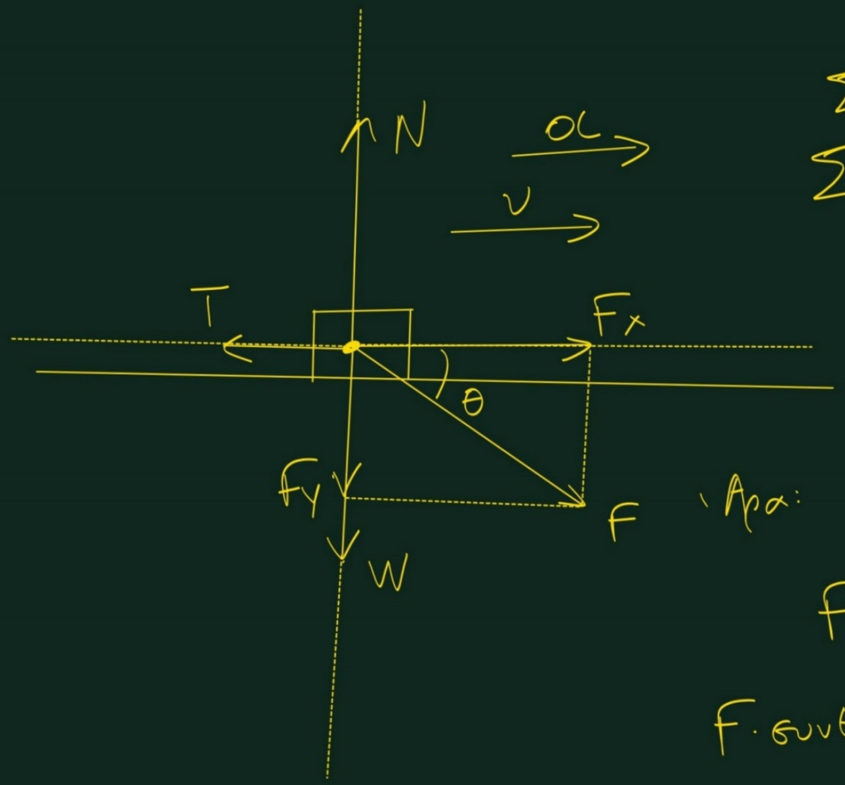


$\Sigma F_x = m\alpha \Rightarrow f_x - T = m\alpha .$

$\Sigma f_y = 0 \Rightarrow N - F_y - W = 0 \Rightarrow$

$N = f_y + W \Rightarrow N = F \cdot \eta\mu\theta + mg .$

$T = \mu N$

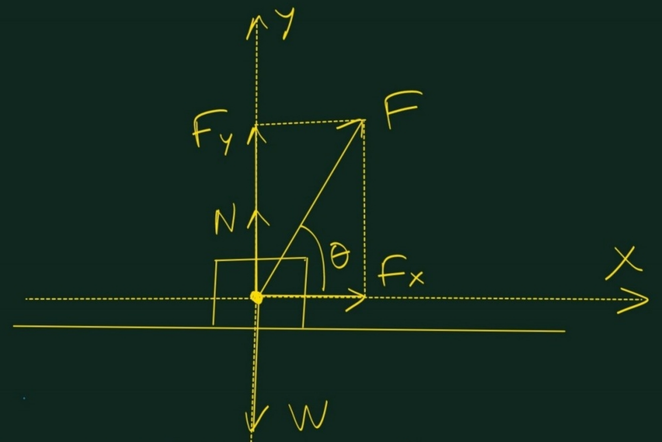
Άρα: $f_x - T = m\alpha \Rightarrow F \cdot \sigma\upsilon\nu\theta - \mu N = m\alpha \Rightarrow$

$F \cdot \sigma\upsilon\nu\theta - \mu(F \cdot \eta\mu\theta + mg) = m\alpha \Rightarrow$

$F \cdot \sigma\upsilon\nu\theta - \mu F \cdot \eta\mu\theta - \mu mg = m\alpha \Rightarrow$

$F(\sigma\upsilon\nu\theta - \mu \cdot \eta\mu\theta) - \mu mg = m\alpha \Rightarrow \alpha = \dots$

Α 6ω. 22 6ε2. 159.



