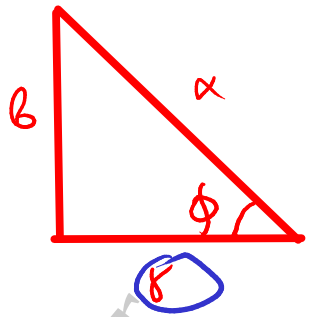
ΑΡΝΟΣ

Φυσική Α Λυκείου -13ο

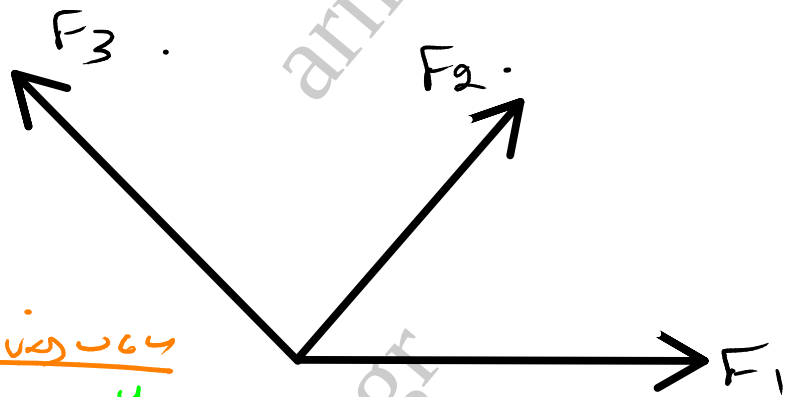
Διδακτική Επιμέλεια: Βασίλης Καράβολας

Ανάλυση και Σύνθεση Δυνάμεων

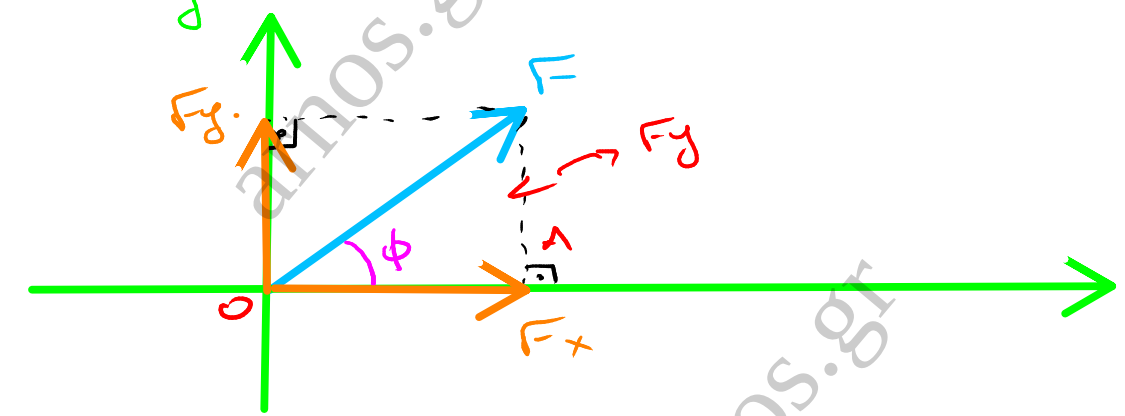


$$\eta\mu\phi = \frac{\beta}{\alpha}$$

$$\sigma\upsilon\nu\phi = \frac{\gamma}{\alpha}$$



Ανάλυση



Ο $\vec{AF}$:

$$\eta\mu\phi = \frac{F_y}{F} \Rightarrow$$

$$F_y = F \cdot \eta\mu\phi$$

$$\sigma\upsilon\nu\phi = \frac{F_x}{F} \Rightarrow$$

$$F_x = F \cdot \sigma\upsilon\nu\phi$$

$\vec{F_x}, \vec{F_y}$ είναι οι συνιστώσες της $\vec{F}$ στους δύο άξονες x, y.

