Khalid Azzabin

Q9) $\Delta x = 2.2\ m$ $\quad x_{compress} = 1.1\ cm \rightarrow \Delta x = 2.2 - 0.21 = 1.9$

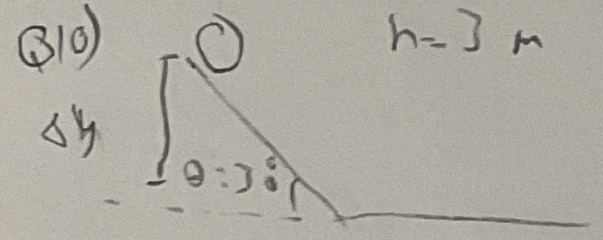
$\Delta K + \Delta U_s = 0$

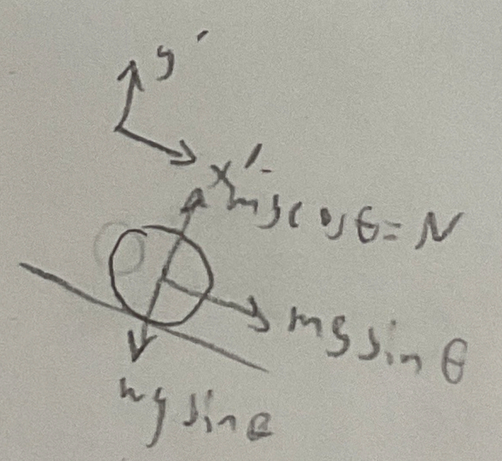
$\frac{1}{2} m v_f^2 - 0 + 0 - \frac{1}{2} k x^2_{compressed} = 0$ $\quad \omega^2 = \frac{k}{m}$

$x(t) = A\cos(\omega t + \phi) = -1.1\ cm$

$v(t) = -\omega A \sin(\omega t - \phi) = 0$

Q10)





$\sin\theta = \frac{\Delta y}{\Delta x'}$ $\quad \Delta x' = \frac{\Delta y}{\sin\theta}$

a) $I\alpha = mg\sin\theta R$

$I\frac{a}{R} = mg\sin\theta R$

$a = \frac{mg\sin\theta R^2}{I}$

$a = \frac{mg\sin\theta}{\frac{1}{2}mR^2}$

$a = 2g\sin\theta = 2(10)\sin 30 = 2(10)\frac{1}{2} = 10$

b) $\Delta KE_{rot} = \frac{1}{2} I\omega_f^2 - \frac{1}{2} I\omega_i^2$

$v_f^2 = v_i^2 + 2a\Delta x'$

$v_f = \sqrt{2a\left(\frac{\Delta y}{\sin\theta}\right)}$

$v_f = \sqrt{2(10)\left(\frac{3}{\sin 30}\right)}$

$= 7.75\ m/s$

$= \frac{1}{2}\left(\frac{1}{2}mR^2\right)\left(\frac{v_f}{R}\right)^2$

$= \frac{1}{4} m R^2 \left(\frac{v_f^2}{R^2}\right)$

$= \frac{1}{4} m v_f^2 = 0.25(2)(7.75)^2$

$= 30\ J$