Α. $\Sigma F_y = 0 \Rightarrow F_y + N - W = 0 \Rightarrow$

$N = W - F_y \Rightarrow$

$N = mg - F \cdot \text{συν} 60^\circ \Rightarrow$

$N = 10 \cdot 10 - 40 \cdot \frac{\sqrt{3}}{2} \Rightarrow$

$N = 100 - 20\sqrt{3} \Rightarrow N \cong 100 - 34 \Rightarrow$

$\boxed{N = 66\,N}$

$\sqrt{3} \simeq 1,7$

$20\sqrt{3} \simeq 34$

Β. $\Sigma F_x = m \cdot a \Rightarrow F_x = m \cdot a \Rightarrow F \cdot \text{συν}\theta = m \cdot a \Rightarrow$

$40 \cdot \text{συν} 60^\circ = 10 \cdot a \Rightarrow 40 \cdot \frac{1}{2} = 10 \cdot a \Rightarrow a = 2\,m/s^2$

$U = a \cdot t \Rightarrow U = 2 \cdot 5 \Rightarrow \boxed{U = 10\,m/s}$

Γ.

$0 \to 1 \to 2 \to 3 \to 4 \to 5$

$1^\circ\ 2^\circ\ 3^\circ\ 4^\circ\ 5^\circ$

$S(t) = \frac{1}{2} a \cdot t^2$

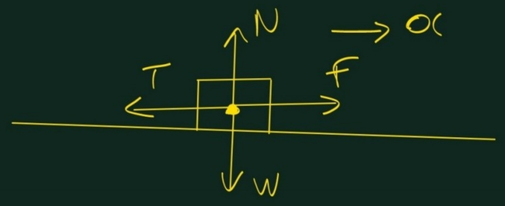
$S(5) = \frac{1}{2} \cdot 2 \cdot 5^2 =$

$S(5) = 25\,m$

$S(4) = \frac{1}{2} \cdot 2 \cdot 4^2 = 16\,m$

Αρα: $S = S(5) - S(4) = 25 - 16 \Rightarrow \boxed{S = 9\,m}$

Εφ. 30 σελ. 153 (αιτιολόγηση)



Έστω ότι υπάρχει τριβή.

$F - T = m \cdot a$ (1)

$2F - T = m \cdot 2a$ (2)

αφού η τριβή μένει σταθερή

Διπλασιάζουμε την (1):

$2F - 2T = 2 \cdot m \cdot a$ (1')

$(-)\ 2F - T = 2m \cdot a$ (2)

