

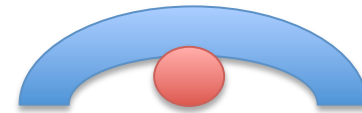
Non-Uniform Circular Motion

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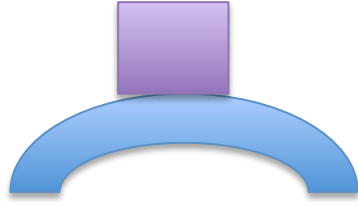
- An object moves in a circular path with changing speed.
 - Rollercoaster around a loop
 - Ball on a string in a vertical circle
- The total acceleration has two components:
 - a_T = tangential acceleration (causes change in speed)
 - a_r = radial (centripetal) acceleration (causes changes in direction)

Ex1: What is the minimum speed needed at the top for a marble to make it around the inside of a circular loop of radius 2.1 m?

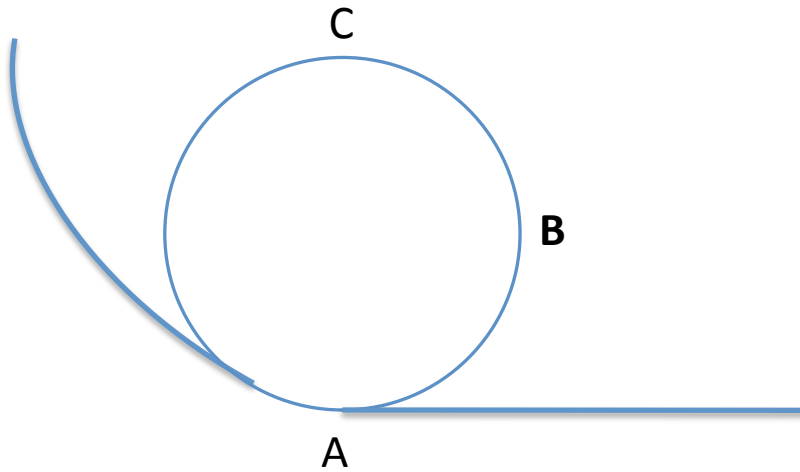
****Hint: minimum speed = no normal force**



Ex2: What is the maximum speed a car can travel over the crest of a hill of radius 10 m and still make contact?



Ex3: A roller coaster is released from rest from a height of 70 m. The radius of the loop is 20 m. Find its speed at points A, B, & C.



If the roller coaster cart has a mass of 1000 kg, find the normal force at these locations.