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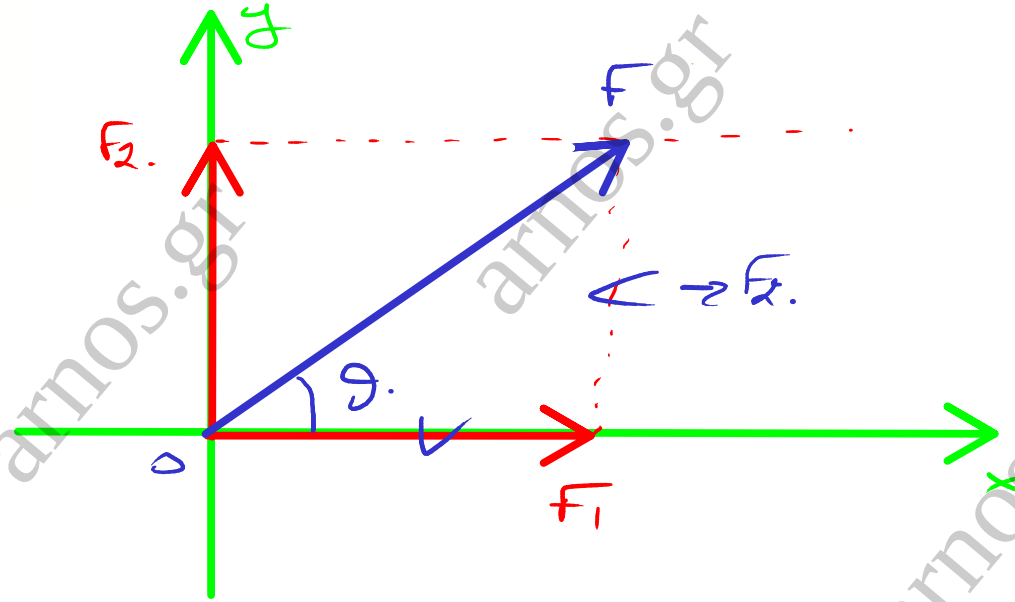
Σύνθεση



$$F = \sqrt{F_1^2 + F_2^2}$$

$$\varepsilon\varphi\vartheta = \frac{F_2}{F_1}.$$

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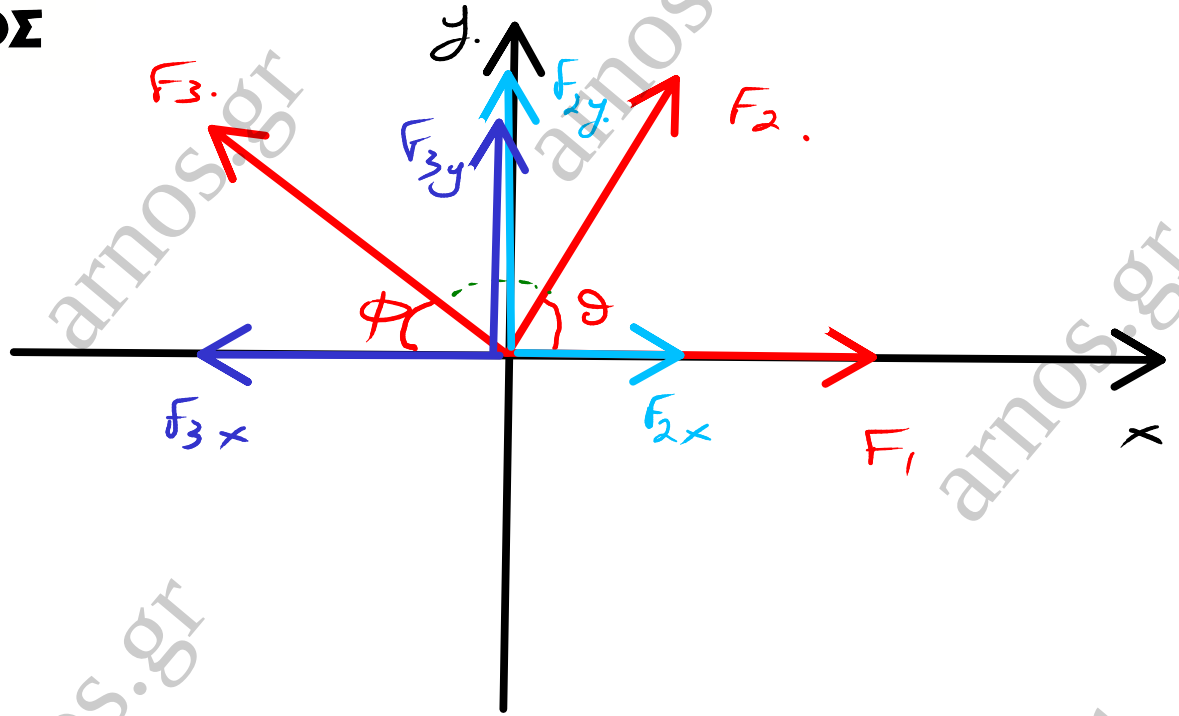
Πρόβλημα Να βρεθεί η συνισταμένη δυνάμεων



