



Department of Physics

Physics 161, Calculus Mechanics and particle dynamics

Quiz #5

A vertical roller coaster loop at an amusement park is teardrop shaped with the broad side of the teardrop facing up. The roller coaster cars ride on the inside of the track and are at speeds high enough to remain on the track. The velocity at the top of the loop is 13m/s and the centripetal acceleration is $2g$.

- a) What is the radius of circle circumscribed partially by the broad end of the teardrop?
- b) If the total mass of the roller coaster car plus the riders is M , what force does the rail exert (the normal force) on the car at the top of the loop?
- c) Suppose that the loop is circular with a radius of 20m. If the coaster has a velocity of 13m/s at the top what is the centripetal acceleration?