$2F - 2T - (2F - T) = 2ma - 2ma \Rightarrow$

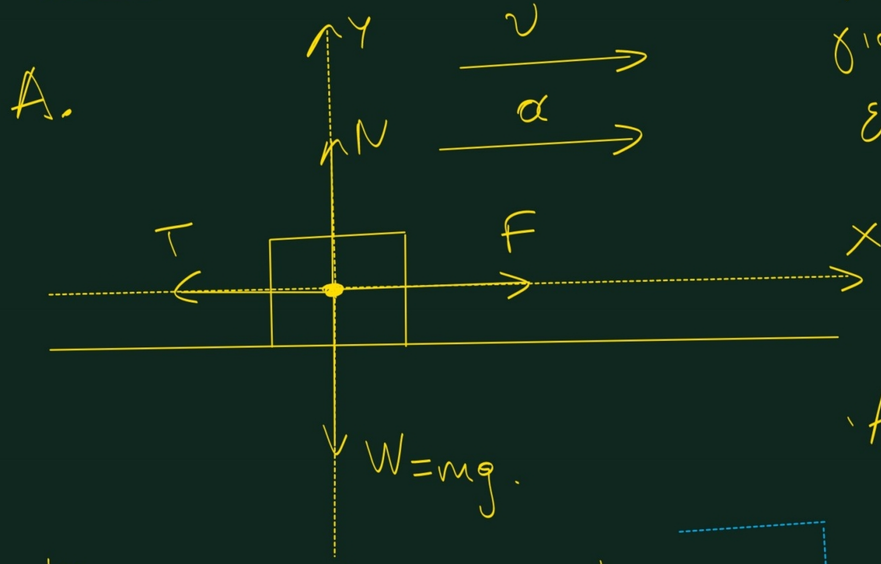
$2F - 2T - 2F + T = 0 \Rightarrow$

$-T = 0 \Rightarrow T = 0$

άρα δεν υπάρχει τριβή.

Ασκ. 23 σελ. 159

Α.



Όσο η τριβή είναι στατική είναι μικρότερη από την τριβή ολίσθησης.

Άρα η μικρότερη δύναμη που πρέπει να ασκήσουμε για να αρχίσει να κινείται είναι: $F_{min} = T = \mu N$

$\Sigma F_y = 0 \Rightarrow N - W = 0 \Rightarrow$

$N = W = 1000N$

Άρα: $F_{min} = \mu \cdot N = 0,2 \cdot 1000 \Rightarrow$

$$F_{min} = 200N$$

Β. $W = m \cdot g \Rightarrow$

$1.000 = m \cdot 10 \Rightarrow$

$m = 100\ kg.$

$\Sigma F_x = m \cdot a \Rightarrow F - T = m \cdot a \Rightarrow$

$500 - 200 = 100 \cdot a \Rightarrow$

$$a = 3\ m/s^2$$

Γ. $S = \frac{1}{2} \cdot a \cdot t^2 \Rightarrow$

$24 = \frac{1}{2} \cdot 3 \cdot t^2 \Rightarrow$

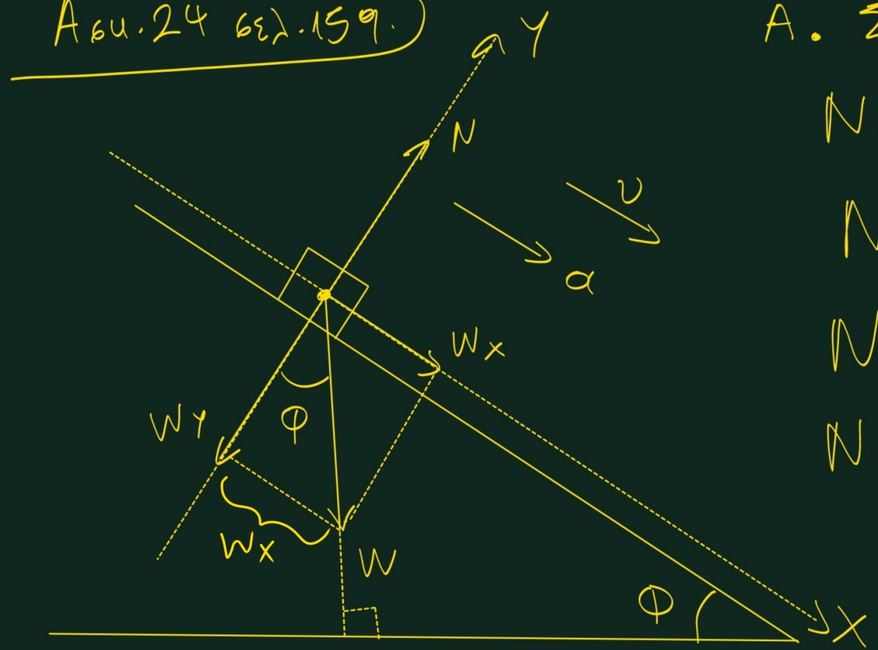
$\frac{48}{3} = \frac{3t^2}{3} \Rightarrow t^2 = 16 \Rightarrow$

$$t = 4sec$$

και: $\upsilon = a \cdot t \Rightarrow \upsilon = 3 \cdot 4 \Rightarrow$

$$\upsilon = 12\ m/s.$$

Ασκ.24 σελ.159.)



