Task 2

$m = 3kg$

$k = 85 N/m^2$

$h = 0.75m$

a.

$E_k = \frac{1}{2} m v^2 = \frac{1}{2} \times 3 \times 4^2 = 24 J$

$24 = \frac{1}{2} \times 85 \times x^2$

$x = 0.75m$

b. $mgh = 3 \times 9.81 \times 0.75 = 22.07 J$

c. $3 \times 9.81 \times 0.75 = \frac{1}{2} \times 3 \times v^2$

$v = 3.84 ms^{-1}$

Task 5

$m = 1.8kg$

$k = 1750 N.m^{-1}$

$x = 0.15m$

friction $= 0.15 N$

a.

$f = 0.15N$

$kx = 1750 \times 0.15 = 262.5N$

$mg = 1.8 \times 9.81 = 17.658N$

b. $F_{net} = kx - mg - f$

$= 1750x - 17.658 - 0.15$

$= 1750x - 17.808$

$F_{net} = ma$

$\therefore a = \frac{F_{net}}{m} = \frac{1750x - 17.808}{1.8}\ ms^{-2}$

c. $E_{tot} = \frac{1}{2}kx^2 = \frac{1}{2} \times 1750 \times 0.15^2 = 19.6875\ J$

$E_{loss} = F\Delta x = 0.15 \times 0.15 = 0.0225\ J$

$E_k = 19.6875 - 0.0225 = 19.665$

$v = \sqrt{\frac{2 \times E}{m}} = \sqrt{\frac{2 \times 19.665}{1.8}} = 4.67\ ms^{-1}$

d. $E_p = E_k - E_{loss} = mgh = mg(x + h_1)$

$1.8 \times 9.81 \times (0.15 + h_1) = 19.6875 - 0.15$

$(0.15 + h_1)$

$\therefore h_1 = 0.955\ m$