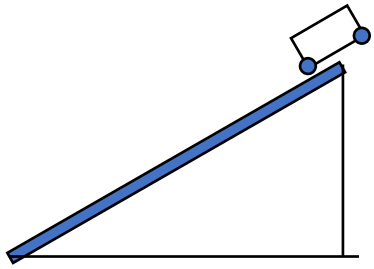
PS#8 Due in Class Tuesday, June 5. Please pay good attention to describe the lens you are using and explain your method.

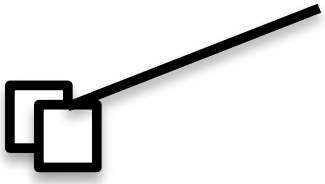
1. 7.1 Exercise 3, ball on post

2. Please read section 7.2 and consider the cart of mass m_o at right, released from rest on a low friction track.



   - Please estimate the resultant force on the cart in terms of constants that we know. Clearly outline your approach.
   - Please estimate the acceleration down the track.
   - Repeat the above two questions if there is a coefficient of dynamic friction of 0.3 between the cart and the road.
   - What coefficient of friction would be necessary for the cart to move at a constant speed?
   - If the wheels on the cart had considerable mass, how would this affect the acceleration?

3. You are watching the fuzzy dice from the rearview mirror. As you take off on level ground, it makes an angle as shown at right.



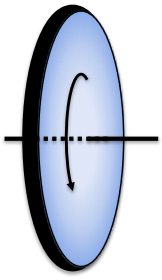
   a) **** state how you will inform your choice of axis.
   b) Estimate the acceleration of the car.
   c) What must be the coefficient of friction of your tires for this to happen?
   d) Is this realistic?
   e) If the mass of the dice is 100 g, what is the tension in the string?

4. Consider the fuzzy dice above. Now the car is stationary and you are sitting it in. You grab the dice and pull them to one side exactly as in the diagram above. Then you let go of them.
   a) **** Choose a good axis. Is the direction of acceleration the same as above? State how this direction will inform your choice of axis.
   b) Again, find the acceleration of the dice with direction.
   c) Again, if the mass of the dice is 100 g, please find the tension in the string. Is it the same as the string above? Why might this make sense?

5. Consider the fuzzy dice above. Now you are holding them from the end of the 50 cm string, and spinning the dice around in a circle. The path of the dice is a circle in the horizontal plane. Estimate the speed of the dice and the tension in the string.

6. Section 7.4 Exercise 1.

7. 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?