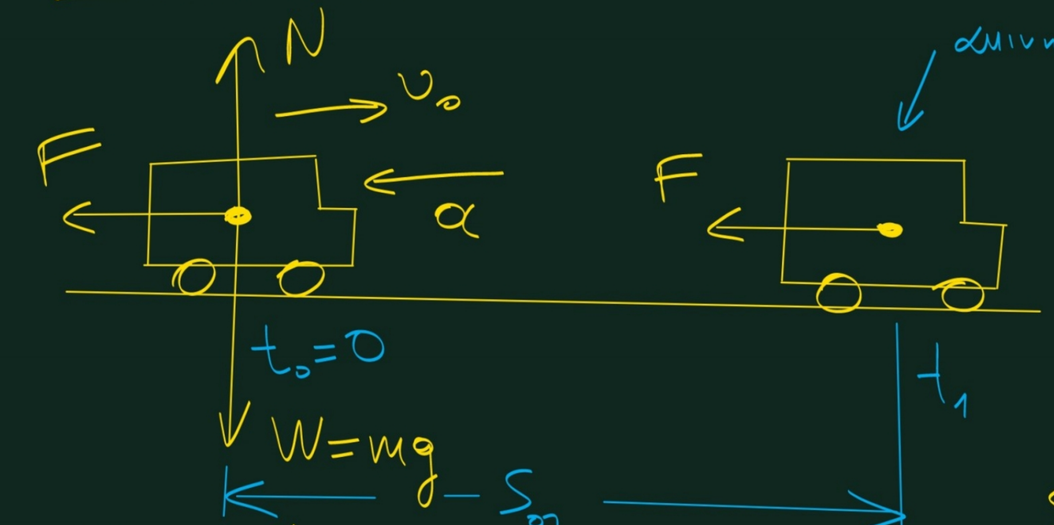
Ασκ. 17. Θεμ. 108-



$F=2\cdot10^4\,N$

$m=4.000\,kg$

Α. Η κίνηση είναι επιβραδυνόμενη.

$\upsilon=\upsilon_0-\alpha t \Rightarrow 0=\upsilon_0-\alpha t_1 \Rightarrow \alpha t_1=\upsilon_0 \Rightarrow$

$$\boxed{t_1=\frac{\upsilon_0}{\alpha}}$$ (χρόνος κίνησης)

Διάστημα φρεναρίσματος.

$$S=\upsilon_0 t-\frac{1}{2}\alpha t^2 \Rightarrow S_{01}=\upsilon_0 t_1-\frac{1}{2}\alpha\cdot t_1^2 \Rightarrow$$

$$S_{01}=\upsilon_0\cdot\frac{\upsilon_0}{\alpha}-\frac{1}{2}\alpha\cdot\left(\frac{\upsilon_0}{\alpha}\right)^2=\frac{\upsilon_0^2}{\alpha}-\frac{1}{2}\frac{\alpha\cdot\upsilon_0^2}{\alpha^2}\Rightarrow$$

$$S_{01}=\frac{\upsilon_0^2}{\alpha}-\frac{\upsilon_0^2}{2\alpha}\Rightarrow S_{01}=\frac{2\upsilon_0^2}{2\alpha}-\frac{\upsilon_0^2}{2\alpha}\Rightarrow$$

