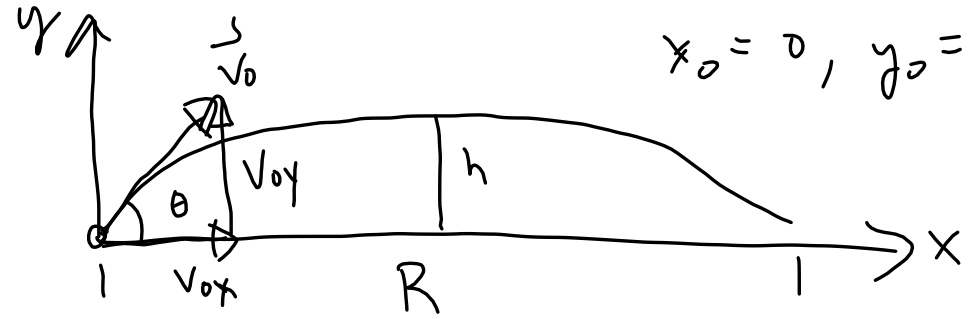


$x_0 = 0$, $y_0 = 0$

a) $v_y^2 = v_{y0}^2 - 2gy$

at $y = h$, $v_y = 0$, $0 = v_{y0}^2 - 2gh$

$$\boxed{v_{y0} = \sqrt{2gh}}$$

put in numbers for answer

b) $v_{ox} = \dfrac{R}{t_f}$, t_f = time of flight

To get t_f, $y = y_0 + v_{0y}t - \frac{1}{2}gt^2$

Sep 19-9:35 AM

When $y = 0$, $0 = v_{0y}t_f - \frac{1}{2}gt_f^2$

$= t_f\left(v_{0y} - \frac{1}{2}gt_f\right)$

either $t_f = 0$ (initial position $y = 0$)

$t_f = \dfrac{2v_{0y}}{g}$

So $v_{ox} = \dfrac{R}{t_f} = \dfrac{Rg}{2v_{0y}} = \dfrac{Rg}{2\sqrt{2gh}}$

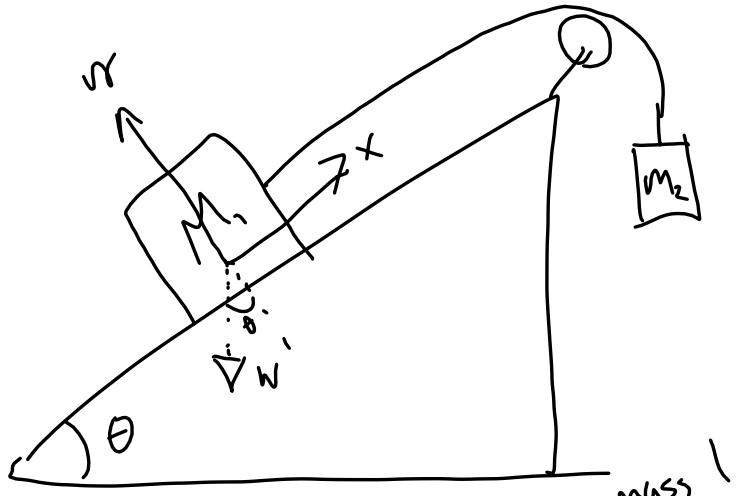
put in numbers to get answer

c) $\tan(\theta) = \dfrac{v_{0y}}{v_{ox}} = \dfrac{\sqrt{2gh}}{Rg/2\sqrt{2gh}} = \dfrac{4gh}{Rg}$

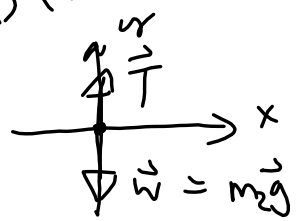
$= \dfrac{4h}{R}$ put in numbers for part (a)

Sep 19-9:41 AM

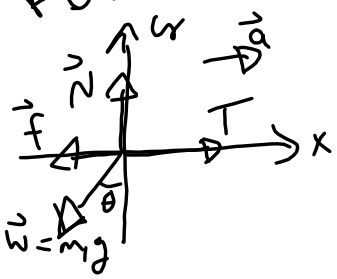
Example of a complicated FBD



FBD for mass 2

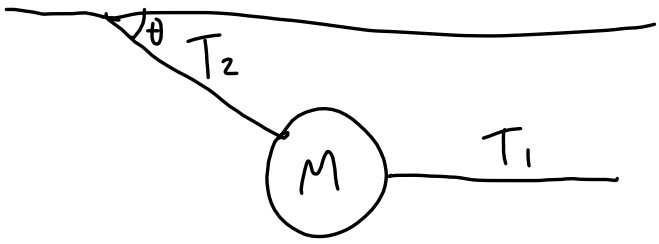


FBD for mass 1



Sep 19-9:48 AM

Bowling Ball Problem

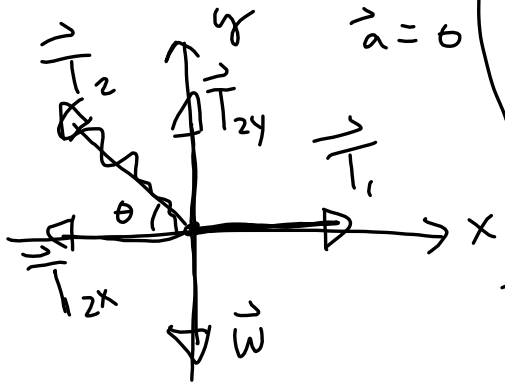


Since $\vec{a} = 0$

$\Sigma F_x = 0$

$\Sigma F_y = 0$

FBD for ball



$\vec{a} = 0$

$T_1 - T_{2x} = 0$

$T_1 - T_2\cos\theta = 0$

$T_{2y} - w = 0$

$T_2\sin\theta - mg = 0$

So $T_2 = \frac{mg}{\sin\theta}$, $T_1 = T_2\cos\theta$

Sep 19-10:35 AM