conservation of mechanical energy

$ME_i = ME_f$

(initial ME) = (final ME)

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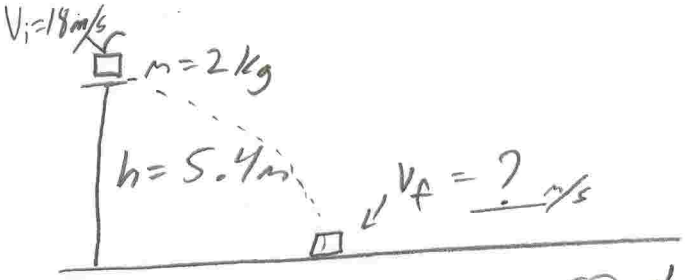
$\frac{1}{2}mv_i^2 + mgh_i = \frac{1}{2}mv_f^2 + mgh_f$ (#1)



① place values in formula

$V_i = 18\,m/s$

$m = 2\,kg$

$h = 5.4\,m$

$V_f =$ ____ m/s

$\frac{1}{2}(2kg)\cdot(18m/s)^2 + 2kg(9.8m/s^2)(5.4m) = \frac{1}{2}(2kg)\cdot(V_f)^2 + 0$

$324\,J + 105.84\,J = V_f^2$ ← square root to solve

$[V_f = 20.7\,m/s]$

#2)

$F = 755\,N$

a) $h_1 = 10m$

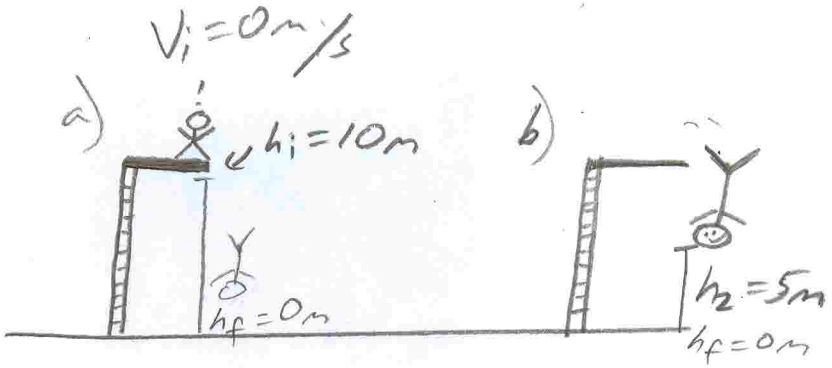
b) $h_2 = 5m$

$V_f =$ ____

$V_i = 0m/s$ (@ rest)

$m = 76.96\,kg$

$h_f = 0m$



M.E.

a) [Speed before hit water] (2)

$\frac{1}{2} m \cdot V_i^2 + mgh_i = \frac{1}{2} m \cdot V_f^2 + mgh_f$

$F = m \cdot g \Rightarrow m = \frac{F}{g}$

$0 + 755_N (10_m) = \frac{1}{2}(76.96 kg) \cdot V_f^2 + 0$

$7550 = 38.48 \cdot V_f^2$

$196.21 = V_f^2$ ← square root

$[V_f = 14 m/s]$

Speed @ 5m

$\frac{1}{2} m \cdot V_i^2 + mgh_i = \frac{1}{2} m \cdot V_f^2 + mgh_f$

$0 + (755_N)(10_m) = \frac{1}{2}(76.96 kg) \cdot V_f^2 + (755_N)(5_m)$

$7550 = (38.48) \cdot V_f^2 + 3775$

$3775 = (38.48) V_f^2$

$98.10 m^2/s^2 = V_f^2$ ← square root

$[V_f = 9.9 m/s]$