

EXERCÍCIOS DINÂMICA

(DO 8 AO 15)

3.-

$\sin \alpha = \frac{15}{100}$

a) $x = 4\text{ m}$
 $t = 2\text{ s}$
 $v_0 = 0\text{ m/s}$

$x = x_0 + v_0 \cdot t + \frac{1}{2} a \cdot t^2$
 $4 = \frac{1}{2} \cdot a \cdot 2^2 \rightarrow \boxed{a = 2\text{ m/s}^2}$

b) $\Sigma F = m \cdot a$ $F - P \cdot \sin \alpha = m \cdot a$
 $F - 1200 \cdot 9,8 \cdot \sin 15 = 1200 \cdot 2 \rightarrow \boxed{F = 4164\text{ N}}$

9.-

(1) $T - P_1 = m_1 \cdot a$
 (2) $P_2 - T = m_2 \cdot a$

$P_2 - P_1 = (m_1 + m_2) \cdot a$
 $(2\text{ m} \cdot 9,8) - (1\text{ m} \cdot 9,8) = (1 + 2) \cdot a$
 $19,6\text{ m} - 9,8\text{ m} = 3\text{ m} \cdot a \rightarrow 9,8\text{ m} = 3\text{ m} \cdot a \rightarrow a = \frac{9,8\text{ m}}{3\text{ m}} = \boxed{3,27\text{ m/s}^2}$

$x = x_0 + v_0 \cdot t + \frac{1}{2} a \cdot t^2$
 $x = \frac{1}{2} \cdot 3,27 \cdot 2^2 = 6,54\text{ m}$ (distância que se move cada unha)

Pelo tanto, se separarem $6,54 \cdot 2 = \underline{\underline{13,08\text{ m}}}$.

10.-

$x = 1\text{m}$
 $t = 5\text{s}$
 $v_0 = 0\text{m/s}$

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

$$1 = \frac{1}{2} \cdot a \cdot 5^2 \rightarrow a = 0.08\text{m/s}^2$$

$$\begin{cases} (1) F - T = m_1 \cdot a \\ (2) T - P_2 = m_2 \cdot a \end{cases}$$

$$F - P_2 = (m_1 + m_2) \cdot a$$

$$F - 6 \cdot 9.8 = (6 + 4) \cdot 0.08 \rightarrow \boxed{F = 59.6\text{N}}$$

Para calcular a tensão podemos empregar qualquer das duas fórmulas.

(1) $F - T = m_1 \cdot a$

$$59.6 - T = 4 \cdot 0.08 \rightarrow \boxed{T = 59.3\text{N}}$$

11.-

$$\begin{cases} P_1 - T = m_1 \cdot a \\ T - F_f = m_2 \cdot a \end{cases}$$

$$P_1 - F_f = (m_1 + m_2) \cdot a$$

$$(3.8 + 0.2) \cdot 9.8 - 6 \cdot 9.8 \cdot 0.4 = (3.8 + 0.2 + 6) \cdot a$$

$$39.2 - 5.88 = 10a \rightarrow \boxed{a = 3.33\text{m/s}^2}$$

12.-

$F = 100\text{N}$

a) Repouso $a = 0$ $\Sigma F = 0$

$$\Sigma F = 0 \rightarrow F \cdot \cos \alpha - F_r = 0$$

$$F_r = F \cdot \cos \alpha \rightarrow \boxed{F_r = 100 \cdot \cos 30 = 86.6\text{N}}$$

$$P = F \cdot \sin \alpha + N \rightarrow N = P - F \sin \alpha$$

$$\boxed{N = 40 \cdot 9.8 - 100 \cdot \sin 30 = 342\text{N}}$$

b) $F = 148\text{N}$

$$F_r = 148 \cdot \cos 30 = 128.2\text{N}$$

$$N = 40 \cdot 9.8 - 148 \cdot \sin 30 = 318\text{N}$$

$$\left\{ \begin{array}{l} F_r = \mu \cdot N \rightarrow \mu = \frac{F_r}{N} = \frac{128.2}{318} = 0.4 \end{array} \right.$$

13. $V_0 = 2 \text{ m/s}$ $V_f = 0 \text{ m/s}$

$F_R = \mu \cdot N$
 $N = P$

$F_R = 0.2 \cdot 9.8 \cdot 10 = 19.6 \text{ N}$
 $\Sigma F = m \cdot a$
 $0 - F_R = m \cdot a \rightarrow -19.6 = 10 \cdot a \rightarrow a = -1.96 \text{ m/s}^2$

$V = V_0 + a \cdot t$
 $0 = 2 + (-1.96) \cdot t \rightarrow t = \frac{-2}{-1.96} = \boxed{1.02 \text{ s}}$

14.-

$F_R = \mu \cdot N$
 $N = P + F \cdot \sin \alpha$
 $N = 3 \cdot 9.8 + 40 \cdot \sin 30^\circ = 49.4 \text{ N}$
 $F_R = 0.25 \cdot 49.4 = \boxed{12.35 \text{ N}}$

$\Sigma F = m \cdot a \rightarrow F \cdot \cos \alpha - F_R = m \cdot a$
 $40 \cdot \cos 30^\circ - 12.35 = 3 \cdot a \rightarrow \boxed{a = 7.43 \text{ m/s}^2}$

15.-

a) $\Sigma F = m \cdot a$ $F_R = \mu N = \mu \cdot P \cos \alpha$
 $P \cdot \sin \alpha - F_R = m \cdot a$
 $P \cdot \sin \alpha - \mu \cdot P \cdot \cos \alpha = m \cdot a$
 $4 \cdot 9.8 \cdot \sin 30^\circ - \mu \cdot 4 \cdot 9.8 \cdot \cos 30^\circ = 4 \cdot a$
 $\mu = \frac{4 \cdot 2 - 4 \cdot 9.8 \cdot \sin 30^\circ}{-4 \cdot 9.8 \cdot \cos 30^\circ} = \boxed{0.34}$

b) $\Sigma F = m \cdot a$
 $v \text{ cte} \rightarrow a = 0$
 $\Sigma F = 0$
 $P \cdot \sin \alpha - F_R - F = 0$
 $F = P \cdot \sin \alpha - F_R = P \cdot \sin \alpha - \mu N =$
 $= P \cdot \sin \alpha - \mu \cdot P \cdot \cos \alpha = P (\sin \alpha - \mu \cos \alpha)$
 $F = 4 \cdot 9.8 (\sin 30^\circ - 0.34 \cdot \cos 30^\circ) = \boxed{8.1 \text{ N}}$