec{B}_{tot} = \vec{B_1} + \vec{B_2}$ donc $\vec{B}_{tot}$ | $B_{xtot} = B_{1x} + B_{2x} = 3,9 + 1,6 = 5,5$ mT ; $B_{ytot} = B_{1y} + B_{2y} = 2,3 - 5,9 = -3,6$ mT

3. $B^2_{tot} = B_{tot\,x}^2 + B_{tot\,y}^2$

$B_{tot} = \sqrt{B_{tot\,x}^2 + B_{tot\,y}^2} = \sqrt{5,5^2 + (-3,6)^2} = \underline{\mathbf{6,6\ mT}}$

4.

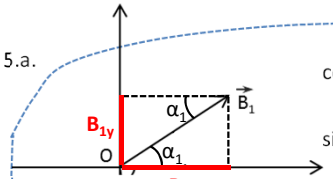


$$\cos\alpha = \frac{B_{xtot}}{B_{tot}} = \frac{5,5}{6,6} = 0,833 \quad \text{donc } \alpha = 34°$$

brouillon

Réponses attendues (pas de «rédaction»)

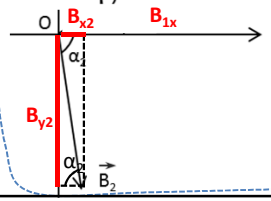
5.a.



$$\cos\alpha_1 = \frac{B_{x1}}{B_1} \qquad B_{x1} = B_1 \times \cos\alpha_1$$

$$\sin\alpha_1 = \frac{B_{y1}}{B_1} \qquad B_{y1} = B_1 \times \sin\alpha_1$$

$$\vec{B}_1 \begin{cases} B_{x1} = B_1 \times \cos\alpha_1 \\ B_{y1} = B_1 \times \sin\alpha_1 \end{cases}$$



$$\vec{B}_1 \begin{cases} B_{x2} = +\, B_2 \times \cos\alpha_2 \\ B_{y2} = -\, B_2 \times \sin\alpha_2 \end{cases}$$