$$\boxed{S_{01}=\frac{\upsilon_0^2}{2\alpha}}$$

Άρα: $\Sigma F=m\alpha \Rightarrow F=m\cdot\alpha \Rightarrow$

$2\cdot10^4=4.000\cdot\alpha \Rightarrow 20.000=4.000\,\alpha \Rightarrow$

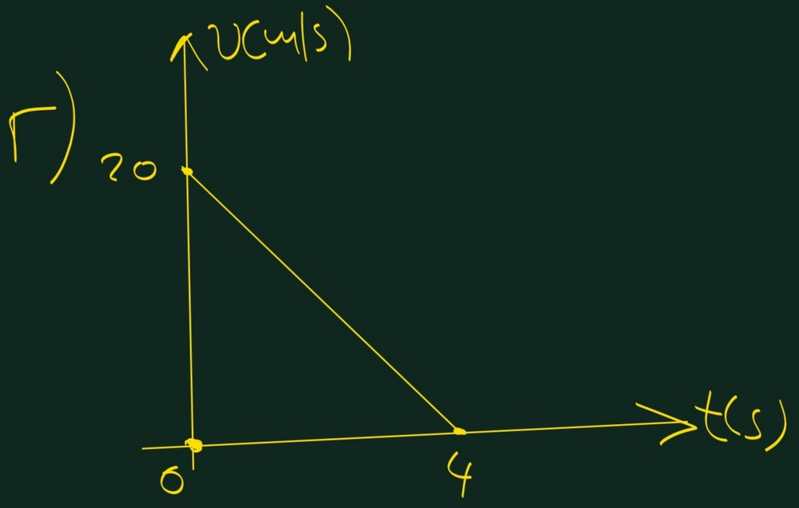
$\alpha=5\,m/s^2$

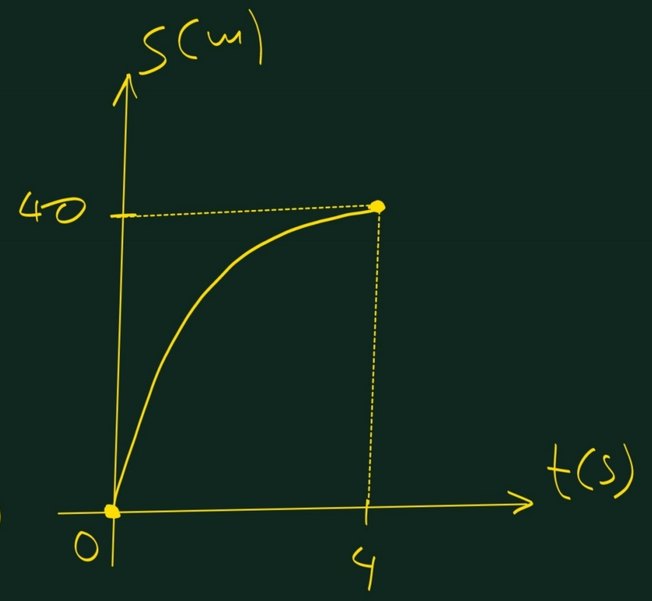
$$S_{o\lambda} = \frac{v_o^2}{2a} \Rightarrow 40 = \frac{v_o^2}{2 \cdot 5} \Rightarrow$$

$$v_o^2 = 400 \Rightarrow v_o = 20 \text{ m/s}$$

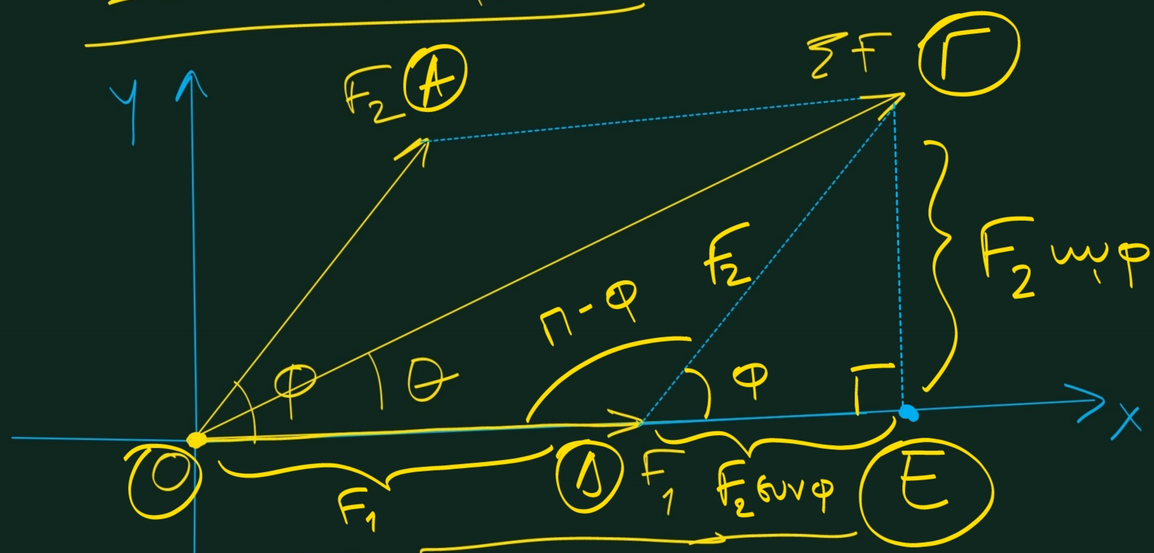
B) $$t_1 = \frac{v_o}{a} = \frac{20}{5} = 4 \text{ sec}$$

