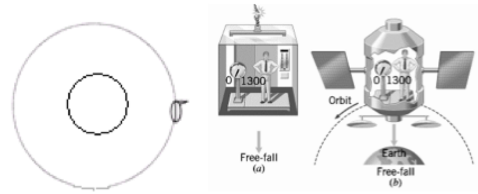
Real weightlessness

Apparent weightlessness



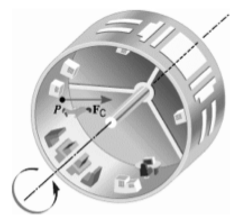
4. Why did the Apollo astronauts feel weightless?

5. Why do the space shuttle astronauts feel weightless?

Artificial Gravity

6. How can gravity be simulated in a space station?

7. How fast would this 20. meter diameter space station have to spin to simulate Earth's gravity?



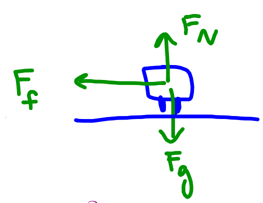
39. A 2.00×10^3 kg car rounds a circular turn of radius 20.0 m. If the road is flat and the coefficient of static friction between the tires and the road is 0.70, how fast can the car go without skidding?

$\Sigma F_{in} = m\left(\frac{v^2}{r}\right)$

$F_f =$

$\mu F_N =$

$\mu(mg) = mv^2/r$



50. A 13 500 N car traveling at 50.0 km/h rounds a curve of radius 2.00×10^2 m. Find the following:

a. the centripetal acceleration of the car v^2/r

b. the centripetal force mv^2/r

c. the minimum coefficient of static friction between the tires and the road that will allow the car to round the curve safely

$\frac{50 \times 10^3 \text{ m}}{3600 \text{ s}}$

2. At what distance above Earth would a satellite have a period of 125 min?

$\Sigma F_{in} = m\frac{v^2}{r}$

$a_c = \frac{v^2}{r}$

$v = \frac{2\pi r}{T}$

$g = \frac{GM}{r^2}$

$\frac{GMm}{r^2} = \frac{mv^2}{r}$

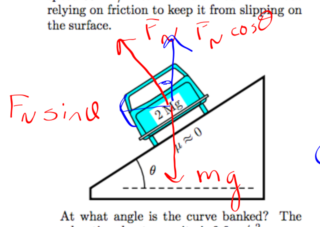
$\frac{GMm}{r^2} = \frac{m4\pi^2 r}{T^2}$

$T = 2\pi\sqrt{\frac{r^3}{GM}}$

$r = \sqrt[3]{\frac{T^2 MG}{(2\pi)^2}}$

Car on a Banked Curve 01
011 10.0 points

A curve of radius 51.8 m is banked so that a car of mass 2 Mg traveling with uniform speed 65 km/hr can round the curve without relying on friction to keep it from slipping on the surface.

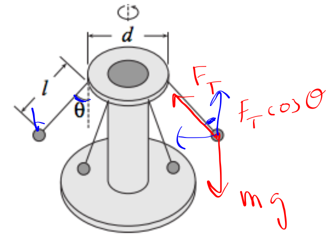


At what angle is the curve banked? The acceleration due to gravity is 9.8 m/s^2.
Answer in units of deg.

r ✓
m ✓
v ✓
$\theta = ?$

$$F_N \sin\theta = \frac{mv^2}{r}$$
$$F_N \cos\theta = mg$$

θ ✓
m ✓
$v = ?$
$F_T = ?$



$$F_T \cos\theta = mg$$
$$F_T \sin\theta = \frac{mv^2}{r}$$

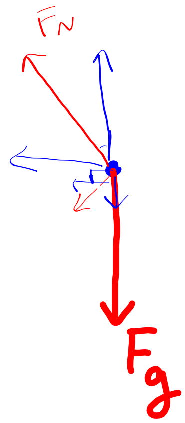
types of circ motion probs:

-friction

-trig

-vertical circle

-grav



$\underline{y}$ $\quad \Sigma F = ma$

$F_N \cos\theta + F_f \sin\theta + F_g = 0$

$\underline{x}$ $\quad \Sigma F = m\frac{v^2}{r}$

$F_N \sin\theta + F_f \cos\theta = \frac{mv^2}{r}$