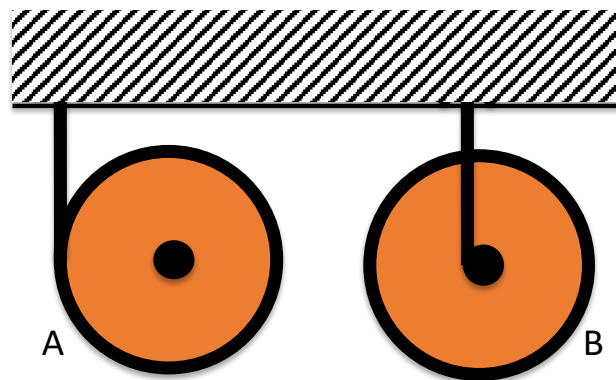


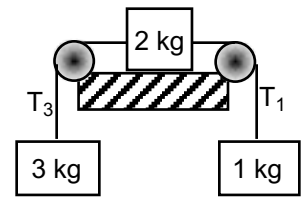
You will be graded on your communication of physics understanding.

#1 At right you see two identical wheels that are simultaneously let go. They are both connected to the same length of string, but the string is wrapped around the rim of wheel A, and the string is wrapped about the small center hub of wheel B.

- Which wheel is spinning the fastest (highest rotational velocity) when it comes to the end of the string, or are they the same? Please outline your argument very clearly.
- The string connected to which wheel has greater tension, or do they have the same tension? Please be very clear in supporting your answer.



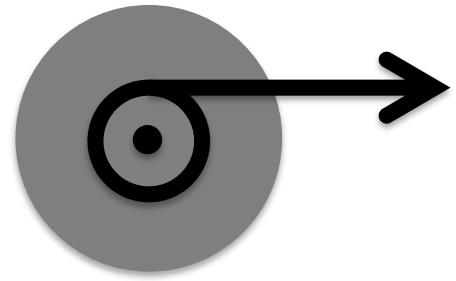
#2 Check out the system at right. The two hanging masses are 1 m from the floor. The force of friction between the 2 kg mass and the surface is 2 N. The string slides with almost no friction over the two wheels shown.



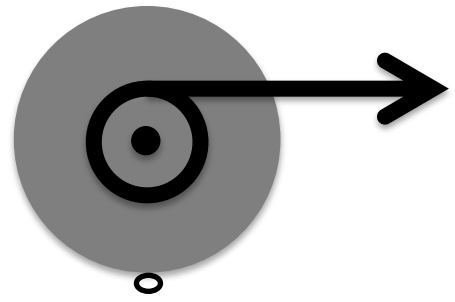
- Make a physically-correct statement about what will happen when I let this system go from rest. Include relevant direction.
- Compare T_3 to T_1 . Provide good reasoning for your answer.
- Find either the acceleration of the system after I let it go, or find the speed of the system just before one of the masses hits the ground.

#3 At right, you see a stationary, 15 kg wheel of radius 2 m that is free to rotate around a low friction bearing at its center. It has a central round hub of radius 60 cm. I wrap a string around the central hub and pull with a tension of 100 N.

- a) What is the angular acceleration of the wheel?
- b) How long does it take for the wheel to be spinning at 3 radians/s?



#4 In the last problem, A large tarantula of mass 40 g is tightly clutching the outside of the rim as shown at the bottom of the ($r = 2\text{m}$, 15 kg) wheel. What is the force that the legs provide to keep the bug on the rim at the rotational velocity of $3/\text{s}$ when in the position shown at right? Clearly explain your answer.



Name _____

By signing below, I testify that I understand everything I wrote on this exam and could reproduce this work if asked to do the problem again.

Signature: _____