$F_1 = 10\ \text{N}$
$F_2 = 8\ \text{N}$
$\theta = 60°$
$F_3 = 10\sqrt{2}\ \text{N}$
$\phi = 45°$

α) Αναλύω σε κάθε μια δυνάμεις οι οποίες δεν βρίσκονται πάνω στους δυο άξονες στις συνιστώσες τους στους δυο άξονες.

$$F_{2x} = F_2 \cdot \sigma\upsilon\nu\theta = 8 \cdot \sigma\upsilon\nu 60 = 8 \cdot \frac{1}{2} = 4\ \text{N}$$
$$F_{2y} = F_2 \cdot \eta\mu 60 = 8 \cdot \frac{\sqrt{3}}{2} = 4\sqrt{3}\ \text{N}.$$

$F_{3x} = F_3 \cdot \sigma\upsilon\nu 45^\circ = 10\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 10$ ν.

$F_{3y} = F_3 \cdot \eta\mu 45^\circ = 10\sqrt{2} \cdot \frac{\sqrt{2}}{2} = 10$ ν.

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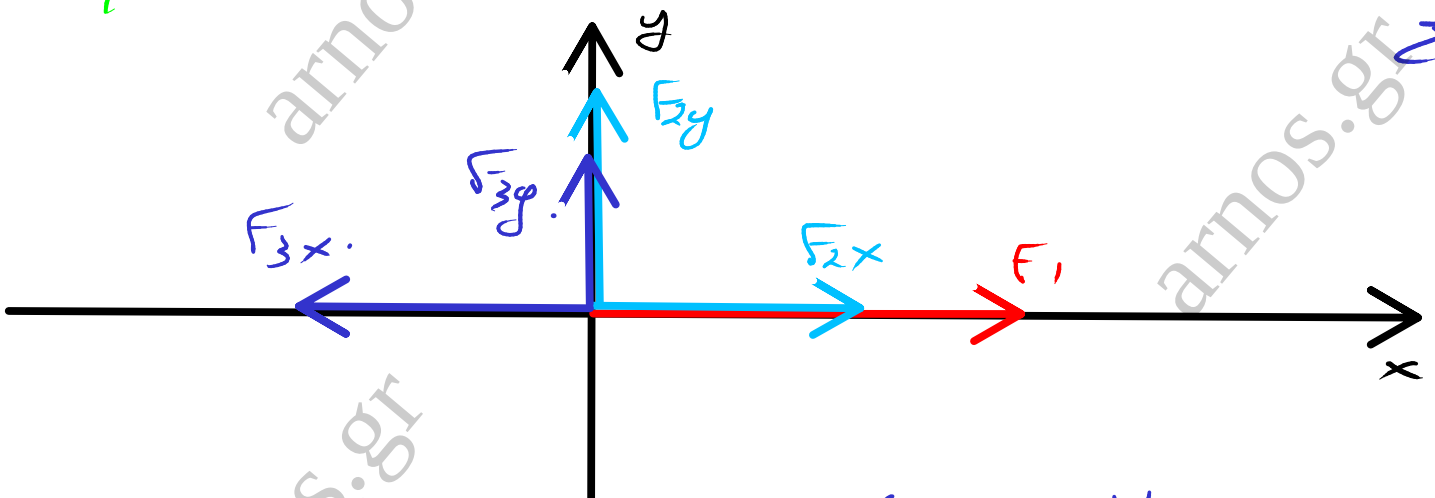
β) Πρόσθεση δυνάμεων στον ίδιο άξονα.



