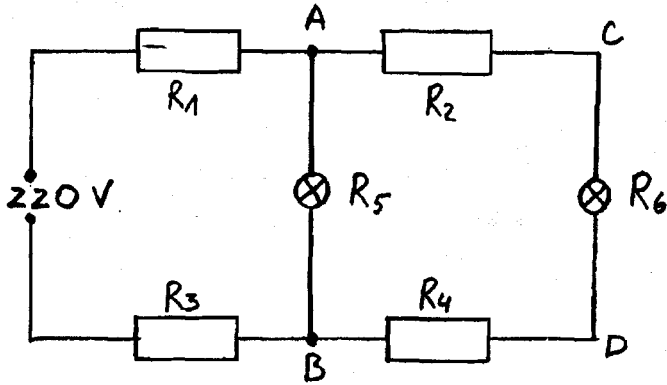


1.



$$R_1 = R_2 = R_3 = R_4 = 4 \Omega$$

$$R_5 = R_6 = 10 \Omega$$

$$E = 220 \text{ V}$$

$$U_{AB} = ? \quad U_{CD} = ?$$

$$U_{AB} = I_{AB} \times R_5$$

$$U_{CD} = I_{CD} \times R_6$$

$$R = R_1 + R_2 + R_{AB}$$

$$\frac{1}{R_{AB}} = \frac{1}{R_5} + \frac{1}{R_2 + R_3 + R_4}, \quad R_{AB} = 6,43 \Omega$$

$$R = 14,43 \Omega$$

$$I = \frac{E}{R} \quad I = \frac{220}{14,43} = 15,25 \text{ A}$$

$$\frac{I_{AB}}{I_{ACDB}} = \frac{R_{ACDB}}{R_{AB}} = 1,8$$

$$I_{AB} = 1,8 I_{ACDB}$$

$$I = I_{AB} + I_{ACDB}$$

$$I = 1,8 I_{ACDB} + I_{ACDB} = 2,8 I_{ACDB}$$

$$I_{ACDB} = \frac{I}{2,8} = \frac{15,25}{2,8} = 5,45 \text{ A}$$

$$I_{AB} = I - I_{ACDB} = 15,25 - 5,45 = 9,80 \text{ A}$$

$$U_{AB} = 9,80 \text{ A} \cdot 10 \Omega = 98 \text{ V}$$

$$U_{CD} = 5,45 \text{ A} \cdot 10 \Omega = 54,5 \text{ V}$$

$$54,5 \text{ V}$$

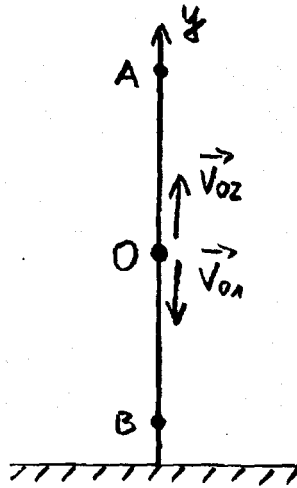
2.

$$V_{01} = 2 \text{ m/s}$$

$$V_{02} = 18 \text{ m/s}$$

S-?

t-?



$$y_1 = -V_{01}t$$

$$y_2 = V_{02}t - \frac{gt^2}{2}$$

1)

$$V = V_{02} - gt$$

$$h = \text{max} : 0 = V_{02} - gt_{\text{max}} \quad (A)$$

$$t_{\text{max}} = \frac{V_{02}}{g}$$

$$A: y_{2A} = V_{02} \cdot t_{\text{max}} - \frac{g t_{\text{max}}^2}{2} = \frac{V_{02}^2}{2g}, \quad y_{2A} = |AO|$$

$$B: y_{1B} = -V_{01} t_{\text{max}} = -\frac{V_{01} \cdot V_{02}}{g}, \quad y_{1B} = |OB|$$

$$S = |AO| + |OB| = \frac{V_{02}}{2g} (V_{02} + 2V_{01})$$

$$\underline{S = 20 \text{ m}}$$

2) $y_1 = y_2$

$$-V_{01}t = V_{02}t - \frac{gt^2}{2}$$

$$\underline{t = \frac{2(V_{01} + V_{02})}{g} \approx 4 \text{ s}}$$

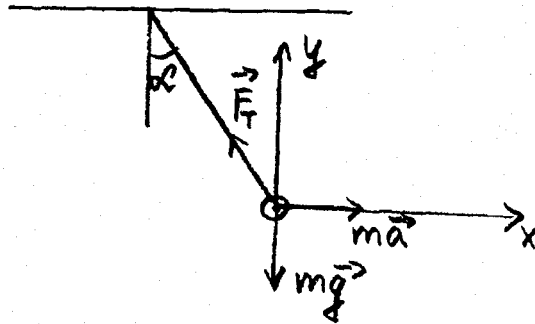
3.

