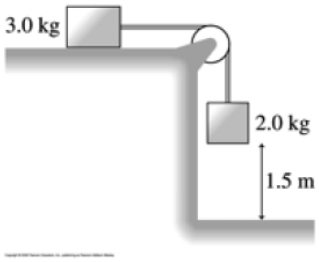
You will be graded on your *COMMUNICATION* of physics understanding

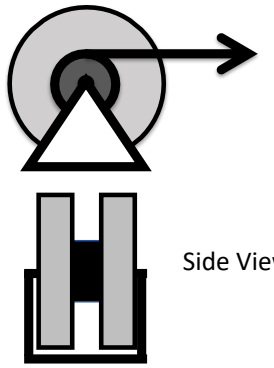


#1 Two objects, one with a mass of 3 kg and the other with a mass of 2 kg, are connected by a light string over a low mass pulley, as shown in the figure at right. A coefficient of friction of 0.20 exists between the horizontal surface and the 3 kg mass. If the system starts at rest,

a) Please calculate the speed of the hanging mass when it hits the floor.
b) Let's say your friend calculates the tension in the string and asks you if you think the answer is correct. You might compare it to some other forces in the problem above. What other force(s) would you compare it to and how should the tension compare?

#2 A yo-yo device is mounted on a stand and I pull on a 2 m string wrapped around the center with a force of 8 N. The wheel starts from rest, has a mass of 2 kg, and center shaft and body radii of 20 cm and 40 cm, respectively.

a) After I pull for 2 seconds, find the wheel's angular velocity.
b) If a bug is on the top of the wheel at that moment (2 seconds), find the bug's acceleration, indicating the correct x and y directions.
c) Find the power I am putting into the yo-yo at t = 2 s.

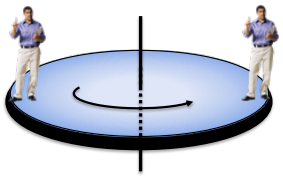


Side View

#3 A satellite in a circular orbit around a planet is moved to a lower orbit, half as far from the planet's center: R => ½ R_o *Clearly Explain Both Answers Below.*

a) By what factor did the gravitational attraction to the planet change: F => ___F_o
b) By what factor did the satellite's speed change: v => ___v_o

#4 A playground carousel is an 80 kg uniform flat disk (r = 2 m) on a freely rotating axis. Two kids, each of mass 20 kg are standing on the top opposite edges of the carousel.



a) Both kids decide that they don't want to be moving anymore, so they begin running in the opposite direction of the carousel's rotation such that they are no longer moving with respect to the ground. When they start running, does the rotational speed of the carousel change? If not, how do you know? If so, does it increase or decrease and by about what factor?
b) Was kinetic energy conserved in this transition? If so, how do you know? If not, did it increase or decrease and by about what factor – and where did the kinetic energy go or come from?

#5 A uniform plank ***has a mass of 14 kg***, is 8 m long, and is supporting a 10 kg hanging mass as shown. The supporting structures (A and B) are bolted onto the plank and are located 1 m and 2 m from the right edge where the 10 kg mass is attached. Find the forces (*and include direction*) that each support supplies.

F_A = _____(state force and direction)

F_B= _____ (state force and direction)

Name _____