

Physics 101-Rec  
Quiz # 5

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Name: Key Id#: \_\_\_\_\_ Sect.#: \_\_\_\_\_

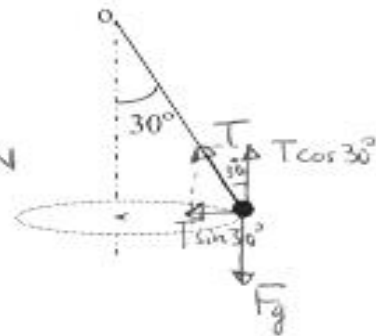
Consider a conical pendulum in which a small mass of 50 g revolves in a horizontal circle with constant speed at the end of a string (see figure). If the string makes an angle of  $30^\circ$  with the vertical and its length is 3 m, find;

a) The tension in the string.

$$T \cos 30^\circ - \bar{F}_g = 0$$

$$\Rightarrow T = \frac{m g}{\cos 30^\circ} = \frac{0.05 \times 9.8}{\cos 30^\circ} = 0.57 \text{ N}$$

$$\boxed{T = 0.57 \text{ N}}$$



b) The speed of the mass m.

$$T \sin 30^\circ = \frac{m v^2}{R}$$

$$\sin 30^\circ = \frac{R}{l} \Rightarrow R = l \sin 30^\circ$$

$$T = \frac{m v^2}{l \sin^2 30^\circ}$$

$$\Rightarrow v = \sqrt{\frac{T l \sin^2 30^\circ}{m}} = 2.9 \text{ m/s}$$

$$\boxed{v = 2.9 \text{ m/s}}$$