Answer on Question 51969, Physics, Other

Question:

A ball of mass $50g$ tied to the end of a $50cm$ inextensible string is whirled around a vertical circle. Find the tension in the string when the ball is at the top of the circle. Take $g = 10\,m/s^2$.

Solution:

Let's write the forces acting on the ball at the top of the circle:

$$F_T + W = F_c,$$

$$F_T + mg = \frac{mv_{top}^2}{R},$$

where, F_T is the tension in the string when the ball is at the top of the circle, v_{top} is the velocity of the ball at the top of the circle, $R = 50cm$ is the radius of the circle. Because from the condition of the question we don't know the velocity of the ball at the top of the circle we find F_T in symbolic form:

$$F_T = \frac{mv_{top}^2}{R} - mg = m\left(\frac{v_{top}^2}{R} - g\right).$$

Answer:

$$F_T = m\left(\frac{v_{top}^2}{R} - g\right).$$