$$t = 3,3 \text{ s}$$

$$v_1 = 15 \frac{\text{m}}{\text{s}}$$

$$v_2 = 10 \frac{\text{m}}{\text{s}}$$

$\alpha = ?$



$$\vec{F} + m\vec{g} + m\vec{a} = 0$$

$$x: -F_T \cdot \sin \alpha + ma = 0 \quad (1)$$

$$y: F_T \cdot \cos \alpha - mg = 0 \quad (2)$$

$$1:2$$

$$\tan \alpha = \frac{a}{g}$$

$$a = \frac{v - v_0}{t}$$

$$\tan \alpha = \frac{v - v_0}{t g} = 0,15$$

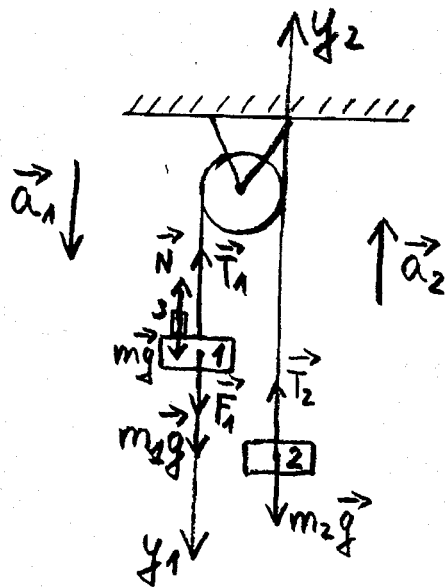
$$\alpha = 8,8^\circ$$

4.

$$m_1 = m_2 = 0,1 \text{ kg}$$

$$m = 0,01 \text{ kg}$$

F_1, F_2 - ?



$$T_1 = T_2 = T, \quad a_1 = a_2 = a$$

1: $m_1 g - T_1 + F_1 = m_1 a_1$

2: $-m_2 g + T_2 = m_2 a_2$

3: $m g - N = m a_1, \quad N = m g - m a_1$

$$m_1 g - T_1 + F_1 - m_2 g + T_2 + m g - N = m_1 a_1 + m_2 a_2 + m a_1$$

$$m_1 = m_2 = M, \quad T_1 = T_2 = T, \quad a_1 = a_2 = a, \quad F_1 = N$$

$$M g + N - T + T - M g + m g - N = M a + M a + m a$$

$$m g = 2 M a + m a$$

$$a = \frac{m g}{2 M + m}, \quad a = 0,47 \frac{\text{m}}{\text{s}^2}$$

$$\underline{F_1 = N = m g - m a = 9,34 \cdot 10^{-2} \text{ N}}$$

$$F_2 = 2 T$$

$$F_2 = 2 M (a + g)$$

$$\underline{F_2 \approx 2,1 \text{ N}}$$

$$T = M (a + g) \quad (2)$$

5.

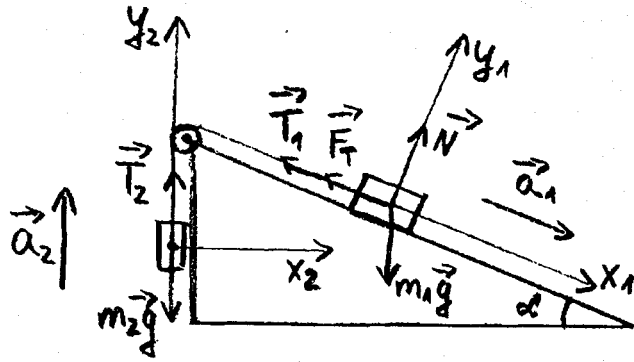
$$m_1 = 5 \text{ kg}$$

$$m_2 = 2 \text{ kg}$$

$$\mu = 0.1$$

$$\alpha = 36^\circ$$

T, a - ?



$$\underline{1-} \quad m_1 \vec{g} + \vec{N} + \vec{T}_1 + \vec{F}_T = m_1 \vec{a}_1$$

$$x: m_1 g \sin \alpha - T_1 - F_T = m_1 a_1$$

$$y: -m_1 g \cos \alpha + N = 0, \quad N = m_1 g \cos \alpha$$

$$F_T = \mu N = \mu m_1 g \cos \alpha$$

$$m_1 g \sin \alpha - T_1 - \mu m_1 g \cos \alpha = m_1 a_1$$

$$\underline{2-} \quad m_2 \vec{g} + \vec{T} = m_2 \vec{a}$$

$$y: -m_2 g + T_2 = m_2 a_2$$

$$m_1 g \sin \alpha - T_1 - \mu m_1 g \cos \alpha + T_2 - m_2 g = m_1 a_1 + m_2 a_2$$

$$T_1 = T_2 = T, \quad a_1 = a_2 = a$$

$$a = \frac{m_1 g (\sin \alpha - \mu \cos \alpha) - m_2 g}{m_1 + m_2}$$

$$a = 0.77 \frac{\text{m}}{\text{s}^2}$$

$$a = +0.77 \frac{\text{m}}{\text{s}^2}$$



$$T = m_2 g + m_2 a = m_2 (g + a)$$

$$a = -0.77 \frac{\text{m}}{\text{s}^2}$$



$$\underline{T \approx 21 \text{ N}}$$