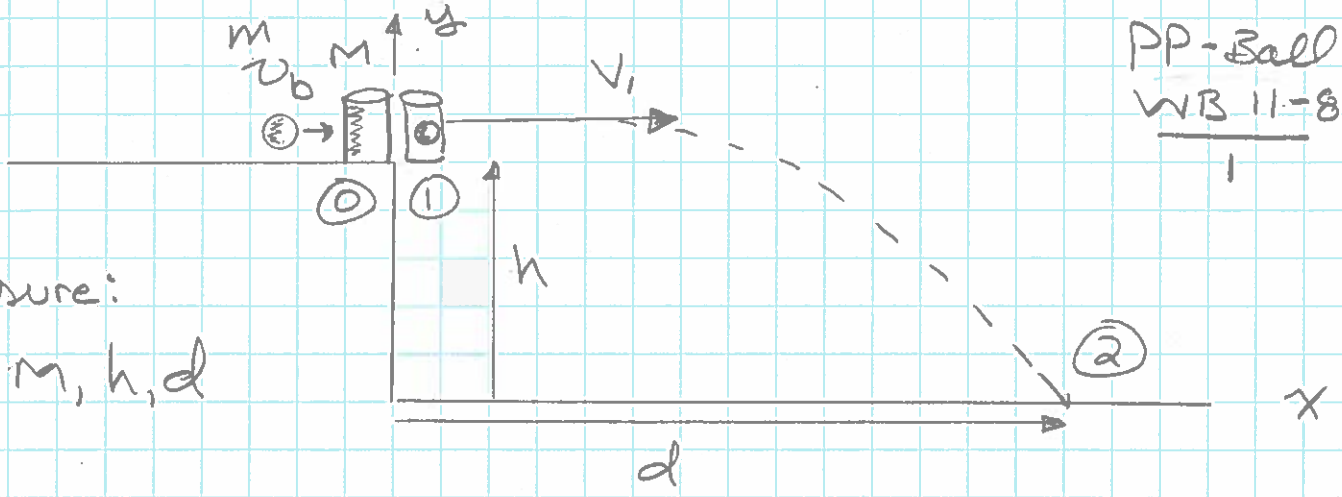
PP-Ball
WB 11-8
1



Measure:

m, M, h, d

2D Trajectory $1 \to 2$:

$x_1 = 0$ $\quad v_{1x} = v_1$ $\quad a_y = -g$ $\quad x_2 = d$

$y_1 = h$ $\quad v_{1y} = 0$ $\quad a_x = 0$ $\quad y_2 = 0$

y-motion: $y_2 = y_1 + v_{1y}\Delta t + \frac{1}{2} a_y \Delta t^2 \quad \Delta t = t_1 - t_0$

$0 = h - \frac{1}{2} g t_1^2$

$t_1 = \sqrt{\frac{2h}{g}}$

x-motion: $x_1 = x_0 + v_{1x}\Delta t + \frac{1}{2} a_x \Delta t^2$

$d = v_1 t_1 = v_1 \sqrt{\frac{2h}{g}}$

So: $v_1 = d\sqrt{\frac{g}{2h}}$

Conserve momentum $0 \to 1$:

x-comp: $m v_0 = (m+M) v_1$

So $v_0 = \frac{m+M}{m} v_1 = \frac{(m+M)}{m} d \sqrt{\frac{g}{2h}}$