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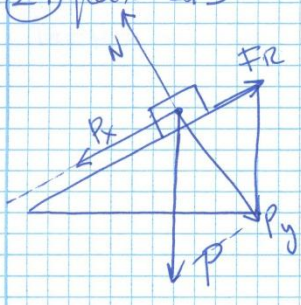

$F_c = \mu \cdot N = \mu \cdot P_y = \mu \cdot P \cos\alpha = \mu \cdot mg\cos\alpha$

2ª Lei Newton:

$P_x - \mu \cdot mg\cos\alpha = ma$

$mg\,\text{sen}\alpha - \mu \cdot mg\cos\alpha = m \cdot a$

$9{,}8\,\text{sen}\,25° - \mu \cdot 9{,}8\cos 25° = 1{,}5$

$\mu = 0{,}3$

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$90\frac{km}{h} = 25\frac{m}{s}$

a) $a = \frac{v^2}{R} = \frac{25^2}{100} = 6{,}25\ \frac{m}{s^2}$

b) $F = m \cdot a_c = 300 \cdot 6{,}25 = 1875\ N$

(26) pág 216

$T_{lúa} = 28\,días \quad \omega = \frac{1\,rev}{28\,días} = \frac{2\pi\,rad}{28 \cdot 24 \cdot 3600\,s} = 2{,}59 \cdot 10^{-6}$

$\omega = 2{,}59 \cdot 10^{-6}\frac{rad}{s}$

$F_c = m \cdot \frac{v^2}{R} = m \cdot \frac{\omega^2 \cdot R^2}{R} = m \cdot \omega^2 \cdot R$

$F_c = 7{,}35 \cdot 10^{22} \cdot (2{,}59 \cdot 10^{-6})^2 \cdot 348\,000 \cdot 10^3 = 1{,}72 \cdot 10^{20}\,N$

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$F_R = \mu \cdot N = \mu \cdot m \cdot g = 0{,}1 \cdot 10 \cdot 9{,}8 = 9{,}8\,N$

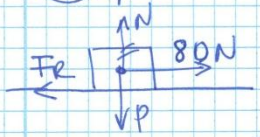
2ª lei Newton $F - F_R = m \cdot a$

$40 - 9{,}8 = 10a$

$a = 3{,}02\frac{m}{s^2}$

$e = \frac{1}{2} \cdot a \cdot t^2 = \frac{1}{2} \cdot 3{,}02 \cdot 5^2 = 37{,}75\,m$

(36) pax 226



$F - F_R = m \cdot a$ (2ª lei)

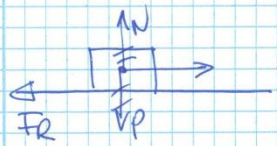
$F_R = \mu \cdot m \cdot g = 0{,}2 \cdot 25 \cdot 9{,}8 = 49\,N$

$80 - 49 = 25 \cdot a$

$a = 1{,}24 \ \frac{m}{s^2}$

$v = v_0 + a \cdot t = 0 + 1{,}24 \cdot 3 = \underline{3{,}72 \ \frac{m}{s}}$

(37) pax 226



$\left.\begin{array}{l} v_f = 20 = a \cdot t \\ e = 50 = 20 \cdot t - \frac{1}{2} \cdot a \cdot t^2 \end{array}\right\}$

$50 = 20t - \frac{1}{2} \cdot 20t$

$50 = 10t$

$t = 5s$

$20 = a \cdot t$

$20 = a \cdot 5$

$a = \frac{4m}{s^2}$

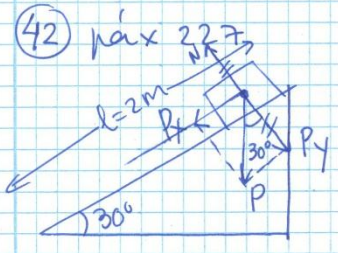
$F_R = m \cdot a$ a força de rozamento é a única força que actua sobre o bloque, e acaba detendo o bloque.

$F_R = m \cdot a$

$\mu \cdot m \cdot g = m \cdot a$

$\mu = \frac{a}{g} \quad \mu = \frac{4}{9{,}8} = 0{,}4 \quad \underline{\mu = 0{,}4}$

(42) máx 227



$e = \frac{1}{2} \cdot a \cdot t^2$

$2 = \frac{1}{2} 4{,}9 \cdot t^2 \quad \underline{t = 0{,}9s}$

b) $\mu = 0$

$P_x = m \cdot a$ 2ª Lei

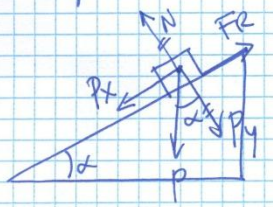
$\mu g \operatorname{sen}\alpha = m \cdot a$

$a = g \operatorname{sen}\alpha = g \operatorname{sen} 30 = 4{,}9 \ \frac{m}{s^2}$

$v = a \cdot t$

$v = 4{,}9 \cdot 0{,}9 = \underline{4{,}42 \ \frac{m}{s}}$

(42) pax 227



a) $\mu = 0{,}2$

2ª lei $P_x - F_R = m \cdot a$

$m \cdot g \cdot \operatorname{sen}\alpha - \mu \cdot m \cdot g \cos\alpha = m \cdot a$

$a = g(\operatorname{sen}\alpha - \mu \cos\alpha)$

$a = 9{,}8(\operatorname{sen}30 - 0{,}2 \cos 30°)$

$a = 3{,}2 \frac{m}{s^2}$

$e = \frac{1}{2} \cdot a \cdot t^2$

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

$t = 1{,}12\ s$

$v = a \cdot t$

$v = 3{,}2 \cdot 1{,}12 = 3{,}58 \frac{m}{s}$

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$72 \frac{km}{h} = 20 \frac{m}{s}$

$F_c = m \cdot \frac{v^2}{R}$

$20\,000 = m \cdot \frac{20^2}{20}$

$m = 1000\ kg$

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$\frac{30\ rev}{6\ min} \cdot \frac{2\pi\ rad}{1\ rev} \cdot \frac{1\ min}{60\ s} = 0{,}52 \frac{rad}{s}$

$F_c = m \cdot \frac{v^2}{R}$ $\quad v = w \cdot R$ $\quad F_c = \frac{m \cdot w^2 \cdot R^2}{R} = m w^2 \cdot R$

$F_c = 4 \cdot 0{,}52^2 \cdot 2 = 2{,}19\ N$