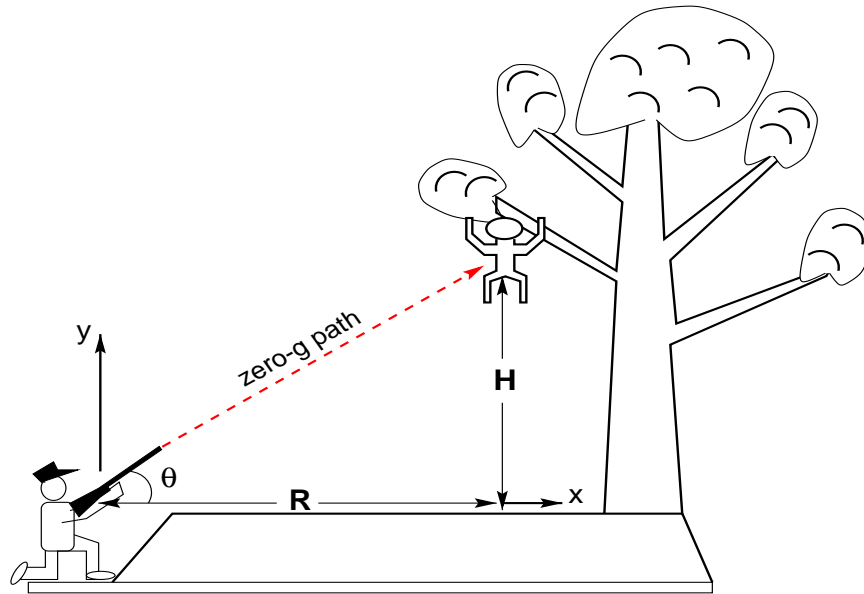


Ex : Shoot the monkey. What do we have to do to hit the monkey?



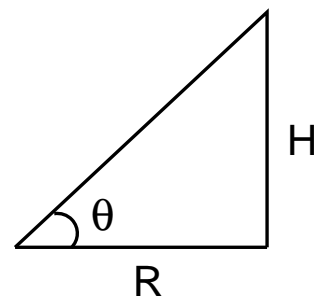
- **MONKEY** : $(y - y_0)_m = v_0^m t - \frac{1}{2}gt^2$, $y_m = H - \frac{1}{2}gt^2$.

- **DART** : $(x - x_0)_d = v_0^d \cos \theta t$, $t = R/v_0^d \cos \theta$

$$(y - y_0)_d = y_d = v_0^d \sin \theta t - \frac{1}{2}gt^2$$

Substitute the time into this equation.

$$\begin{aligned} y_d &= v_0^d \sin \theta \left(\frac{R}{v_0^d \cos \theta} \right) - \frac{1}{2}gt^2 \\ &= R \tan \theta - \frac{1}{2}gt^2 \\ y_d &= H - \frac{1}{2}gt^2 = y_m \end{aligned}$$



◇ We **always** hit the monkey with the dart if v_0^d is large enough.

◇ If v_0^d is too small, the dart does not travel far enough in x.