Γ)





Σύνθεση δυνάμεων



$\Sigma F = \sqrt{F_1^2 + f_2^2 + 2F_1 F_2 \sigma\upsilon\nu\varphi}$ → κανόνας των συνημιτόνων

Αν $\varphi = 90^\circ$ τότε $\sigma\upsilon\nu\varphi = 0$

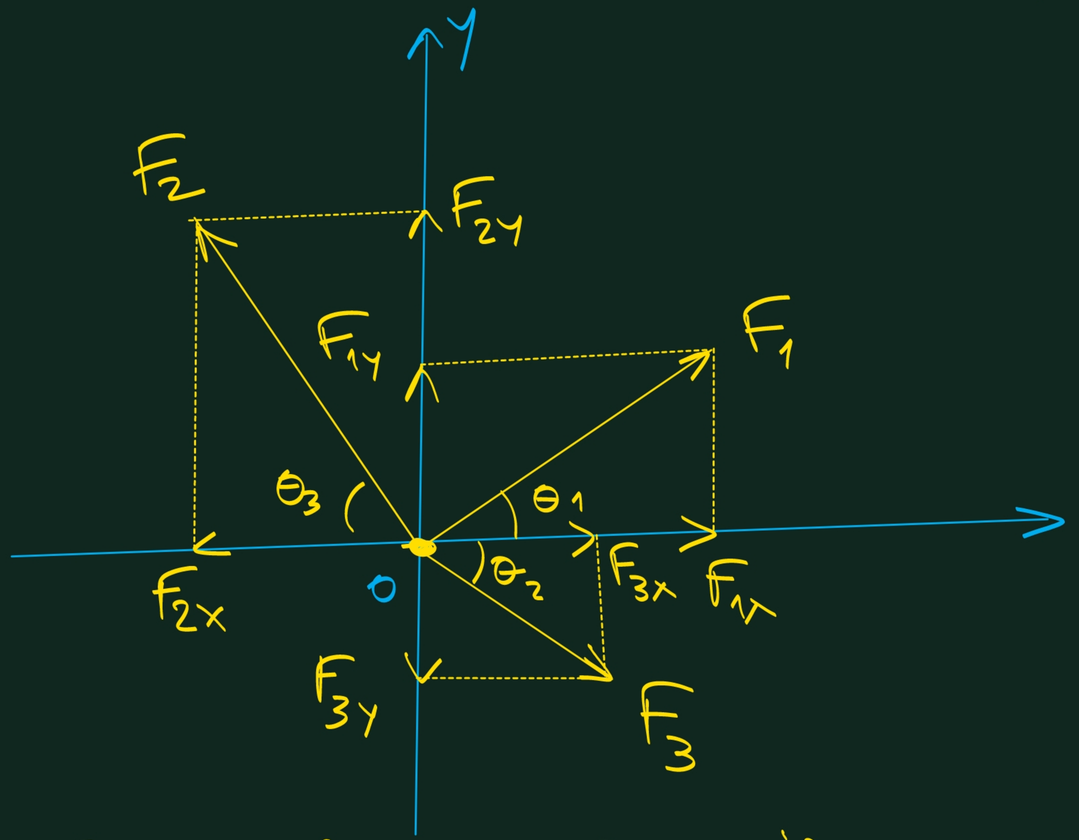
οπότε: $\Sigma F = \sqrt{F_1^2 + F_2^2}$

