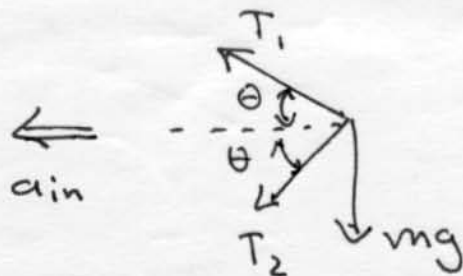


Problem 2

(a) sys = ball



(b) uniform circular motion $\Rightarrow a_{in} = \frac{v^2}{R}$

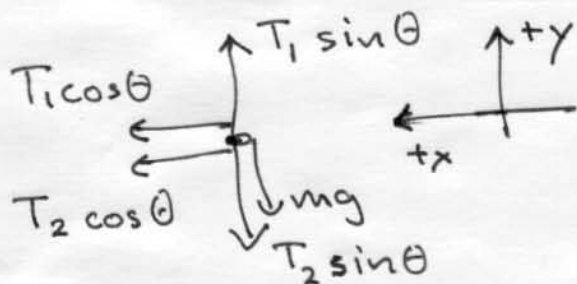
$$f = \frac{\text{revolutions}}{\text{sec}} = \frac{v}{2\pi R} \Rightarrow v = 2\pi R f$$

$$a_{in} = \frac{(2\pi R f)^2}{R} = 4\pi^2 R f^2$$

$$R = l \cos \theta \quad l = \text{length of string}$$

$$\Rightarrow \boxed{a_{in} = 4\pi^2 l \cos \theta f^2} = 17.1 \text{ m/s}^2 \text{ dir} = \text{inward}$$

(c) Resolve forces on free-body diagram



$$\text{N2: } F_{\text{tot}, x} = m a_x$$

$$F_{\text{tot}, y} = m a_y$$

$$\Rightarrow \boxed{\begin{aligned} T_1 \cos \theta + T_2 \cos \theta &= m a_{in} \\ T_1 \sin \theta - mg - T_2 \sin \theta &= 0 \end{aligned}}$$

2 equs, 2 unknowns (T_1, T_2)

$$(1): T_1 + T_2 = \frac{m a_{in}}{\cos \theta}$$

$$(2): T_1 - T_2 = \frac{mg}{\sin \theta}$$