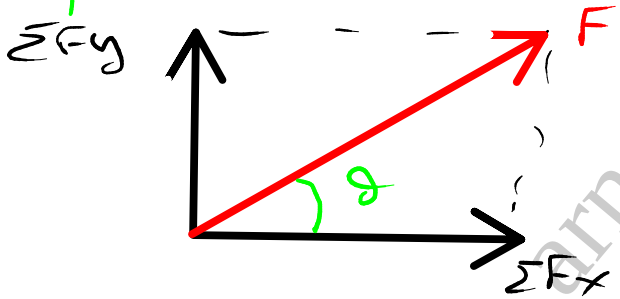
$\Sigma F_x = F_1 + F_{2x} + F_{3x}$

$\Sigma F_x = 10 + 4 - 10$

$\Sigma F_x = 4$ ν.

$\Sigma F_y = F_{2y} + F_{3y} = 4\sqrt{3} + 10 = 16,92$ ν.

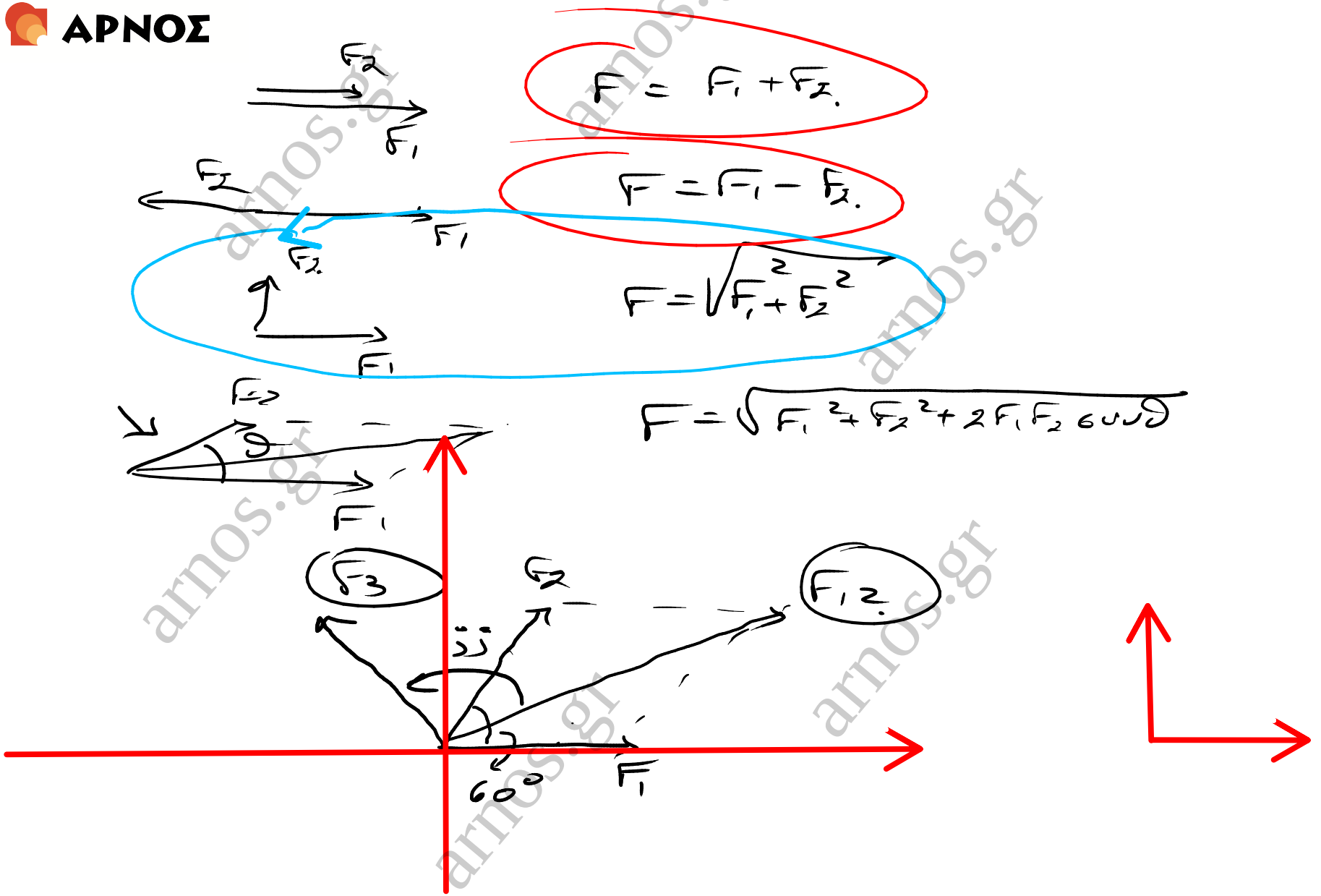
γ) Πρόσθεση κάθετων δυνάμεων.