Στο τρίγωνο $O\hat{\Gamma}E$ έχουμε:

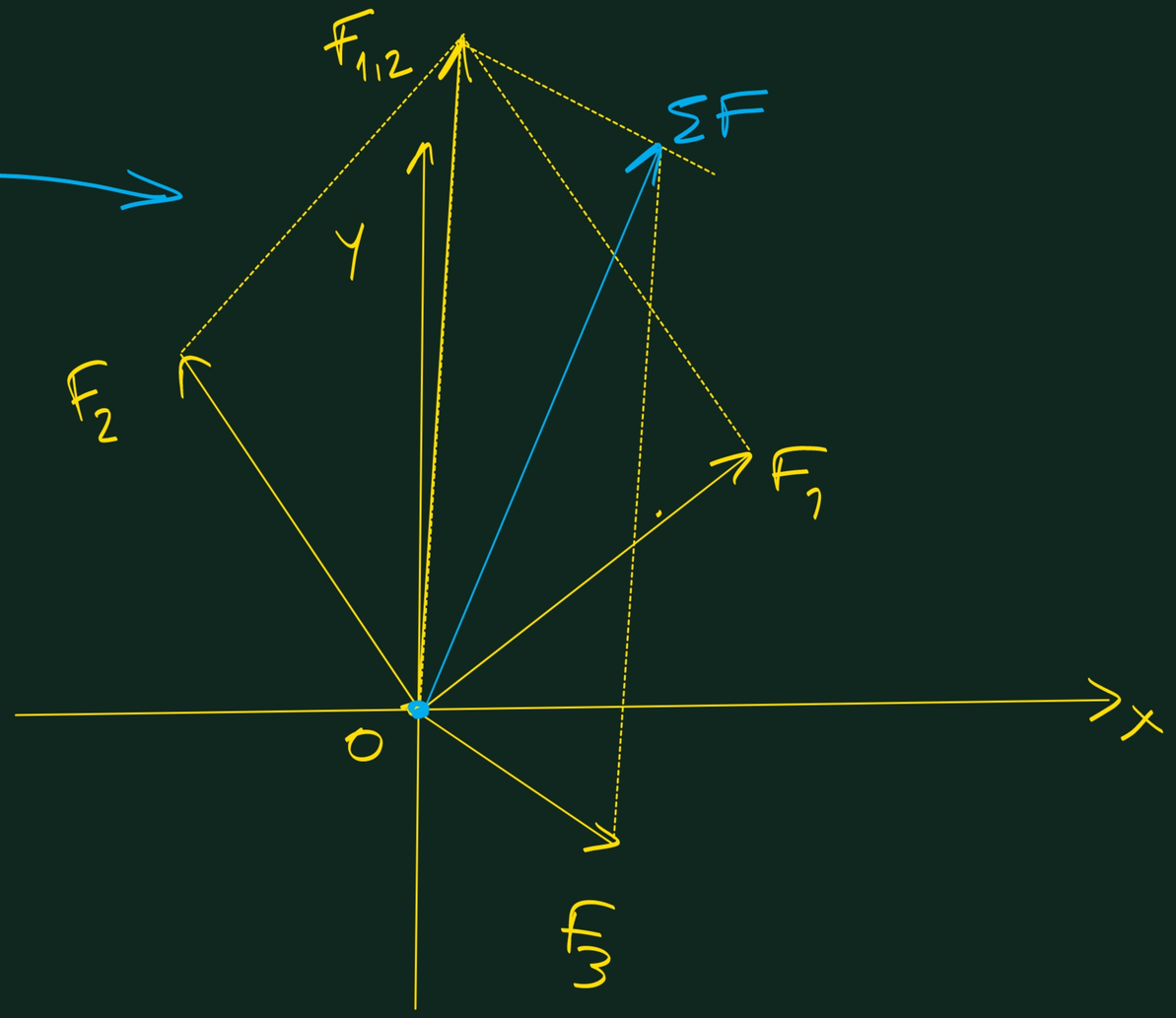
$$\varepsilon\varphi\theta = \frac{\Gamma E}{OE} = \frac{\Gamma E}{O\Delta + \Delta E} =$$

