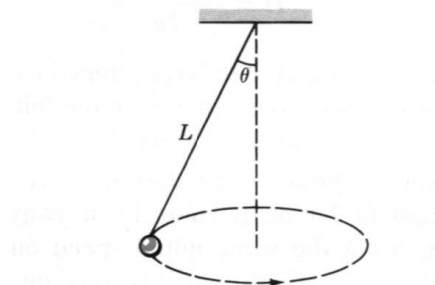


## Homework #5

- 1) A ball thrown at 20.0 m/s at angle  $\theta$  below the horizontal from a cliff of height  $H$  lands 69.0 m from the base 4.00 s later. Find  $\theta$  and  $H$ .
- 2) A ball is thrown at 14.0 m/s at  $45^\circ$  above the horizontal. Someone located 30.0 m away along line of the path starts to run just as the ball is thrown. How fast, and in which direction, must the person run to catch the ball at the level from which it was thrown?
- 3) If a baseball player can throw a ball at  $45^\circ$  to a point 100 m away horizontally to the initial vertical level, how high could he throw it vertically upward?
- 4) A motorcyclist plans to jump across a gorge width 32.0 m. He takes off on an  $18.0^\circ$  ramp. What minimum speed does he require if he lands at the initial level?
- 5) A projectile fired from the ground has a velocity  $\vec{v} = 24.0 \hat{i} - 8.00 \hat{j}$  m/s at a height of 9.10 m. Find: (a) the initial velocity; (b) the maximum height.
- 6) The figure below shows a conical pendulum. It consists of a bob is suspended at the end of a string and describes a horizontal circle at a constant speed of 1.28 m/s. If the length of the string is 1.20 m and it makes an angle of  $20^\circ$  with the vertical, find the acceleration of the bob.



- 7) A stone moves in a circle of radius 60.0 cm and has a centripetal acceleration of  $90 \text{ m/s}^2$ . How long does it take to make 8 revolutions?
- 8) Compute the acceleration for the following in terms of g's where  $g = 9.81 \text{ m/s}^2$ : (a) a car moving at 100. km/h round a curve of radius 50.0 m; (b) a jet flying at  $1.50 \times 10^3$  km/h and making a turn of radius 5.00 km; (c) a stone being twirled every 0.500 s at the end of a rope of length 1.50 m; (d) a speck of dust at the rim of an LP with a radius of 6.00 in. turning at 33.1 rpm; (e) a molecule in a centrifuge rotating at 30,000 rpm at a radius of 15.0 cm.