

### Answer on Question #75699-Physics-Other

A ball hung at the bottom end of a string with a length of 1.2 m undergoes a horizontal circular motion with a radius of 0.8 m.

- (a) What force acts as the centripetal force for the circular motion of the ball?
- (b) What is the magnitude of centripetal acceleration?
- (c) What is its angular velocity?
- (d) How long (in minutes) does the ball take to finish 100 revolution? Note: the friction can be neglected in this question.

### Solution

(a) The horizontal projection of tension force.

(b)

$$a = \frac{v^2}{r} = g \tan \theta$$

$$\theta = \sin^{-1} \frac{r}{l} = \sin^{-1} \frac{0.8}{1.2} = 41.8^\circ$$

$$a = 9.8 \tan 41.8^\circ = 8.8 \frac{m}{s^2}$$

(c)

$$\omega = \sqrt{\frac{a}{r}} = \sqrt{\frac{9.8 \tan 41.8^\circ}{0.8}} = 3.3 \frac{rad}{s}$$

(d)

$$t = 100T = 100 \frac{2\pi}{\omega} = 100 \frac{2\pi}{3.3} = 190 \text{ s} = 3.2 \text{ min}$$

Answer provided by <https://www.AssignmentExpert.com>