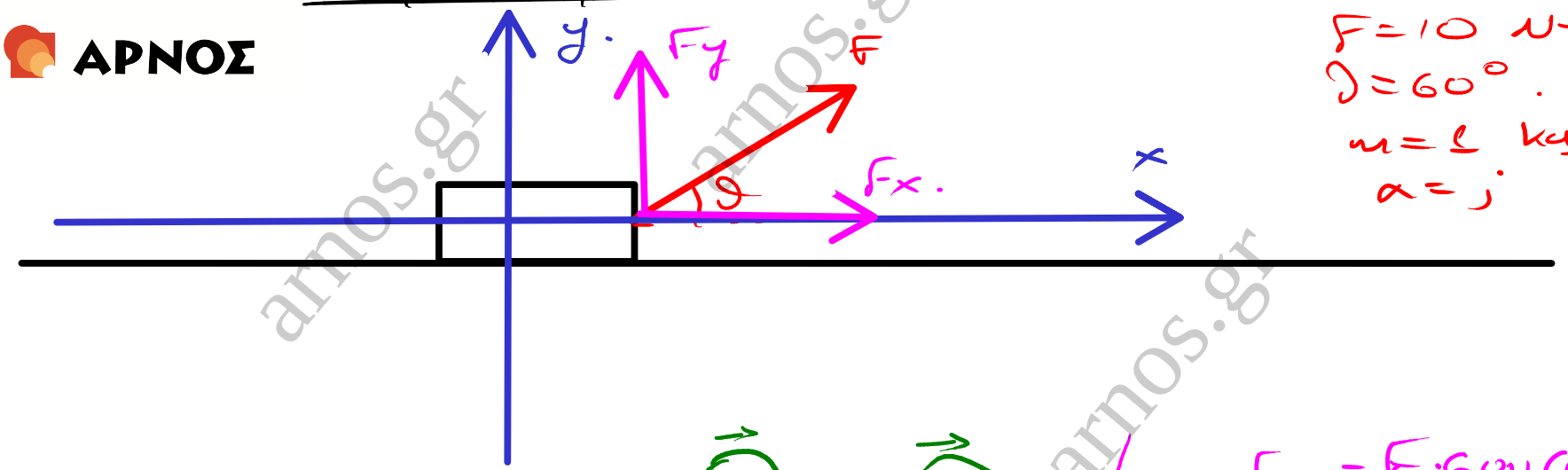
$F = \sqrt{\Sigma F_x^2 + \Sigma F_y^2} = \sqrt{4^2 + 16,92^2}$

$F = 8$ ν.

