

Physics 101-Rec
Quiz # 5

Instructor: Dr. Mekki

Name: Key Id#: _____ Sect.#: _____

Consider a mass $m = 1.0$ kg attached to a string of length 1.5 m. The system is rotated vertically.

(a) What is speed of the mass m at the bottom of circle if the tension is three times the weight?

at the bottom

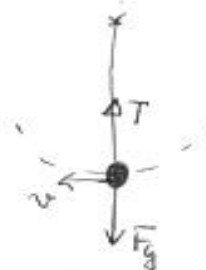
$$T - F_g = m \frac{v^2}{R}$$

$$T = 3F_g = 3mg$$

$$3mg - mg = m \frac{v^2}{R}$$

$$2g = \frac{v^2}{R} \Rightarrow v = \sqrt{2gR} = \sqrt{2 \times 9.8 \times 1.5} =$$

$$\boxed{v = 5.4 \text{ m/s}}$$



(b) What is the minimum speed of the mass at the top of the circle for it to just make it through?

$$T + F_g = m \frac{v^2}{R}$$

$$v_{\min} \Rightarrow T = 0$$

$$\Rightarrow F_g = m \frac{v_{\min}^2}{R} = mg$$

$$v_{\min} = \sqrt{gR} = \sqrt{9.8 \times 1.5} = 3.8 \text{ m/s}$$

$$\boxed{v_{\min} = 3.8 \text{ m/s}}$$

