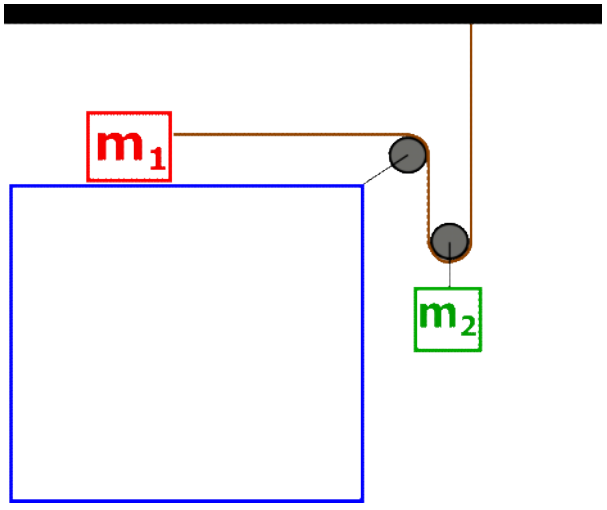
HIP 05

COMMENTS:

- Problem 1 will be graded based off of the HIP rubric.
- Problem 2 is a list of suggested Student Workbook Volume 1 problems to practice in your spare time. You do not need to turn these in, they will not be graded.

(1) This week's homework is a slight variation of what we did in lab. Up to this point we looked at pulleys as basically redirecting the direction that the tension acts in, while also keeping the magnitude of tension the same throughout the entire string. For this problem, we will still assume that the string is massless and the pulley(s) is frictionless and massless so the consequences of those approximations are still valid. However, you will hopefully discover that pulleys can be used in a clever fashion to adjust the "geometrical" properties of a device.

Consider the figure below.



a. Draw 2 FBDs (one for each mass). Label each force vector clearly so that there is no doubt what you mean by any/all symbols. Be sure to properly scale your FBDs.
b. Carefully examine each mass and pulley. As m_2 moves downward by 1 meter, how far across the table does m_1 move?
c. Based off of your answer to part b, how do the magnitude of accelerations for each mass compare to each other? Quantify this comparison (e.g. $a_1 = a_2$ or $a_1 = 1.5\, a_2$ or …)
d. Let $m_1 = 7.0$ kg and $m_2 = 3.0$ kg. Find the acceleration of each mass. I highly recommend using all variables until you get an expression for the accelerations. Then plug in numbers.
e. Enhancement. (Think FBDs, pulleys, Newton's 2nd law, etc…)

(2) CH 4: 2, 3, 9, 10, 11, 12, 13, 14, 16, 26, 27
CH 5: 1, 2, 3, 7, 8, 9, 13, 14, 15