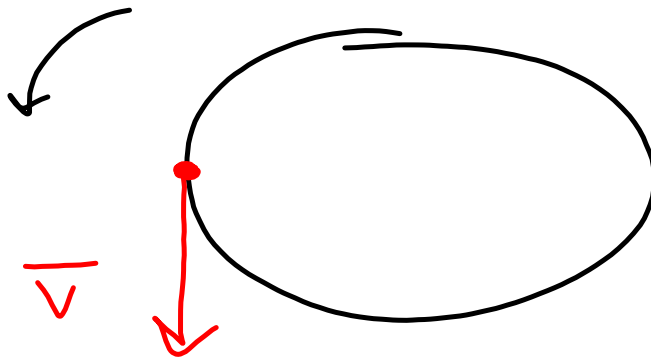
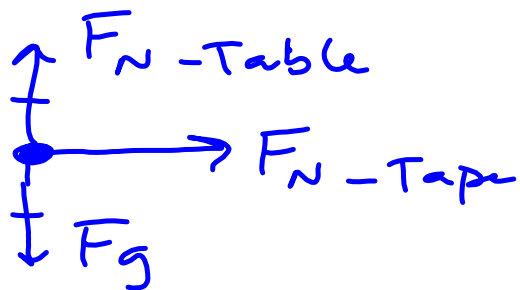


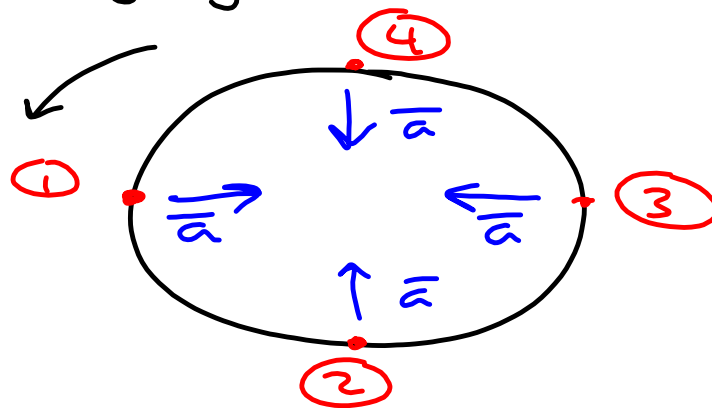
Circular Motion



Side view
of ball
inside tape

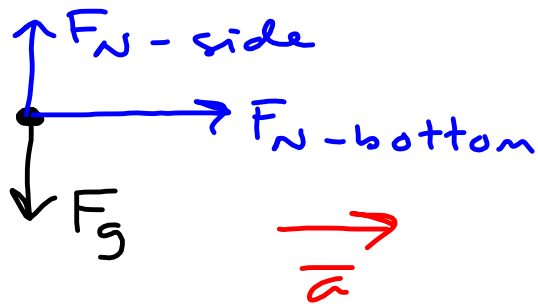


Swinging Bucket

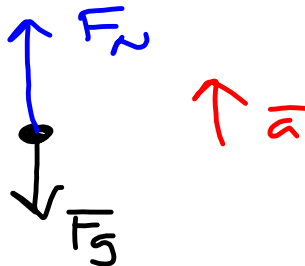


FBDs of Water

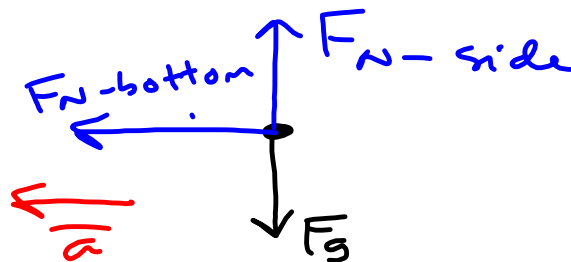
①



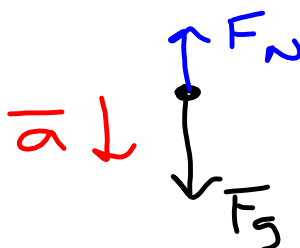
②



③



④



Mathematics

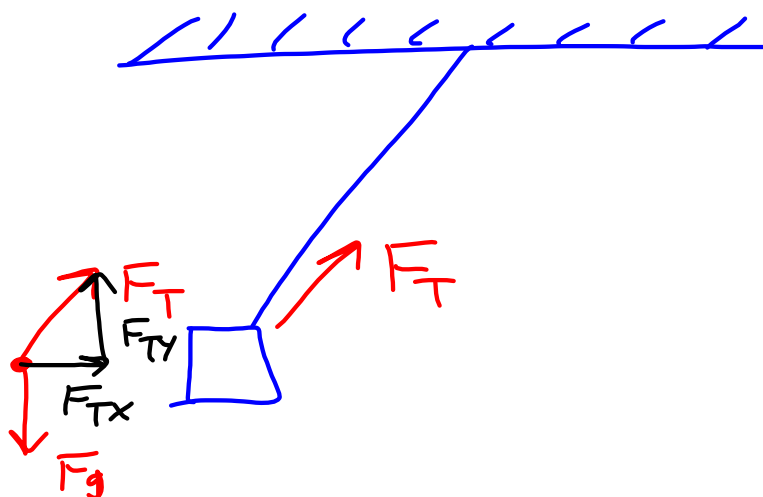
$$a_c = \frac{v^2}{r}$$

centripetal
acceleration

$$F_c = \frac{m v^2}{r}$$

centripetal
force

$$\left[\frac{\text{kg} \frac{\text{m}^2}{\text{s}^2}}{\text{m}} = \frac{\text{kg} \cdot \text{m}}{\text{s}^2} \right]$$



$$\begin{aligned}
 F_c = F_{Tx} &= \frac{mv^2}{r} \\
 &= \frac{m \left(\frac{\text{circumference}}{\text{time}} \right)^2}{r} \\
 &= \frac{(.125 \text{ kg}) \left(\frac{2.04 \text{ m}}{1.8 \text{ s}} \right)^2}{0.325 \text{ m}} \\
 &= 0.49 \text{ N}
 \end{aligned}$$

A right-angled triangle representing the force components. The hypotenuse is $F_T = 1.32 \text{ N}$. The horizontal side is $F_{Tx} = 0.49 \text{ N}$. The vertical side is $F_{Ty} = 1.23 \text{ N}$. The angle θ is between the hypotenuse and the vertical side.

$$\begin{aligned}
 \tan \theta &= \frac{F_{Tx}}{F_{Ty}} \\
 \theta &= \tan^{-1} \left(\frac{0.49 \text{ N}}{1.23 \text{ N}} \right) \\
 &= 21.2^\circ
 \end{aligned}$$

