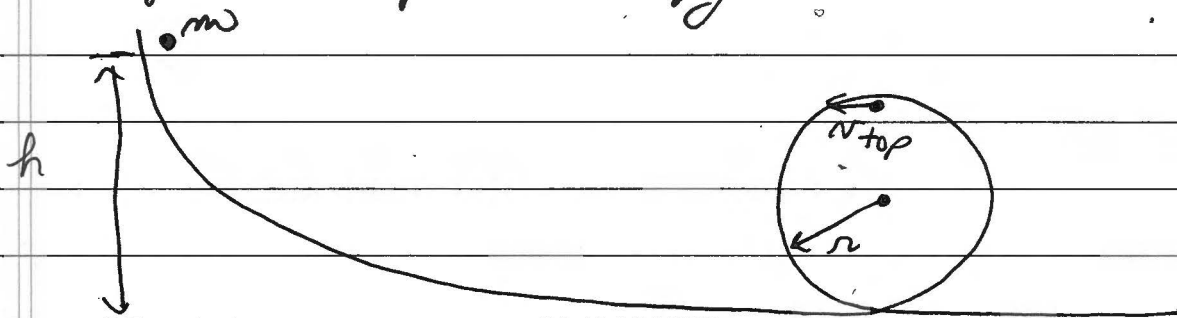


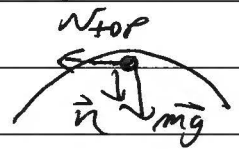
Loop-the-Loop = Energy Conservation



Release ball from rest. What is the minimum initial height h such that the ball just barely stays on the track at the top?

1st: what is N_{top} ? Use $\Sigma F = ma$

$$-\vec{n} - m\vec{g} = -mN^2/r \hat{j}$$



Let $n \rightarrow 0$. $N_{top} = \sqrt{gr}$.

2nd Conserve energy

$$E_i = E_f$$

$$U_i + K_i = U_f + K_f$$

$$mgh + 0 = mg(2r) + \frac{1}{2}mN_{top}^2$$

$$gh = g(2r) + \frac{1}{2}(gr) = \frac{5}{2}gr$$

$$\boxed{h = \frac{5}{2}r}$$

$$r = 0.215 \text{ m} \Rightarrow h \approx 0.538 \text{ m}$$