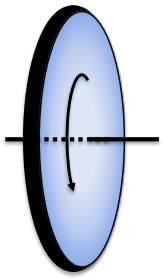
PS#9 Due in Class Thursday, March 14. Please pay good attention to describe the lens you are using and explain your method.

1. You are holding the axle of a bicycle wheel (one hand on each side) out in front of you, spinning as shown.
   a) What is the direction of the angular momentum vector?
   b) You push away with your right hand and pull in with your left hand. What is the direction of the torque you put on the wheel? What is the direction of the angular impulse that you give to the wheel?
   c) After you push for a moment, how does the orientation of the wheel change?



2. 7.5 Exercise 1, Applying torque to a spinning wheel.

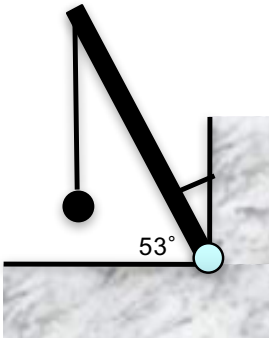
3. 7.5 Exercise 3, Precession of a bicycle wheel.

4. 7.6 Exercises 1 and 2, deriving our two kinematic equations. These are covered in the videos, and you don't have to hand them in, but it's a good exercise to do them in order to know where the formulas come from.

5. 7.6 Exercise 3, Throwing a rock upwards off the edge of a cliff.

6. 7.6 Exercise 4, Catching the Bus.

7. 7.6 Exercises 5 – 7 (Pulling sled, Hitting a baseball, Torque on a wheel. *On the final exam*, you will not have to use a calculator to do trigonometry; you are welcome to estimate angles and components using drawings. Take a look at these three problems and make sure you can solve them. You can decide if you want to use trig or not.



8. In the diagram at right, a string of some length supports a 100 kg ball. The length of the tilted rod is 10 m and the cable is attached 2.5 m from the pivot. From the drawing at right (make your own better drawing), estimate the tension on the cable and the force provided by the foundation at the pivot.

9) In class I asked you to find the coefficient of friction between my computer and a wooden surface. The 114 cm wooden platform was lifted so that one end was 52 cm off the ground when the computer slipped.
a) If the plank made a triangle, find the length of the horizontal component of the incline.
b) Estimate the force of friction and the normal force in terms of mg (the force of gravity on the computer).
c) Calculate the coefficient of friction
d) just for fun, use trigonometry to find the angles of the triangle.

10) Hit a baseball off a cliff: Exercise 6, section 7.6