$$= \frac{f_2 \cdot \eta\mu\varphi}{F_1 + F_2 \cdot \sigma\upsilon\nu\varphi}$$

Σύνθεση πολλών ομοεπίπεδων δυνάμεων (κανόνας παραλληλογράμμου)



Σύνθεση δυνάμεων (με αναλυση σε συνιστώσες).



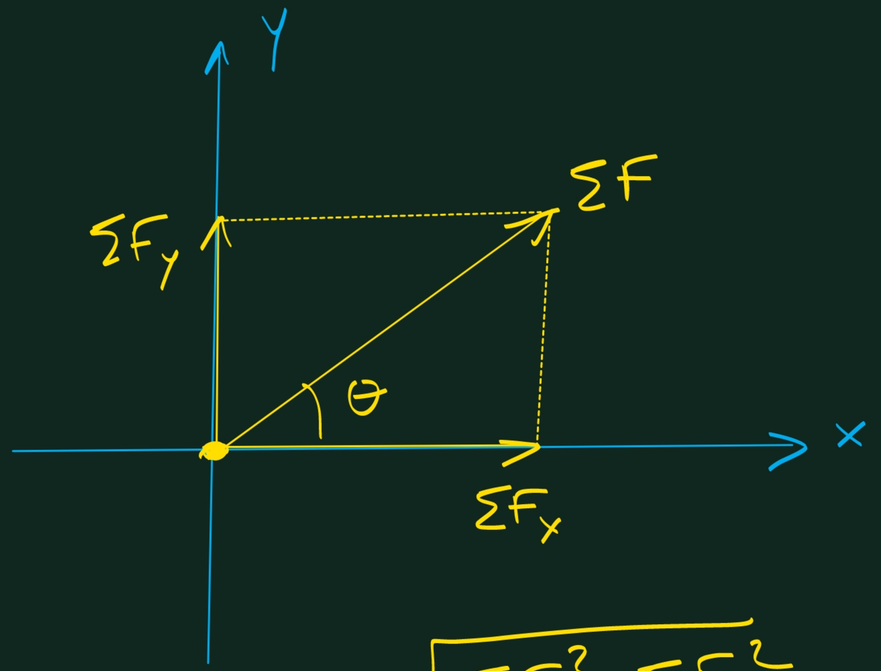
$$\Sigma F_x = F_{1x} + F_{3x} - F_{2x}$$

$$\Sigma F_y = F_{1y} + F_{2y} - F_{3y}$$

$$F_{1x} = F_1 \cdot \sigma\upsilon\nu\theta_1 \qquad F_{1y} = F_1 \cdot \eta\mu\theta_1$$

$$F_{1y} = F_2 \cdot \sigma\upsilon\nu\theta_2 \qquad F_{2y} = F_2 \cdot \eta\mu\theta_2$$

$$F_{3y} = F_3 \cdot \sigma\upsilon\nu\theta_3 \qquad F_{3y} = F_3 \cdot \eta\mu\theta_3$$



$$\Sigma F = \sqrt{\Sigma F_x^2 + \Sigma F_y^2}$$

$$\varepsilon\varphi\theta = \frac{\Sigma F_y}{\Sigma f_x}$$

Παράδειγμα σελ. 119.