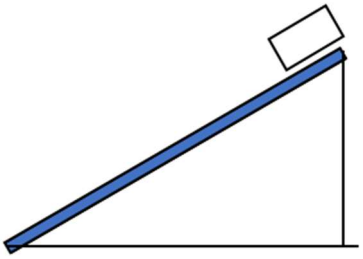
PS#9 Due in Class Monday, Nov. 18. Please pay good attention to describe the lens you are using and explain your method.

**** Make sure to consider the direction of acceleration to inform your choice of axis. Do you remember how to pick a good axis?

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

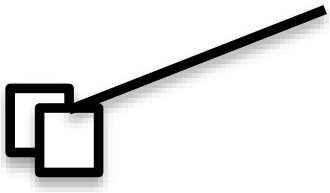


   - Please estimate the resultant force on the cart in terms of constants that we know. Clearly outline your approach.
   - Please estimate the acceleration down the track.
   - Repeat the above two questions if there is a coefficient of dynamic friction of 0.3 between the block and the track.
   - What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

2. Slacklining is pretty fun, but you have to run some webbing between two trees first. At right, you see two pictures of me at 70 kg, slack lining.

   a) In which drawing is the line tighter? Please prove how you know this with a good force drawing and discussion. Lens?
   b) Using your force drawing, please estimate the tension on the slack line at left.

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.



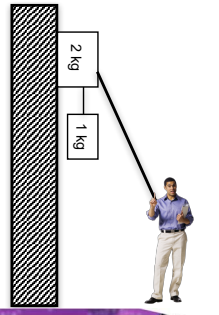
   a) **** state how you will inform your choice of axis.
   b) Estimate the acceleration of the car.
   c) What must be the coefficient of friction of your tires for this to happen?
   d) Is this realistic?
   e) If the mass of the dice is 100 g, what is the tension in the string?

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. 7.4 Exercise 1, a child jumps onto a carousel.

7. Please see a picture of me pushing a system of masses up a vertical wall with a coefficient of friction of 0.4. If I push the stick as shown with a force of 80 N, please find the approximate acceleration of the system of masses, and the tension in the string holding the 1 kg mass.



8. The 60 kg speed skater at right is executing a turn.
   a) If she is standing on one leg at this moment, estimate the force on her leg. Is this a lot of force? Could you stand on one leg with this much force on your leg?
   b) The radius of curvature of these tracks is 15 m. Estimate the speed of this skater.

9. Please do your assessment #8 in fine fashion.