

Physics 141

Problem Set 8

Due Monday, Nov. 24 (hand in in class).

Monday, Nov. 17, 2008

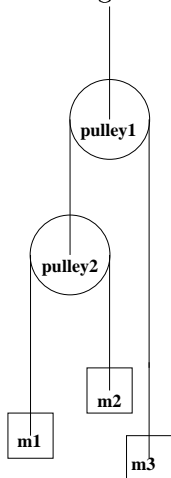
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Reading for Monday, Nov.24: K&K: Chapter 7 Rigid Body Motion, Sections 7.1-7.7.6
Please read these with a pencil or pen in hand, taking notes. This chapter is long and thought-provoking, and so please allow lots of time- it cannot be read in a single sitting. You may want to discuss the reading section-by-section in your study group.
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Study Groups You are **strongly** encouraged to discuss the problems in a study group to save time. However, the work you hand in has to be your own- you must **NEVER** copy anybody else's work! (grounds for severing your connection).
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Problem Solving: Please always work in symbols and only plug numbers in at the end where and if required. In general you should start by drawing a careful picture, with labelled axes. This is a problem set that will be much easier if you talk through each problem with your study group before starting (draw a picture).
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1. Two weights of 10 kg each hang from a string that is draped over a pulley, with one weight on each side. The pulley in turn hangs from a second string that is draped over a second pulley, connected on the other side to a third weight (see picture). Ignore the masses of the string and pulleys.



- (a) Draw a coordinate system with labeled coordinates for weights and the moveable pulley (please draw it nicely- clear, well-labeled,etc.)
 - (b) Write the equation for the length of the first string in terms of the coordinates of the 2 weights tied to it.
 - (c) Write the equation for the length of the second string in terms of the coordinates of the weight and pulley tied to it.
 - (d) Find the equations of constraint on the accelerations by differentiating the equations of constraint on the positions of the weights.
 - (e) Set up the equations of motion for the 3 weights and the moveable pulley.
2. **Conservation Laws** K&K Chapter 6, Problem 6.39 (over)

3. **Grist for the Mill** K&K Chapter 7, Problem 7.4
4. **Change** K&K Chapter 7, Problem 7.6
5. **Bicycles** K&K Chapter 7, Problem 7.9
6. **I the Tensor** K&K Chapter 7, Problem 7.11

