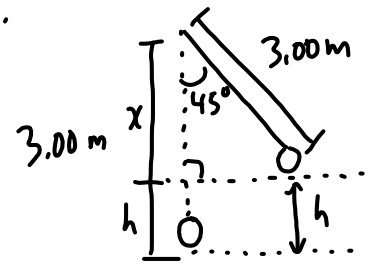
p329

21.



$\cos\theta = \frac{adj}{hyp}$

$\cos 45^\circ = \frac{x}{3.0m}$

$x = (3.0m)\cos 45^\circ$

$x = 2.1m$

$3.00\ m = x + h$

$3.00\ m = 2.1m + h$

$h = 0.9m$ $(0.878679765\ m)$

The gravitational potential energy will be:

$E_g = mgh$

$E_g = (2.00kg)(9.81m/s^2)(0.9m)$

$E_g = 17.2\ J$ $(2 \times 10^1\ J)$

At the rest position, $E_g = 0$. When it was released $E_K = 0$.

$E_{total} = E'_{total}$

(release) (rest)

$E_g + \cancel{E_K^0} = \cancel{E_g^{0'}} + E'_K$

$E_g = E'_K$

$17.2\ J = \frac{1}{2}(2.00kg)v^2$

$v = 4.15\ m/s$

$(4\ m/s)$

25.

$k = 950\ N/m$

$m = 1.5\ kg$

$E_{total} = E'_{total}$

(compressed) (equilibrium)

$E_k^{0} + E_e = E'_k + E'^{0}_e$

$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$

$kx^2 = mv^2$

$v^2 = \frac{kx^2}{m}$

$v^2 = \frac{(950\ N/m)(0.20\ m)^2}{1.5\ kg}$

$v = 5.1\ m/s$