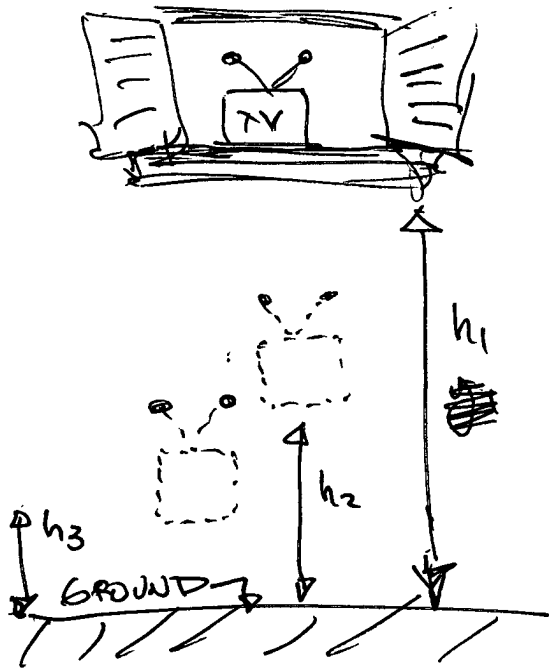
HW02

(1) $m = 2000\,kg$
$V = 20\,m/s$
$KE = ??$

$$KE = \frac{1}{2}mV^2 = \frac{1}{2}(2000\,kg)(20\,m/s)^2$$

$$KE = 400{,}000\,kg\,\frac{m^2}{s^2} = \underline{4.0 \times 10^5\,J}$$

HW03



(2)(a) $m = 25\,kg$
$h_1 = 10\,m$

$$GPE_1 = mgh_1$$

$$GPE_1 = (25\,kg)(9.8\,\frac{m}{s^2})(10\,m)$$

$$GPE_1 = 2{,}450\,kg\,\frac{m^2}{s^2}$$

$$GPE_1 = \underline{2{,}450\,J}$$

(b) AT $h_2 = 5\,m$,

$$GPE_2 = mgh_2 = (25\,kg)(9.8\,m/s^2)(5\,m)$$

$$GPE_2 = \underline{1{,}225\,J}$$

AT $h_3 = 2\,m$,

$$GPE_3 = mgh_3 = (25\,kg)(9.8\,m/s^2)(2\,m)$$

$$GPE_3 = \underline{490\,J}$$

(c) RIGHT BEFORE IT HITS, $h_4 = 0$, SO $GPE_4 = mgh_4 = 0$.

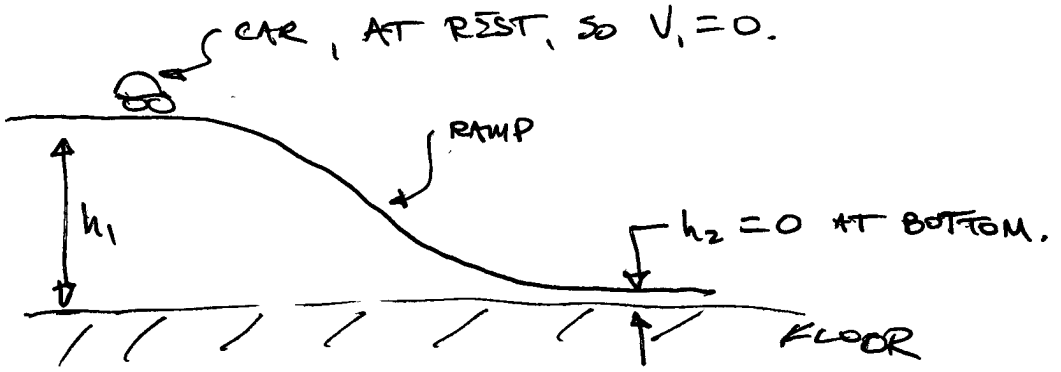
ALL OF THE ENERGY IS NOW KINETIC!

$KE_4 = 1{,}225\,J$ (BY LAW OF CONSERVATION OF ENERGY)

HW03

(3)

(A) $m = 40g = 0.040kg$



$h_1 = 35cm = 0.35m$

$V_1 = 0$.

$KE_1 = \frac{1}{2} m V_1^2 = 0$ $\qquad$ $GPE_1 = mgh_1 = (0.040kg)(9.8\frac{m}{s^2})(0.35m)$

$GPE_1 = 0.137J$

$\therefore$ $\underline{TE_1 = KE_1 + GPE_1 = 0 + 0.137J = 0.137J}$

(B) BY THE LAW OF CONSERVATION OF ENERGY,

$TE_1 = \underline{TE_2 = 0.137J}$

AT THE BOTTOM, $h_2 = 0$, SO $GPE_2 = 0$.

$\therefore$ SINCE $TE_2 = KE_2 + GPE_2$, $\underline{KE_2 = 0.137J}$

(C) $KE_2 = \frac{1}{2} m V_2^2$, SO $V_2 = \sqrt{\frac{2(KE_2)}{m}}$

$\therefore$ $\underline{V_2 = \sqrt{\frac{2(0.137J)}{0.040kg}} = 2.62 m/s}$