Phys 320 Assignment 9  
due by Wednesday, October 28, 2009

1. Chapter 7, problems 1,2,3,4,8,15,20,21,22,24,27,29,35,41 (14 problems total)

Hints:

1. P7.4 - the wording in the book is unnecessarily confusing; set up the problem as you normally would, with y being parallel to the slope and x perpendicular. The length of the slope is unknown, so it is easiest to take $U = 0$ at the starting point of the block.

2. P7.8 - it will help to find the time derivative of the position of the center of mass

3. P7.20 - in problems like this one, recall that coordinates ($r, \theta, \phi$) are orthogonal and the particle can have a component of velocity in each coordinate unless a constraint exists

4. P7.22 - break this into $x$ and $y$ components of velocity. The $y$ component has two contributions, one from the swing of the pendulum, and one from the motion of the pivot point of the pendulum. Do not just write down that the effective gravity $g_{eff} = g + a$ and solve trivially.

5. P7.24 - explain in words what the mathematical expressions for force and momentum tell us

6. P7.27 - think about the location of the center of mass of the three blocks

7. P7.29 - read my hint for P7.35

8. P7.35 - the rectangular coordinates of the position of the bead are given by $\vec{r}(x, y) = (R \cos \theta + R \cos(\theta + \phi), R \sin \theta + R \sin(\theta + \phi))$. Draw an excellent diagram to prove this statement true. Find the velocities of the $x$ and $y$ components by differentiating the position vector.

9. P7.41 - read my hint about P7.20

Grading

- You can share concepts, but all work must be completely original
- Write neatly and legibly
- Line up equal signs in a straight vertical column, and never have more than one equal sign on a line
- Define all non-standard variables
- Do not skip essential lines of algebra
- Develop ideas logically from start to finish
- Include a statement at the end of each problem interpreting the result
- Label your diagrams; all plots must be computer plots
- Take pride in your work
- All assignments are weighted equally