

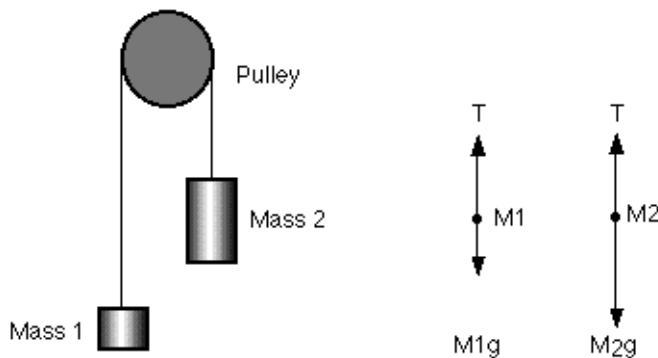
PHYS 301

HOMEWORK #9

Due : 13 Nov. 2014

Please be sure that you show clear and complete work for all problems. Explicitly show the equations you are solving, and present your logic and mode of solution clearly.

1. Consider the figure below :



Two masses are suspended by a massless, inextensible string around a massless, frictionless pulley. Assume Mass 2 > Mass 1. (Ignore the free body diagrams to the right; we will not use forces in this problem). Assume Mass 1 starts on the ground, and Mass 2 is initially a distance d above the ground. If the system is started from rest, use energy conservation principles to show that the speed of the masses just before Mass 2 strikes the ground is :

$$v = \sqrt{\frac{2(m_2 - m_1)gd}{(m_1 + m_2)}}$$

Problems from the book (these are all from the problems section) :

2. No. 52, p. 225

3. No. 48, p. 225.

4. No. 44, p. 225.

5. No. 60, p. 226

6. No. 106, p. 230

7. Consider figure 7.47 on p. 228. If the loop has a radius R , determine the minimum starting height H above the ground so that the car can complete the loop without losing contact with the track.

8. Conceptual question 6 on p. 258. The same reasoning applies to why you bend your knees when

you land after jumping off from a height.

9. Consider two bullets of equal size and mass. One bullet is made of rubber, the other of steel. They are fired at identical metal cans. The rubber bullet bounces off the can, the steel bullet goes through the can and emerges from the opposite side. Which bullet exerted more force on the can?