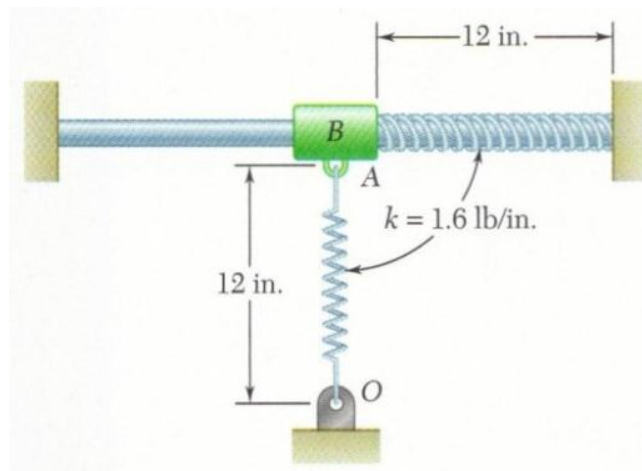


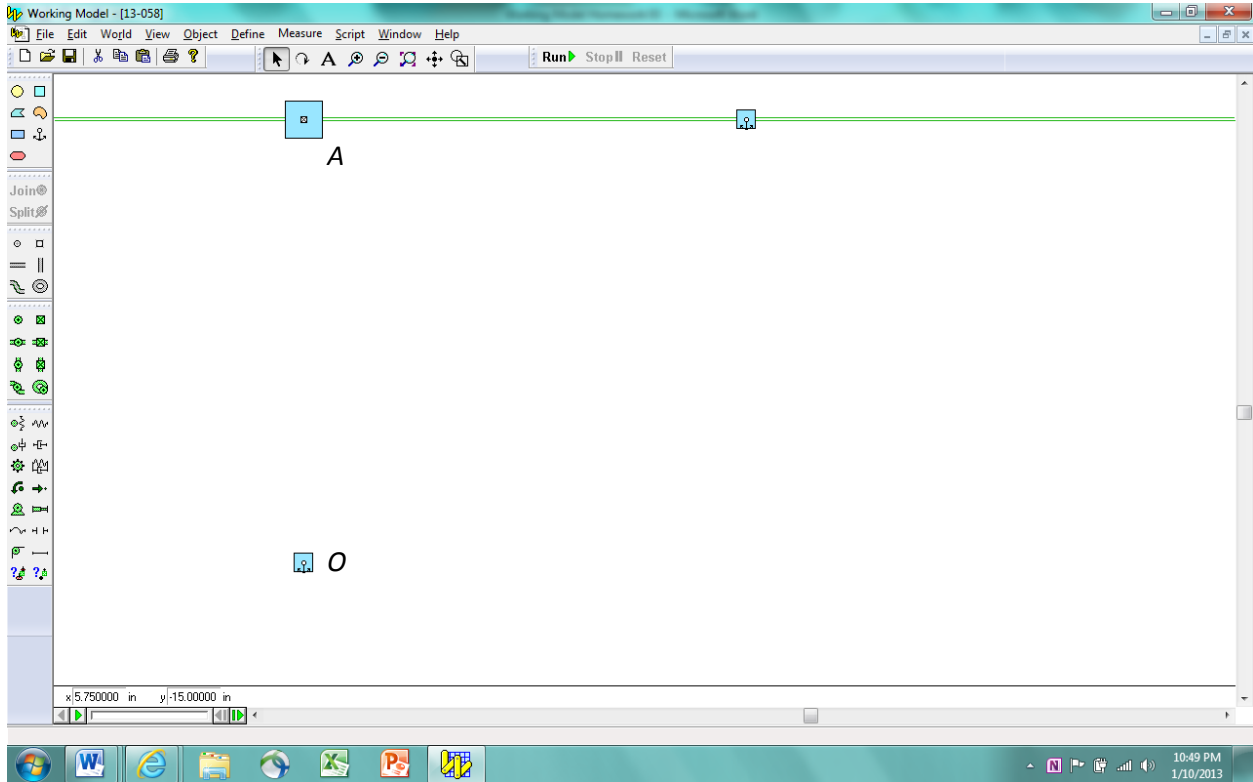
## ME 2210 Dynamics: Working Model Homework 03

