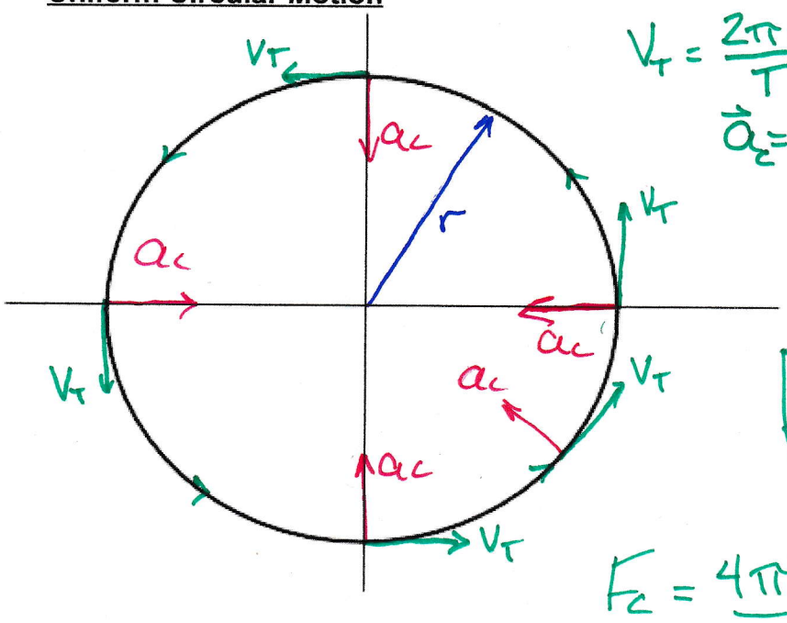
Uniform Circular Motion



$V_T = \frac{2\pi r}{T}$ T-period

$\vec{a}_c = \frac{\Delta \vec{V}}{t} = \frac{v^2}{r}$ [centre of circle]

$F_{net} = ma$

$F_{net} = \frac{mv^2}{r}$

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

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

$f = \frac{1}{T}$

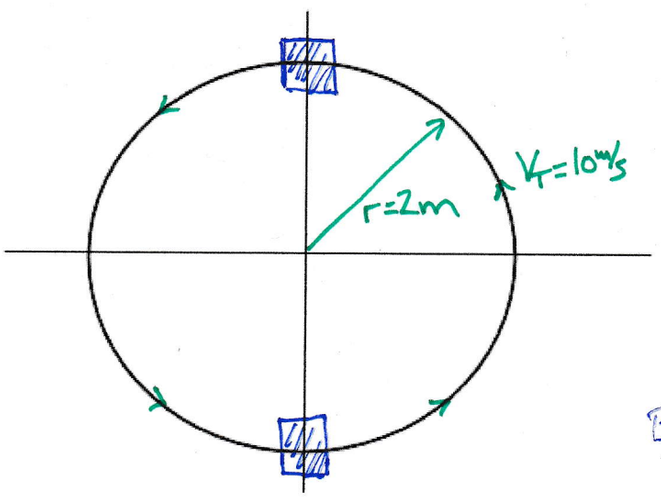
$F_c = \frac{4\pi^2 r m}{T^2}$ $F_c = 4\pi^2 r m f^2$

Solving Problems Involving Uniform Circular Motion (the vertical loop).

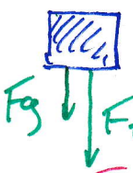
(1kg object moving at 10 m/s in a 2m radius on a string)

$F_{net} = F_c = \frac{mv^2}{r} = 50N$; $F_g = mg = 9.8N$

Find F_T at top & bottom of circle.



Top

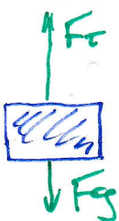


$F_{net} = F_g + F_T$

$50N = 9.8 + F_T$

$F_T = 40.2N$

Bottom



$F_{net} = F_T - F_g$.

$50N = F_T - 9.8$

$F_T = 59.8$

Δ(Top→Bottom) = 19.6N (2x Fg's)

Other examples of Uniform Circular Motion

Friction keeping a car moving from sliding out of a corner

Air pressure allowing an airplane to maneuver around corners.

Loop the loop in roller coasters keeping the car in the track.

**** Planetary mechanics - gravity as a force keeping planets in orbit.** $F_g = \frac{Gm_1m_2}{r^2}$ *

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