(2)

A) $x = A\sin\omega t$

$y = A\cos\omega t$

$\vec{v} = \left(\frac{\partial x}{\partial t}; \frac{\partial y}{\partial t}\right) = (A\omega\cos\omega t; -A\omega\sin\omega t)$ (0,5b)

$\vec{a} = \left(\frac{\partial v_x}{\partial t}; \frac{\partial v_y}{\partial t}\right) = (-A\omega^2\sin\omega t; -A\omega^2\cos\omega t)$ (0,5b)

$\vec{v}\cdot\vec{a} = |v|\cdot|a|\cos\alpha = v_x a_x + v_y a_y$ (0,5b)

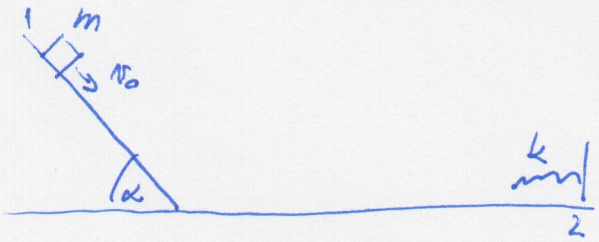
$|v|\cdot|a|\cos\alpha = -A^2\omega^3\cos\omega t\cdot\sin\omega t + A^2\omega^3\cos\omega t\sin\omega t$

$|v|\cdot|a|\cos\alpha = 0$

$\alpha = 90^\circ$ (0,5b)

0,5 + 0,5 + 0,5 + 0,5 = 2b

B)



$h = L_1\sin\alpha$ (0,5b)

$E_{tr_1} = L_1 N_1 f = mgL_1 f\cos\alpha$ (0,5b)

$E_{tr_2} = L_2 N_2 f = mgL_2 f$ (0,5b)

$E_{k_1} + E_{p_1} - E_{tr_1} - E_{tr_2} = \frac{1}{2}kx^2$ (1b)

$\frac{1}{2}mv_0^2 + mgL_1\sin\alpha - mgL_1 f\cos\alpha - mgL_2 f = \frac{1}{2}kx^2$ (0,5b)

$x = \sqrt{\frac{mv_0^2 + 2mgL_1\sin\alpha - 2mgf(L_1\cos\alpha + L_2)}{k}}$ (1b)

1 + 1 + 0,5 + 0,5 + 0,5 + 0,5 = 5b