**Ex**: Consider rolling a ball through a loop. What is the minimum value of \( h \) required to make it through the loop? **Ignore friction.**

![Diagram of a ball rolling through a loop]

Consider conservation of mechanical energy.

\[
K_A = 0 \quad U_A = mgh
\]

\[
K_B = \frac{1}{2}mv_B^2 \quad U_B = 0
\]

\[
K_C = \frac{1}{2}mv_C^2 \quad U_C = mg(2R)
\]

Conservation of mechanical energy: \( E_A = E_B = E_C = K + U \)

\[
mgh = \frac{1}{2}mv_B^2 = \frac{1}{2}mv_C^2 + 2mgR
\]

Solve \( E_A = E_C \) for \( h \),

\[
h \geq \frac{5R}{2}
\]