Examples

1 A 0.250 kg ball is being swung on a 1.3 m string in a vertical circle. If its tangential speed at the bottom of the path is 4.2 m/s, what is the tension in the string for that position?

2 For the ball in the previous example, what is the minimum speed that the ball can have at the top and still move in a circle?

Key: The minimum speed is that speed which cause the tension in the string to go to 0 N. At even smaller speeds, the string will go limp and the ball will fall out of its circular path.

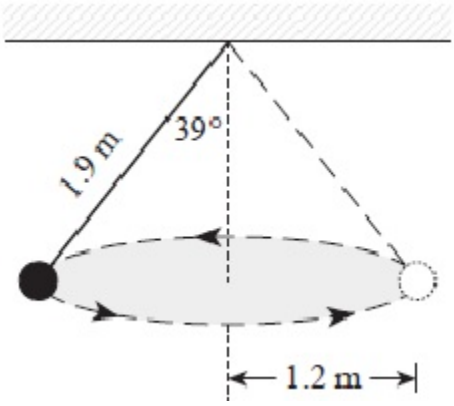
3 A 0.450 kg stone is swinging in a vertical circle of radius 75.0 cm. The constant speed of the stone is 6.21 m/s. Determine the tension in the string at the bottom of the circle and at the top of the circle.

4 As a 58.0 kg pilot comes out of a dive in a circular arc at a speed of 350 km/h, he experiences an acceleration of 9.0 g's. What force is applied upward by his seat and what must be the radius of the path?

5 One of the vertical circular rides in Fisics Fantasy Land has a radius of 35.0 m. You are sitting in a car that is just cresting the top of the ride. How fast must the car be moving in order that you momentarily lift off your seat and feel weightless?

Key: F_N is the force of the seat pushing up on you. Since you feel weightless, you are momentarily free of your seat. Since it is not pushing on you, F_N is equal to 0 N.

6. The diagram shows an object of mass 3.0 kg travelling in a circular path of radius 1.2 m while suspended by a piece of string of length 1.9 m.



A. What is the centripetal force on the mass?

B. What is the velocity?

C. What is its period