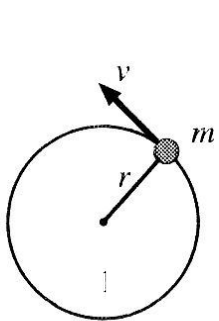
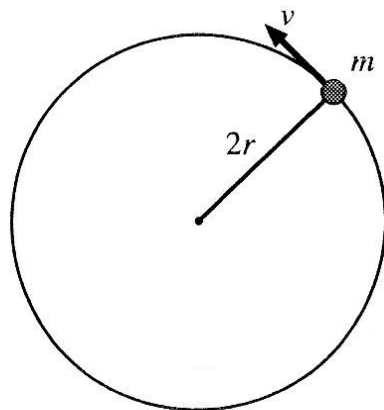


Circles and Strings

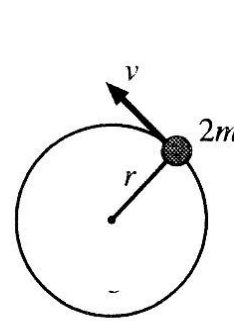
The figures shown below provide a bird's-eye view of a set of different particles moving in horizontal circles on a tabletop. Each of them is held in its orbit by a string and all are moving at the same speed. Rank, in order from largest to smallest, the tensions T_1 through T_4 in the strings.



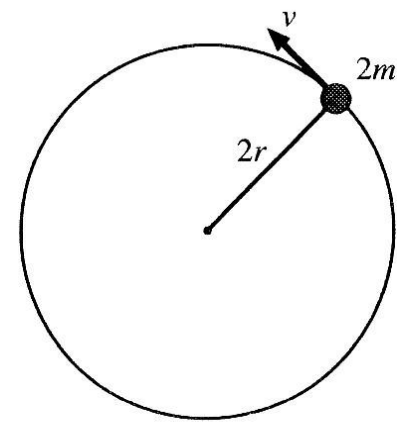
(1)



(2)



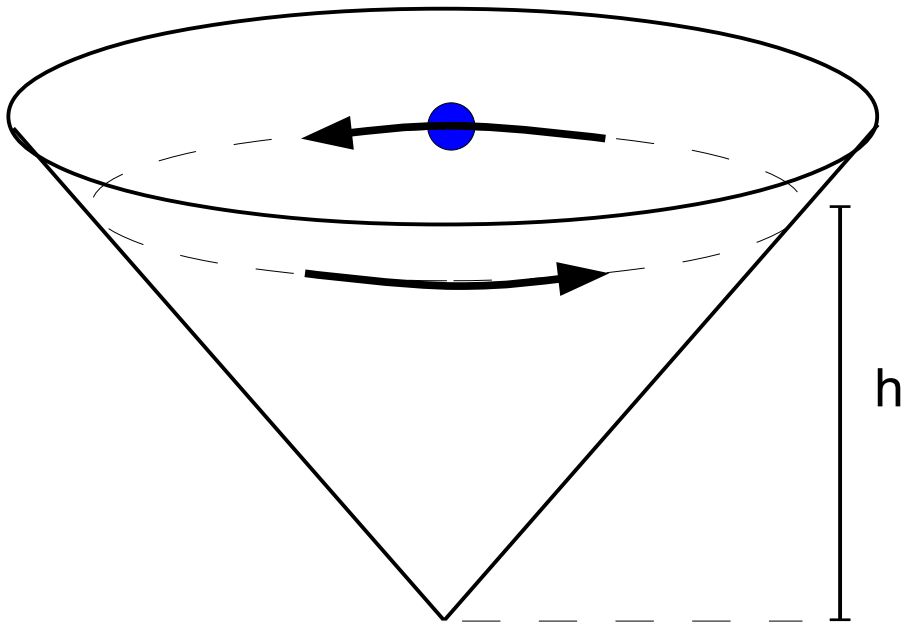
(3)



(4)

Marble in a Cone

A marble is rolling around in a circle inside of a cone.



- (a) Draw two free-body diagrams for the marble: one when it is on the left side of the cone, and one when it is on the right side of the cone.
- (b) If you measure the height h above the tip of the cone at which the marble is rolling, what information would you need in order to determine the speed at which it's rolling?

Tetherball!

A tetherball of mass 0.5 kg is connected to the center pole by a rope of length 2.5 m . The child holding the ball hits it with his fist and it begins traveling around the pole at a constant speed with the rope at an 40° angle with the pole.



- (a) How long does it take the ball to make one complete revolution around the pole?
- (b) If the ball started from rest, find the impulse (magnitude and direction) that the child gave the ball when he punched it.

Rollercoaster Engineering



You are designing a rollercoaster and want to incorporate a “corkscrew” (as shown in the figure) with a radius of 5 m.

Find the minimum height h at which the rollercoaster car must start in order for it to make it around the corkscrew.

