The application of Energy Conservation to study or explain the physical behavior of a system is demonstrated in the analysis of the energy conversions of a ball rolling down a loop-the-loop.

If the object slides with no friction, it must be released from an initial height equal to the the diameter (2\*Radius ) of the loop in order to get around the loop to the other side. This is the first principle in roller coaster design.

However, roller coasters and real balls do not slide , they roll. and they must start higher than 2R. In fact a rolling ball must start exactly at 2.7R to get around.

Why?

[MIT TechTV – Loop the Loop](https://vendovi.ctc.edu/exchweb/bin/redir.asp?URL=http://shar.es/3i7F1)

Source: techtv.mit.edu