### Conservation of Energy Equation: Problem 13-058 from the Handouts

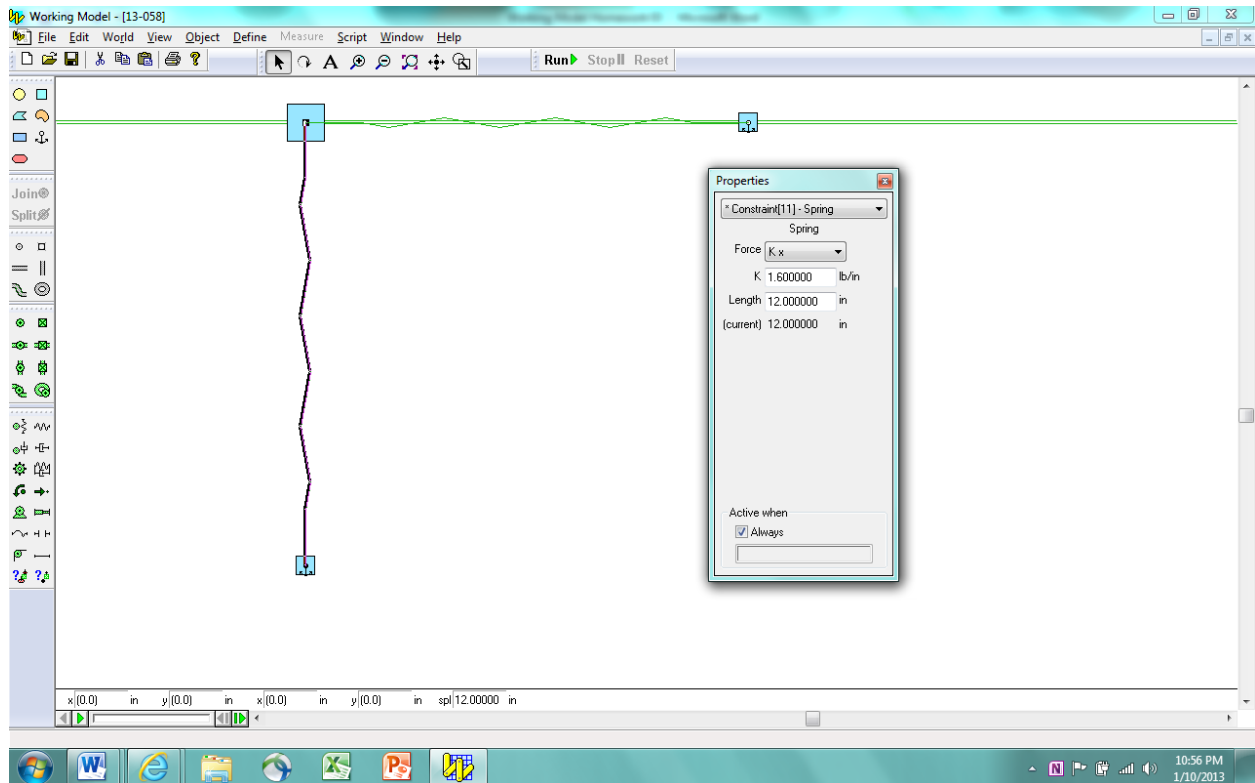
- 13.58** A 10-lb collar  $B$  can slide without friction along a horizontal rod and is in equilibrium at  $A$  when it is pushed 5 in. to the right and released. The undeformed length of each spring is 12 in. and the constant of each spring is  $k = 1.6$  lb/in. Determine (a) the maximum speed of the collar (b) the maximum acceleration of the collar.



