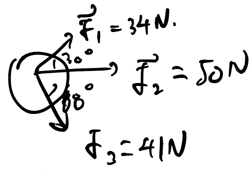
①



137kg

We calculate the combined force.

take the $\vec{F}_2$ direction as the x-axis and the direction perpendicular to it as the y-axis to establish a Carteensin coordinate system.

Newton's second law:

$$x: \vec{F}_1 \cos\theta_1 + \vec{F}_2 + \vec{F}_3 \cos\theta_3 = m a_x$$

$$y: \vec{F}_1 \sin\theta_1 - \vec{F}_3 \sin\theta_3 = m a_y$$

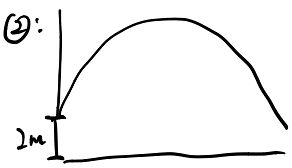
$$a_x = 0.7295 \, m/s^2$$

$$a_y = -0.1351 \, m/s^2$$

so. $a = \sqrt{a_x^2 + a_y^2} = 0.7419 m/s^2$

$$\theta = \arctan \frac{a_y}{a_x} = -10.4908°.$$

②:



$\Delta T = 0.42 s$

I can only do the calculation by looking at the values of the picture. $y_0 = 2$

$$\begin{cases} x = v_x t \\ y = v_y t - \frac{1}{2} g t^2 + y_0 \end{cases}$$

may it's not exactly 6.

from the picture. (0.2) (25.2) $(5, 6)$ $(20. 6)$

$5 v_x \Delta T = 25m.$ $v_x = 11.9048 m/s$

$$\begin{cases} v_y - g \frac{5}{2} \Delta T = 0 \\ y = 6 = v_y \Delta T - \frac{1}{2} g \Delta T^2 + y_0 \end{cases} \Rightarrow \begin{cases} v_y = 11.9048 m/s \\ g = 11.3379 m/s^2 \end{cases}$$

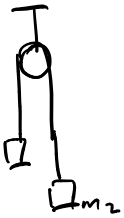
a: So. $\vec{v} = 11.9048 \, m/s \cdot \vec{i} + 11.9048 m/s \cdot \vec{j}$

b: $g = 11.3379 m/s^2$

c: $y = 0.$ $v_y t - \frac{1}{2} g t^2 + y_0 = 0$. $t = 2.2564 s$

d: $v_y t - \frac{1}{2} g_0 t^2 + y_0 = 0.$ $t = 2.5873 s$

②:



$m_1 = 1.6\,kg \quad - 0.19\,kg/s$

$M_2 = 2.9\,kg$

$m_2 g - m_1 g = (m_1 + m_2) a.$

$m_1 = 1.6\,kg - 0.19\,kg/s \cdot t$

$(g = 9.8\,m/s^2)$

$$a = \frac{1.3 + 0.19\,t}{4.5 - 0.19\,t} g \ m/s^2$$

$$\dot{a} = \frac{1.102}{(4.5 - 0.19\,t)^2} g \quad m/s^3$$

$t = 0. \quad a = 2.8311\ m/s^2 \quad \dot{a} = 0.5333\ m/s^3$

$t = 4 \quad a = 5.3979\,m/s^2 \quad \dot{a} = 0.7721\,m/s^3$

when. $m_1 = 0.$ a reach its maximum value.

$m_1 = 1.6\,kg - 0.19\,kg/s \cdot t \qquad t = 8.4211\,s.$