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Phys 2010 (NSCC), Fall 2006
Problem Set #6

1. A 2.0-kg mass slides down a *rough* inclined plane which is sloped at 35° above the horizontal. A student measures its acceleration down the slope and finds it to be $3.90 \frac{\text{m}}{\text{s}^2}$.

What is the magnitude of the (kinetic) frictional force which acts on the block?

2. In problem 1, what is the magnitude of the normal force of the surface, and what is the coefficient of kinetic friction for the block and surface?

3. A hockey puck begins sliding on a flat smooth surface at with speed of $15.0 \frac{\text{m}}{\text{s}}$. The coefficient of kinetic friction for the puck and surface is 0.050.

What is the magnitude of the acceleration of the hockey puck?

How far will the puck go before coming to rest?

4. A 2.0-kg mass moves in a circle of radius 1.2 m. It makes one revolution in 0.950 s.

What is the speed of the mass? What is the centripetal acceleration of the mass? What is the centripetal force which acts on the mass?

- 5.** An athlete swings a 5.00 kg ball horizontally on the end of a rope. The ball moves in a circle of radius 0.800 m such that it makes one revolution every 2.00 s.
Find the speed of the ball.

- 6.** In Problem 5, find the centripetal acceleration of the ball and the tension in the rope.

7. Tarzan (who has a mass of 200 kg) tries to cross a river by swinging from a 10-m long vine. His speed at the bottom of the swing is $8.0 \frac{\text{m}}{\text{s}}$. Find the tension in the vine at this point.

8. Io, a satellite of Jupiter, has an orbital period of 1.77 days and an orbital radius of 4.22×10^5 km.

From these data (and the equations we found in class relating orbital period and radius) find the mass of Jupiter.