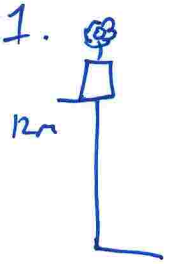
Conservation of Energy w/s

Solution.

#1.



$m = 8kg$

$h_i = 12m$

a) Solve for KE

$PE_g + PE_s + KE = PE_g + PE_s + KE$

$mgh \times \times = \times \times KE$

$8 \cdot 9.81 \cdot 12 = KE$

$\boxed{941.76 = KE}$

b) Solve for V_f

$mgh = \frac{1}{2} m \cdot v_f^2$

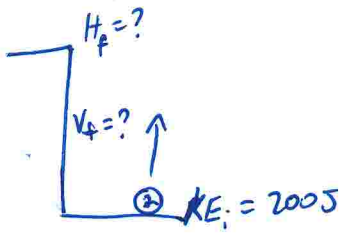
$8 \cdot 9.81 \cdot 12 = \frac{1}{2} 8 \cdot v_f^2$

$941.76 = 4 \cdot v_f^2$

$235.44 = v_f^2$ sq. root.

$[15.34 m/s]$

#2.



a) Solve for h_f

$PE_g + PE_s + KE = PE_g + PE_s + KE$

$\times \times KE = mgh \times \times$

$200J = 2 \cdot 9.81 \cdot h$

$\frac{200}{19.62} = \frac{19.62 \cdot h}{19.62}$

$[10.19m = h] \approx \boxed{10m}$

b) $PE_g + PE_s + KE = PE_g + PE_s + KE$

$\times \times 200J = mgh + \frac{1}{2} m \cdot v_f^2$

$200J = (2 \cdot 9.81 \cdot 5) + (\frac{1}{2} 2 \cdot v_f^2)$

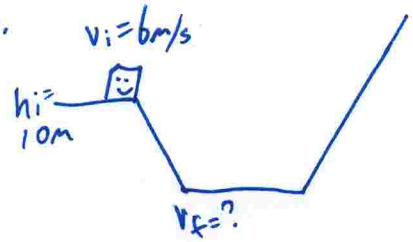
$200J = 98.1 + v_f^2$

$200 - 98.1 = v_f^2$

$\sqrt{101.9} = \sqrt{v_f^2}$

$[v_f = 10.09 m/s]$

3.



(a) $PE_g + PE_s + KE = PE_g + PE_s + KE$

$mgh + x + \frac{1}{2}m \cdot v^2 = x \quad x \quad \frac{1}{2}m v_f^2$

* mass is constant. you can omit

$gh + \frac{1}{2}(v)^2 = \frac{1}{2}(v_f)^2$

$(9.81 \cdot 10) + \frac{1}{2}(6)^2 = \frac{1}{2}(v_f)^2$

$98.1 + 18 = \frac{1}{2}(v_f)^2$

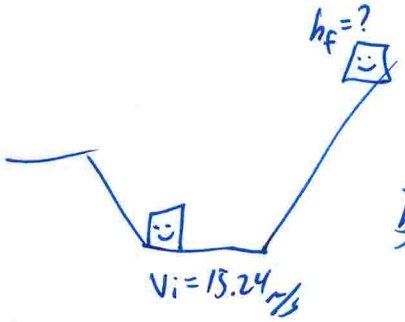
$116.1 = \frac{1}{2}(v_f)^2$

~~$\sqrt{116.1} = \frac{1}{2} v_f$~~

$2 \cdot 116.1 = v_f^2$

$\sqrt{232.2} = \sqrt{v_f^2}$

$[v_f = 15.24 m/s]$



(b) $PE + PE_s + KE = PE_s + PE_s + KE$

$x \quad x \quad \frac{1}{2}mv^2 = mgh \quad x \quad x$

$\frac{1}{2}(v)^2 = gh$

$\frac{1}{2}(15.24)^2 = 9.81 \cdot h$

$\frac{116.13}{9.81} = \frac{9.81 \cdot h}{9.81}$

$[h = 11.84 m]$

#4

$k = 300 N/m$

$\Delta x = 0.3m$

$V_f = ?$

$m = 0.3 kg$

$PE_g + PE_s + KE = PE_g + PE_s + KE$

$x \quad \frac{1}{2}k \cdot \Delta x^2 \quad x = x \quad x \quad \frac{1}{2}m \cdot v^2$

$(\frac{1}{2} 300) \cdot (0.3)^2 = (\frac{1}{2} 0.3) \cdot v_f^2$

$(150) \cdot (0.09) = 0.15 \cdot v_f^2$

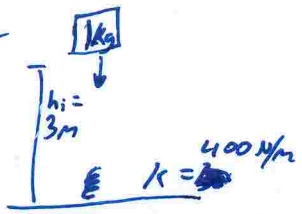
$13.5 = 0.15 \cdot v_f^2$

$\frac{}{0.15} \quad \frac{}{0.15}$

$\sqrt{90} = \sqrt{v_f^2}$

$[9.49 \frac{}{m/s} = v_f]$

#5



a) $PE_g + \cancel{PE_s} + \cancel{KE} = \cancel{PE_g} + PE_s + \cancel{KE}$

$mgh = (\frac{1}{2}k)\cdot(\Delta x^2)$

$1 \cdot 9.81 \cdot 3 = (\frac{1}{2}400)\cdot(\Delta x^2)$

$\frac{29.43}{200} = \frac{200\cdot(\Delta x)^2}{200}$

$\sqrt{0.147} = \sqrt{\Delta x^2}$

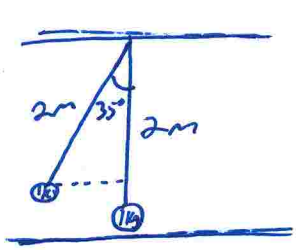
$[0.38m = \Delta x]$

b) ...

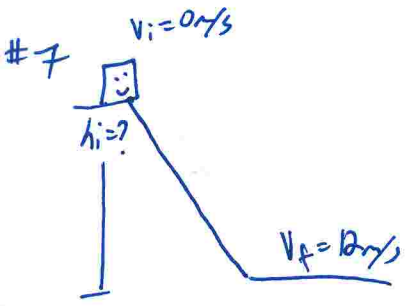
Look at your notes

hint: SOH CAH TOA

#6



#7



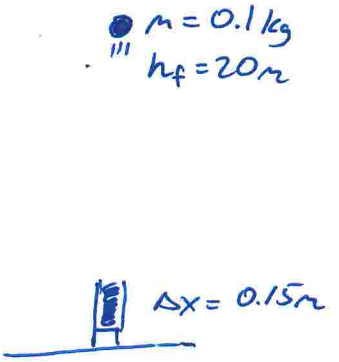
h_i = ?

V_f = 12 m/s

$PE_g + \cancel{PE_g} + \cancel{KE} = \cancel{PE_g} + \cancel{PE_s} + KE$

$mgh = \frac{1}{2}m\cdot v_f^2$

#8



a) solve for v_i

$\cancel{PE_g} + \cancel{PE_s} + KE = PE_g + \cancel{PE_s} + \cancel{KE}$

$\frac{1}{2}m\cdot v^2 = mgh$

b) Solve for k

more than one way to solve.