

M K P

$$1) x_1 = 4t - 8t^2 - 16t^3$$

$$x_2 = 2t - 4t^2 + t^3$$

$$v_1 = 4 - 16t - 48t^2$$

$$v_2 = 2 - 8t + 3t^2$$

$$a_1 = -16 - 96t$$

$$a_2 = -8 + 6t$$

Приравняем: $-16 - 96t = -8 + 6t$
 $102t = -8$
 $t \approx 0,078 \text{ c}$

2) Дано

$$R = 10000$$

$$a_T = 5 \text{ м/с}^2$$

$$t = ?$$

$$a_T = \frac{v}{r}, a_n = \frac{v^2}{R} \Rightarrow t = \frac{v}{a_T}, v = \sqrt{a_n R}$$

$$t = \frac{\sqrt{a_n R}}{a_T}, \text{ так как } a_n = a_T, \text{ то}$$

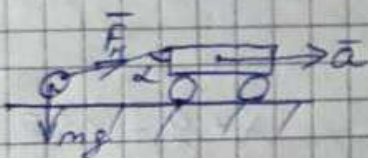
$$t = \frac{\sqrt{R}}{\sqrt{a_T}} = \sqrt{\frac{10}{5}} = \sqrt{2} \approx 1,41$$

3) Дано

$$\alpha = 2,8^\circ$$

$$m = 0,1 \text{ кг}$$

$$F_H = ?, L = ?$$



1) II з. Ньютона:

$$mg + F_H = ma$$

2) Ка бис ox: $\sin \alpha \cdot F_H = ma$

на бис oy: $\cos \alpha \cdot F_H - mg = 0$

$$\Rightarrow F_H = \frac{ma}{\sin \alpha}, F_H = \frac{mg}{\cos \alpha}$$

$$\frac{ma}{\sin \alpha} = \frac{mg}{\cos \alpha} \Rightarrow$$

$$\Rightarrow \tan \alpha = \frac{ma}{mg} = 1, \text{ то}$$

$$\alpha = 45^\circ, \text{ найдем } L$$

$$F_H = \frac{mg}{\cos \alpha} = \frac{0,1 \cdot 9,8}{\frac{1}{\sqrt{2}}} = \frac{0,98}{\frac{1}{\sqrt{2}}} = 1,4 \text{ Н}$$

4) Dado: 33 E.

m	$E_{K1} = E_{K2} + Q \Rightarrow Q = E_{K1} - E_{K2}$
M	$Q = \frac{m v_1^2}{2} - \frac{(m+M) u^2}{2}$
$Q = ?$	

B.S.J:

$$m v_1 + M v_2 = (m+M) u \quad (v_2 = 0)$$

$$m v_1 = (m+M) u \Rightarrow u = \frac{m v_1}{(m+M)}$$

$$Q = \frac{m v_1^2}{2} - \frac{(m+M) \cdot (m v_1)^2}{2 (m+M)^2} = \frac{m v_1^2 (m+M) - m^2 v_1^2}{2 (m+M)} = \frac{v_1^2 (m^2 + m M - m^2)}{2 (m+M)}$$

$$= \frac{v_1^2 m M}{2 (m+M)}$$

$$\frac{Q}{E_{K1}} = \frac{\frac{v_1^2 m M}{2 (m+M)}}{\frac{m v_1^2}{2}} = \frac{M}{m+M}$$

5) Dado

$$m = 10 \text{ kg}$$

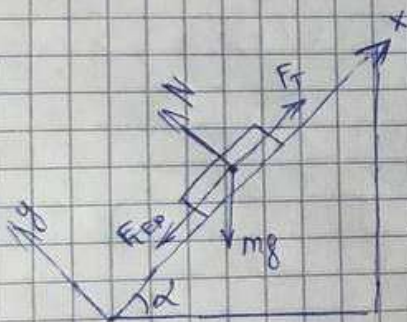
$$\alpha = 45^\circ$$

$$L = 2 \text{ m}$$

$$t = 2 \text{ s}$$

$$\mu = 0,1$$

$$A = ?$$



II g. Harmonica

$$m a = m g + N + F_T + F_{TSP}$$

$$l = \frac{a t^2}{2} \Rightarrow a = \frac{2 l}{t^2} = 1$$

$$Ox: m a = -m g \sin \alpha + F_T - F_{mer}$$

$$Oy: 0 = -m g \cos \alpha + N$$

$$F_{mer} = \mu m g \cos \alpha$$

$$F_T = m(a + g(\sin \alpha + \mu \cos \alpha))$$

no universo L

$$A = F_T L = m L (a + g(\sin \alpha + \mu \cos \alpha)) =$$

$$= 10 \cdot 2 \left(1 + 9,8 \left(\frac{\sqrt{2}}{2} + 0,1 \cdot \frac{\sqrt{2}}{2} \right) \right) =$$

$$= 20 (1 + 2,8 \cdot 0,47) = 170,92 \text{ J}$$

6) Dano

$$l_1 = 0,5 \mu$$

$$m = 0,4 \text{ кг}$$

$$l_2 = 0,15 \mu$$

$J = ?$

$$J = J_0 + m l_2^2 \quad (J_0 \text{ глукь стержня} = \frac{m l^2}{12})$$

$$J = \frac{l}{12} m l_1^2 + m \left(\frac{l_1}{2} - l_2 \right)^2 =$$

$$= \frac{l}{12} \cdot 0,4 \cdot 0,5^2 + 0,4 \left(\frac{0,5}{2} - 0,15 \right)^2 =$$

$$= 0,1 \cdot \frac{1}{12} + 0,4 \cdot 0,09 = 0,01233 \approx 12,3 \cdot 10^{-3} \text{ кг} \cdot \text{м}^2$$