Circular Motion Example Problems

Problem 1: Driving on a flat road

On a wet day, a car begins to slip on a curve (r = 35 m) when its speed reaches 8.0 m/s. What is the coefficient of static friction between the tires and the road in this weather?

Problem 2: Tetherball

The game of tetherball is played with a ball tied to a pole with a string. When the ball is struck, it whirls around the pole. Solve for the speed of the tetherball if the angle the rope makes with respect to the vertical is 30° .

Problem 3: Revolving ball (vertical circle)

A 0.150 kg ball on the end of a 1.10 m long cord is swung in a vertical circle. At its highest point, the speed of the ball is 5.2 m/s. Determine the tension in the cord at point A and point B.



- (a) For a car traveling with speed *v* around a curve of radius *r*, determine a formula for the angle at which a road should be banked so that no friction is required.
- (b) An engineer wishes to design a curved exit ramp in such a way that the car will not have to rely on friction to round the curve without slipping. Suppose a typical car rounds the curve with a speed of 30 mph and the radius of the curve is 50 m. At what angle should the curve be banked? (1 mph = 0.447 m/s)
- (c) In which direction will friction act if a car rounds the curve at a speed lower than 30 mph?





