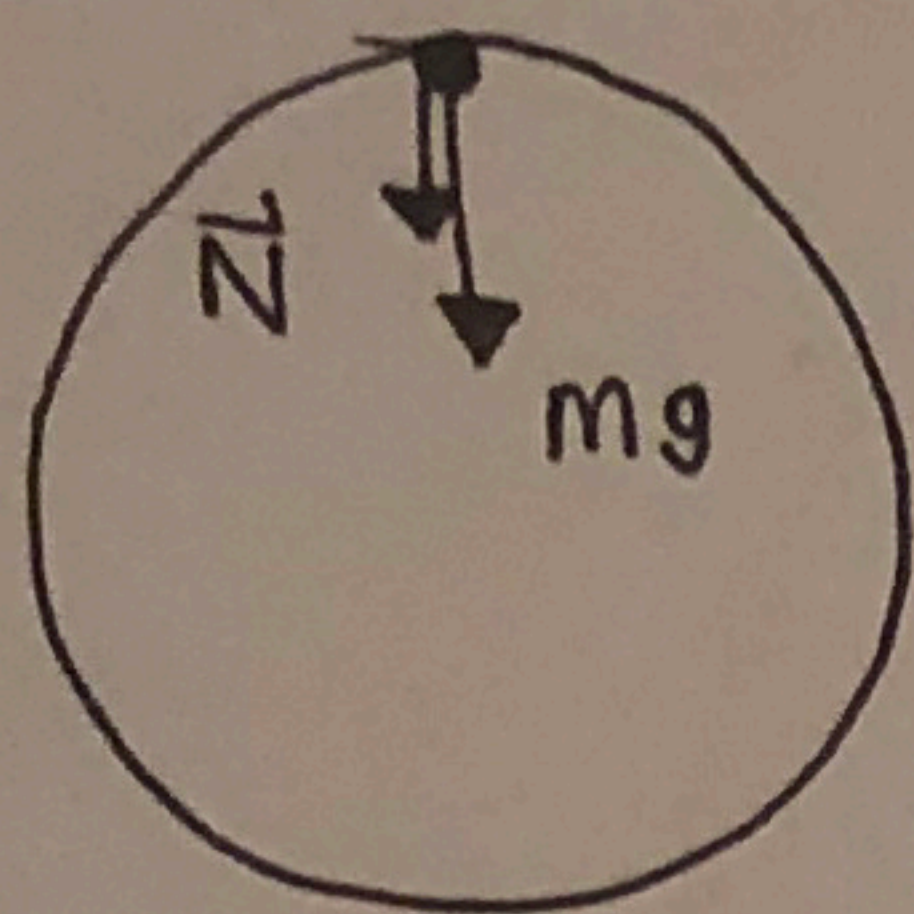**Part A (10 points):** Determine the minimum height h from which the block must be released so that it completes the loop without falling off. Express your answer in terms of R.

At the top of the loop,

$$\vec{V} = V_{min} \rightarrow |\vec{N}| = 0$$

$$\therefore F_{rad} = mg = \frac{m v^2}{R}$$

$$V = \sqrt{Rg} \;//$$

E mech is conserved:

$$U_i + \cancel{K_i} + \cancel{\theta} = K_f + U_f$$

$$\cancel{mgh} = \frac{1}{2}m(Rg) +$$

E mech is conserved:

$$U_i + \cancel{K_i}^0 = U_f + K_f$$

$$mgh = \frac{1}{2}m(\sqrt{Rg})^2 + mg(2R)$$

$$\cancel{mgh} = \frac{Rmg + 2Rmg}{2}$$

$$\boxed{h = \frac{5R}{2} \; //m.}$$