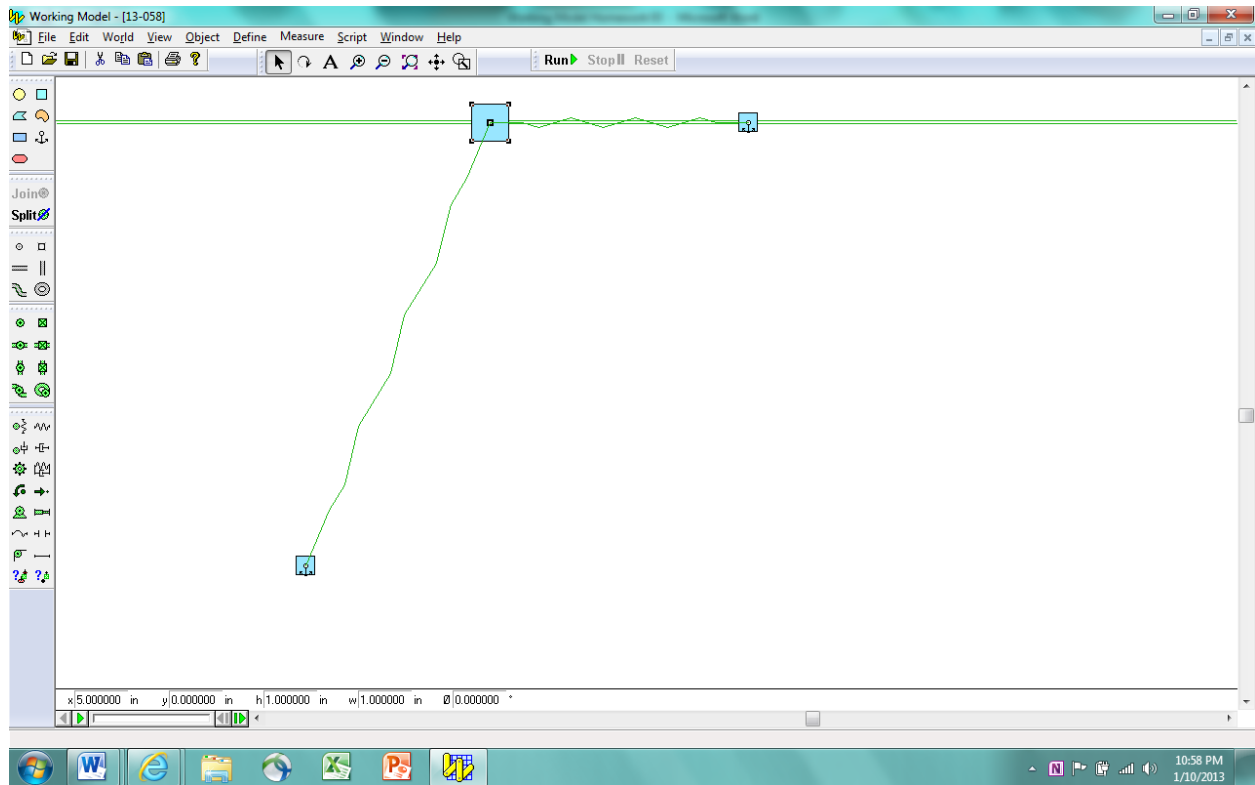
Open Working Model. Go to the View Tab/Numbers-and-Units and change the Unit System to English (pounds). Create a 10-lb block and locate it at  $x = 0$  and  $y = 0$ . Use the Horizontal Keyed Slot Joint at the center of the block. Place and anchor small blocks at point  $O$  and to the right of point  $A$  as shown below.



Use the Spring Tool and place springs as shown below. Change the spring constant of the springs using the Properties Window for each spring. Note that the spring force is defaulted to be  $F = kx$ , but other nonlinear choices can be made using the drop-down menu.



Move the block to  $x = 5.0$  inches, thereby compressing the horizontal spring. Use the type-in boxes to set the value of the location to exactly  $x = 5.0$  inches.



Place graphs on the panel to measure the x-direction velocity and acceleration. Run the simulation and note the values. If the simulation runs too quickly, go to the World Tab/Accuracy and change the Animation Step size. Place your name onto the panel using the Text Tool. Take a screenshot of your simulation and place it in the Dropbox Folder entitled, "myname WM Homework 03". Save your simulation for your records.

Answer: Notice that the velocity and acceleration are out of phase by  $90^\circ$ .

