Circular Motion Examples

1. A 200 g ball on the end of a string is rotated in a horizontal circle of radius 10.0 m. The ball completes 10 rotations in 5.0 s. What is the centripetal force on the ball?

2. In the Bohr model of the hydrogen atom, the electron revolves around the nucleus. If the radius of the orbit is 5.3×10^{-11} m and the electron makes 6.6×10^{15} rotations per second, calculate
   a. the acceleration of the electron.
   b. the centripetal force acting on the electron.

3. When you whirl a ball on a cord in a vertical circle, you find a critical speed at the top for which the tension in the cord is zero. This is because the force of gravity on the object itself supplies the necessary centripetal force. How slowly can you swing a 2.5 kg ball like this so that it will just follow a circle with a radius of 1.5 m?

4. An object of mass 3.0 kg is whirled around in a vertical circle of radius 1.3 m with a constant velocity of 6.0 ms^{-1}. Calculate the maximum and minimum tension in the string.