

Soru 1)

a<sub>1</sub>)  $t=0 : x(0) = 3 \text{ m}$

$t=3 : x(3) = 27 - 6 + 3 = 24 \text{ m}$

$$\Rightarrow v_{ort} = \frac{\Delta x}{\Delta t} = \frac{24-3}{3-0} = \boxed{7 \text{ m/s}}$$

a<sub>2</sub>)  $v = \frac{dx}{dt} \Rightarrow v(t) = 3t^2 - 2$

$t=0 : v(0) = -2 \text{ m/s}$

$t=3 : v(3) = 27 - 2 = 25 \text{ m/s}$

$$\Rightarrow a_{ort} = \frac{\Delta v}{\Delta t} = \frac{25 - (-2)}{3 - 0} = \boxed{9 \text{ m/s}^2}$$

b)  $\vec{F} = m \cdot a$

$4\vec{i} - 8\vec{j} + 6\vec{k} = 2a$

$\Rightarrow a = 2\vec{i} - 4\vec{j} + 3\vec{k}$

$v_s = v_i + a \cdot t$

$\Rightarrow v_s = (2\vec{i} - 2\vec{j}) + (2\vec{i} - 4\vec{j} + 3\vec{k}) \cdot 2$

$\Rightarrow \boxed{v_s = 6\vec{i} - 10\vec{j} + 6\vec{k}}$

Soru 2)

a)  $2A = 6\vec{i} - 8\vec{j} + 8\vec{k}$

$$C = 2\vec{A} - \vec{B} = 6\vec{i} - 8\vec{j} + 8\vec{k} - 2\vec{i} - 3\vec{j} + 7\vec{k}$$

$$\Rightarrow C = 4\vec{i} - 11\vec{j} + 15\vec{k}$$

$$|C| = \sqrt{(4)^2 + (-11)^2 + (15)^2} = \sqrt{362} = \boxed{19,03}$$

$$\bullet \frac{\cos \theta_x}{A_x} = \frac{1}{A} \Rightarrow \frac{\cos \theta_x}{4} = \frac{1}{19,03}$$

$$\Rightarrow \cos \theta_x = \frac{4}{19,03} = 0,21 \xRightarrow{\arccos} \boxed{\theta_x = 77,88^\circ}$$

b)  $\vec{A} = 0\vec{i} + 8\vec{j}$   $\vec{B} = 7,5\vec{i} + 13\vec{j}$

$\cos 60 = \frac{8x}{15}$   $\sin 60 = \frac{8y}{15}$

$$\vec{A} \cdot \vec{B} = |A| \cdot |B| \cdot \cos \theta = 181 \cdot 151 \cdot \cos 150$$

$$\Rightarrow \boxed{\vec{A} \cdot \vec{B} = -60\sqrt{3} = -103,9}$$

$$\bullet \vec{A} \times \vec{B} = \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 0 & 8 & 0 \\ 7,5 & 13 & 0 \end{vmatrix} = (13 \cdot 0 - 8 \cdot 0)\vec{i} - (7,5 \cdot 0 - 0 \cdot 0)\vec{j} + (7,5 \cdot 8 - 13 \cdot 0)\vec{k}$$

$$\Rightarrow \boxed{\vec{A} \times \vec{B} = 60\vec{k}}$$

Soru 3)  $\mu_k = 0,10$

a)

$m_1 > m_2$  için

$m_1$  aşağı yönde

$m_2$  yukarı yönde hareket eder

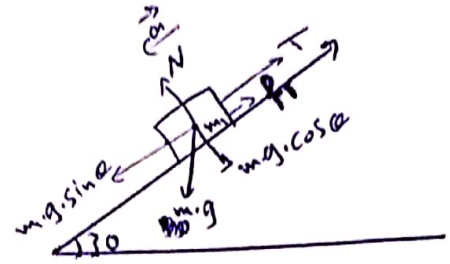
$$m_1 \cdot g \cdot \sin \alpha - T - f_1 = m_1 \cdot a$$

