

Centripetal acceleration and force

Reminder: connection between angular and linear velocity:

$$v = \omega R$$

When moving along a circular path with constant speed v , an object has acceleration directed towards the center, called Centripetal Acceleration:

$$a = \omega^2 R = \frac{v^2}{R}$$

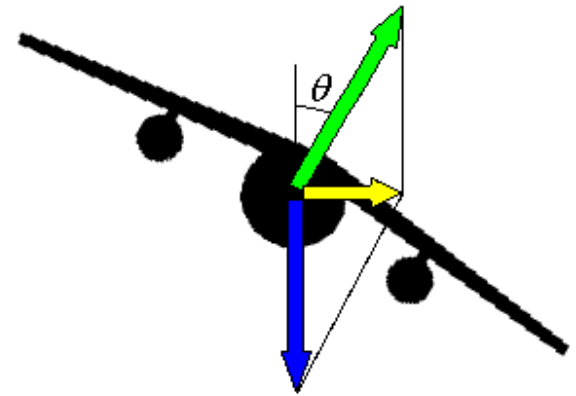
Homework 20




Problem 1

Friction coefficient between the cars wheels and the road is μ . Find the maximum speed with which it can move on a curved road without slipping, if the radius of curvature of the road is R . If the friction coefficient changes from 0.7 to 0.35 due to rain, how much that speed changes?

Problem 2

An airplane in order to turn must roll to a banked position (see picture) so that its are angled towards the desired direction of the turn. Find the radius of such a turn, if the bank angle is $\theta=5^\circ$, and speed is $v=700$ km/hr



-  Lift force
-  Weight
-  Centripetal force

Problem 3

How much (in %) a weight of an object measured on an Equator would be different from the one on a Pole, due to rotation of the Earth? Assume Earth to be a perfect sphere with uniform mass distribution.