$\varepsilon\varphi\theta = \frac{\Sigma F_y}{\Sigma F_x} = \frac{16,92}{4}$


F2
F1
F = F1 + F2.
F2
F1
F2.
F = F1 − F2.
F1
F = √(F1² + F2²)
F2
θ
F1
F = √(F1² + F2² + 2F1F2 συνθ)
F3
F2
F1,2.
60°
F1

Παράδειγμα



$F = 10\ N$
$\theta = 60^\circ$
$m = 2\ kgr$
$\alpha = ;$

Β Νόμος Νεύτωνα:

$$\Sigma \vec{F_x} = m \cdot \vec{\alpha}$$

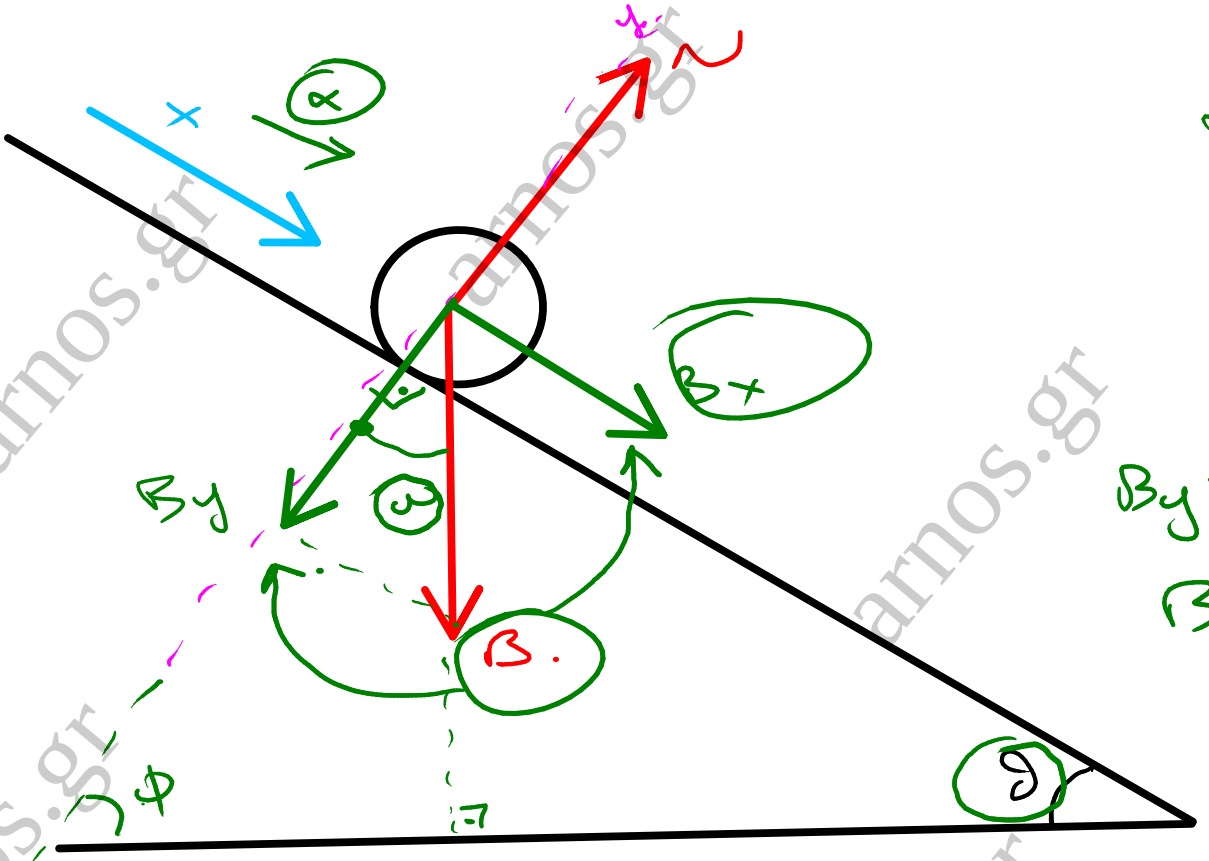
$F_x = m\alpha$

$5 = 1 \cdot \alpha \Rightarrow$

$\alpha = 5\ \frac{m}{sec^2}$

$F_x = F \cdot \sigma\upsilon\nu 60^\circ$

$F_x = 10 \cdot \frac{1}{2} = 5\ N$



$\theta + \phi = 90^\circ$

$\phi + \omega = 90^\circ$

$\theta = \omega.$

$B_y = B \cdot \sigma\upsilon\nu\theta$

$B_x = B \cdot \eta\mu\theta.$