~~$$8 \cdot 9,8 \cdot \sin 30 - T - 6,8 = 8 \cdot a$$~~

$$\Rightarrow 8 \cdot 9,8 \cdot \sin 30 - T - 6,8 = 8 \cdot a$$

$$\Rightarrow 32,4 - T = (0,38) \cdot 8$$

$$\Rightarrow \boxed{T = 29,36 \text{ N}}$$



$$f_1 = \mu \cdot N_1$$

$$f_1 = \mu \cdot m_1 \cdot g \cdot \cos \alpha$$

$$f_1 = 6,8 \mu$$

b)

$$T - m_2 \cdot g \cdot \sin \alpha - f_2 = m_2 \cdot a$$

$$\Rightarrow T - 7 \cdot 9,8 \cdot \sin 60 - 34,3 \mu = 7 \cdot 10,5$$

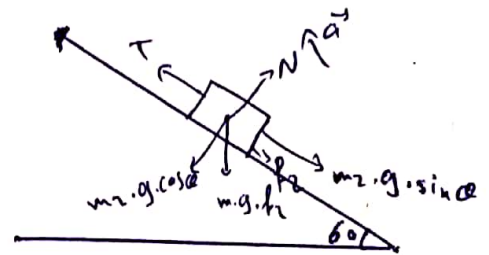
$$\Rightarrow T - 59,4 - 2,66 = 34,3 \mu$$

$$\Rightarrow T - 62,06 = 34,3 \mu$$

$$\Rightarrow 29,36 - 62,06 = 34,3 \mu$$

$$\Rightarrow -32,7 = 34,3 \mu_k$$

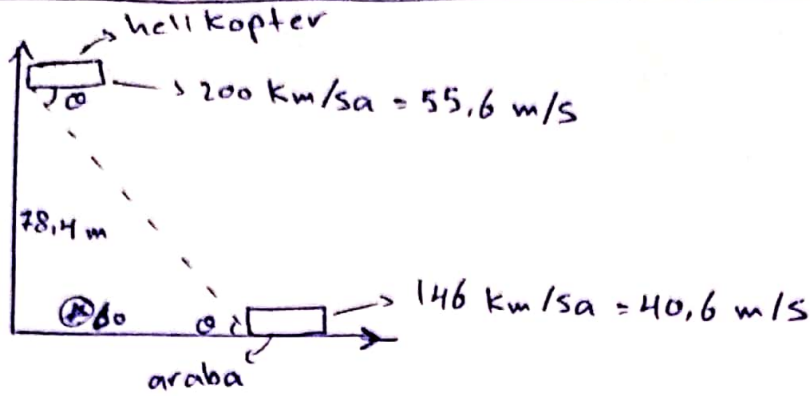
$$\Rightarrow \boxed{\mu_k = -0,95}$$



$$f_2 = \mu \cdot m_2 \cdot g \cdot \cos \alpha$$

$$f_2 = 34,3 \mu$$

Soru 4)



$$\frac{1}{2} g \cdot t^2 = 78.4 \text{ m}$$

$$\Rightarrow \frac{1}{2} \cdot 9.8 \cdot t^2 = 78.4 \text{ m}$$

$$\Rightarrow 4.9 \cdot t^2 = 78.4 \text{ m}$$

$$\Rightarrow t^2 = 16 \Rightarrow t = 4 \text{ s} \quad (4 \text{ saniyede aşağı inecektir})$$

$$55.6 - 40.6 = 15 \text{ m}$$

(Her saniye helikopter 15m arabaya yaklaşıyor)

$$15 \text{ m} \cdot 4 \text{ s} = 60 \text{ m} \quad (*)$$

$$\theta = \arctan\left(\frac{78.4}{60}\right)$$

$$\Rightarrow \theta = 52.57$$