A. $\Sigma F_y = 0 \Rightarrow N - W_y = 0 \Rightarrow$

$N = W_y \Rightarrow N = W \cdot \sigma\upsilon\nu\varphi \Rightarrow$

$N = m \cdot g \cdot \sigma\upsilon\nu\varphi \Rightarrow$

$N = 1 \cdot 10 \cdot \sigma\upsilon\nu 30^\circ \Rightarrow$

$N = 10 \cdot \frac{\sqrt{3}}{2} \Rightarrow$

$\boxed{N = 5\sqrt{3}\,N}$

B. $\Sigma F_x = m \cdot a \Rightarrow$

$W_x = m \cdot a \Rightarrow$

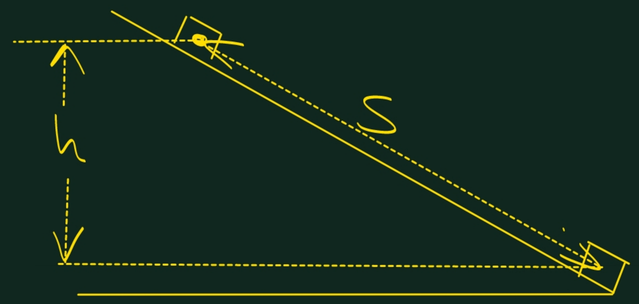
$W \cdot \eta\mu\varphi = m \cdot a \Rightarrow$

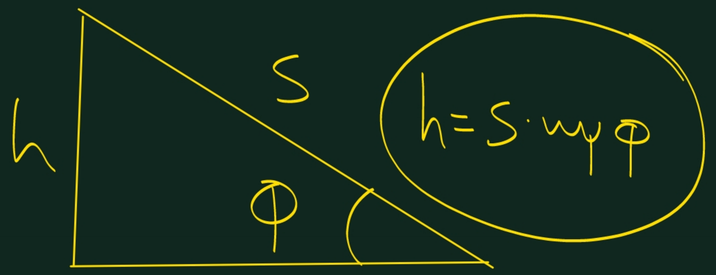
$\cancel{m} g \cdot \eta\mu\varphi = \cancel{m} \cdot a \Rightarrow$

$a = g \cdot \eta\mu\varphi \Rightarrow$

$a = 10 \cdot \eta\mu 30^\circ \Rightarrow$

$a = 10 \cdot \frac{1}{2} \Rightarrow a = 5\,m/s^2$





Γ. $S = \frac{1}{2} a \cdot t^2 \Rightarrow$

$\frac{h}{\eta\mu\varphi} = \frac{1}{2} \cdot a \cdot t^2 \Rightarrow$

$\frac{S}{\eta\mu 30^\circ} = \frac{1}{2} \cdot S \cdot t^2 \Rightarrow$

$\frac{S}{\frac{1}{2}} = \frac{S}{2} \cdot t^2 \Rightarrow 10 = \frac{S}{2} \cdot t^2 \Rightarrow$

$20 = 5t^2 \Rightarrow$

$t^2 = 4 \Rightarrow t = 2\,sec.$

$h = S \cdot \eta\mu\varphi \Rightarrow$

$S = \frac{h}{\eta\mu\varphi}$

$v = a \cdot t \Rightarrow$

$v = S \cdot 2 \Rightarrow$

$v = 10\,m/s$

Δ. $S = \frac{1}{2} a t^2 \Rightarrow$

$S = \frac{1}{2} \cdot \alpha \cdot \frac{v^2}{\alpha^2} \Rightarrow$

$S = \frac{v^2}{2a} \Rightarrow v^2 = 2 \cdot a \cdot S \Rightarrow$

$v^2 = 2 \cdot g \cdot \eta\mu\varphi \cdot \frac{h}{\eta\mu\varphi} \Rightarrow$

$v^2 = 2gh \Rightarrow v = \sqrt{2gh}$

ανεξάρτητη της μάζας.