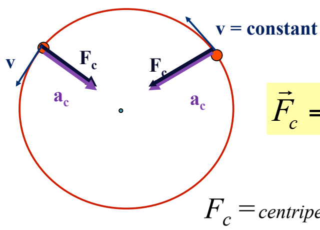
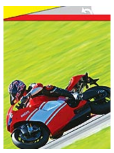
Uniform Circular Motion



$$\vec{F}_c = m\vec{a}_c$$

$F_c =$ *centripetal force*



http://images.motorcyclistonline.com/firstrides/122_0712_01_s+ducati_desmosedici_rr+curve.jpg

$$\tan\theta = \frac{v^2}{gR}$$

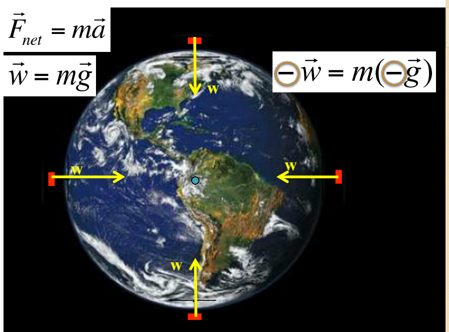
- The bike turns because it is leaning. The operator uses the handle bars around a curve, not directly to steer but to control the lean angle.
- The lean angle is needed to safely drive a motorcycle around a curve.
- It is related to the radius of the turn and the speed of the bike.

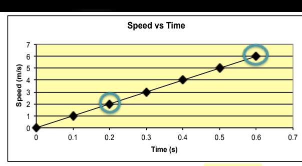
http://www.motorcycleaccidentinjury.com/law.html

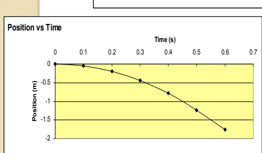
$$\vec{F}_{net} = m\vec{a}$$

$$\vec{w} = m\vec{g}$$

$$-\vec{w} = m(-\vec{g})$$





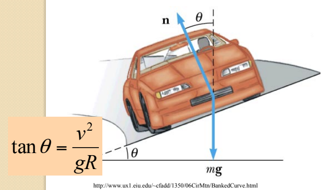


$$a = \frac{\Delta v}{\Delta t}$$

$$a = \frac{6-2}{0.6-0.2}\left[\frac{m/s}{s}\right]$$

$$a = 10\,{}^{m}/_{s^2}$$

Why is a curved road banked?



$$\tan\theta = \frac{v^2}{gR}$$

http://www.usu.edu/~cfadd/1350/06CirMtn/BankedCurve.html

The banked road is designed at a specific speed for a car to round the curve without requiring friction.

Conditions for free fall:

- **gravity is the only force acting on the body**
- **distance of the body from the surface of the earth should be very small compared to the radius of the earth**

d <<< r (earth)

Which component is affected by gravity?