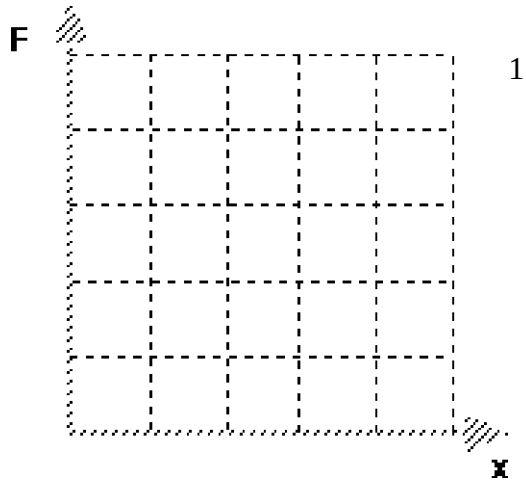
Name_____ / 43 **Date** _____ **Pd**____

PreQuiz Unit 6: Work and Energy Hooke's Law and U_S

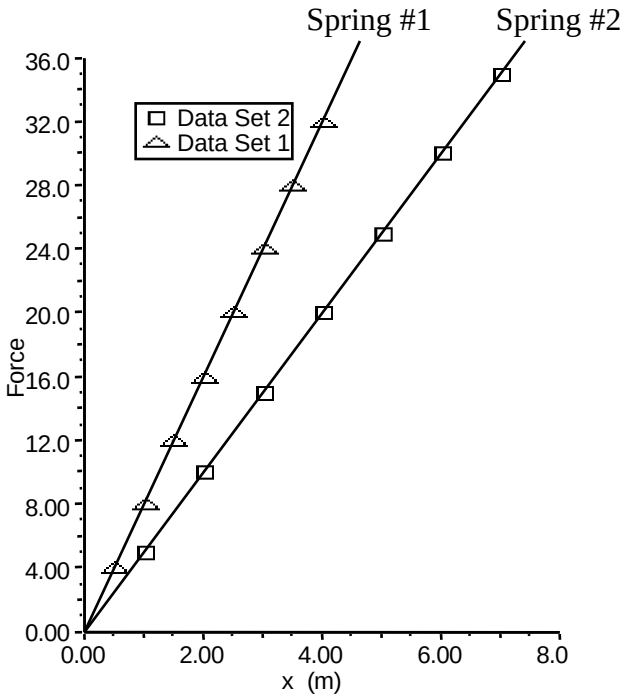
Suppose in the lab one group found that $F = 1000\frac{N}{m}(\Delta x)$. Construct a graphical representation of force vs. displacement. (Hint: make the maximum displacement 0.25 m.)



1. Graphically determine the amount of energy stored while stretching the spring described above from x = 0 to x = 10 cm (3 pts)

2. Graphically determine the amount of energy stored while stretching the spring described above from x = 15 to x = 25 cm. (3 pts)

The graph at left was made from data collected during an investigation of the relationship between the amount two different springs stretched, when different forces were applied.



3. For each spring determine the spring constant.(3pts)

4.For each spring, compare:

a. the amount of force required to stretch the spring 3.0 m. (3pts)

b.the U_S stored in each spring when stretched 3.0 m. (3pts)

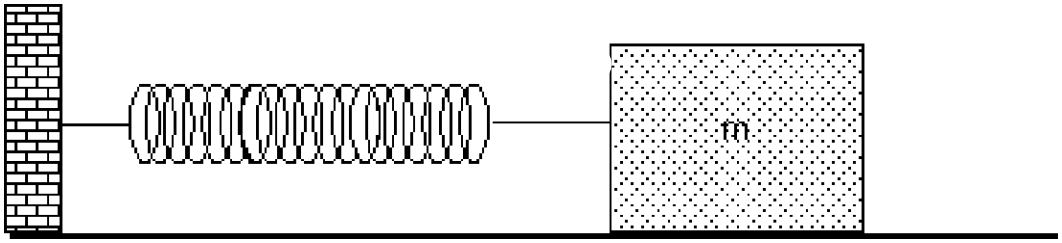
5. Determine the amount that spring 2 needs to be stretched in order to store 24 joules of energy.(2pts)

6. You have two springs that are identical except that spring #1 is stiffer than spring #2 ($k_1 > k_2$). On which spring is more work done? Explain!

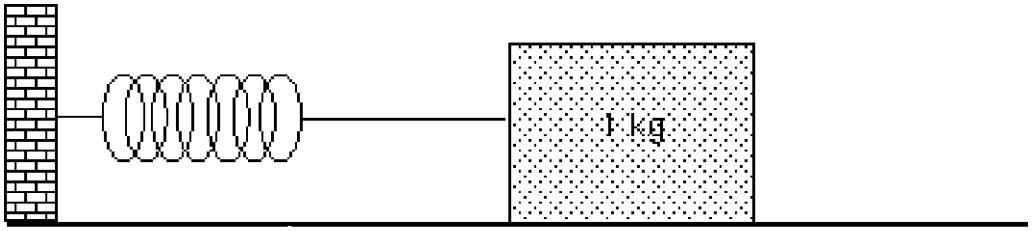
a) if they are stretched using the same force? (4 pts)

b) if they are stretched the same distance? (4 pts)

7. The spring below has a spring constant of 10. N/m. If the block is pulled 0.30 m horizontally to the right, and held motionless, what force does the spring exert on the block? Sketch a force diagram for the mass as you hold it still. (Assume a frictionless surface.) (3 pts)



8. The spring below has a spring constant of 20. N/m. The μ_s between the box and the surface is 0.40.



a. The box is pushed to the right, then released. Once released, the box remains in place; in other words, it doesn't return to the equilibrium position where the force of the spring is zero. Draw a force diagram for the box above when the spring is stretched, yet the box is stationary.(2pts)

b. What is the maximum distance that the spring can be stretched from equilibrium before the box begins to slide back?(3 pts)

9.

a) A spring is stretched from a rest length of 25 cm to a length of 30 cm. A certain amount of energy, U_{S1}, is stored. The spring is then stretched from 30 to 35 cm. How does the new amount of energy stored compare to U_{S1}? (4 pts)

b) A block is raised from the ground to a height H and now contains a certain amount of energy U_{g1}. The box is then raised to a height of 2H. How does the new amount of energy stored compare to U_{g1}? ($-W_g=\Delta U_g$ so $Ug=mgh$) (3 pts)

c) An object is moving with speed v and contains a certain amount of energy K1. The speed is increased to 2v. How does the new amount of energy stored compare to K1?(3 pts)

Answers

1) 5J 2) 20 J 3) k_1 = 5 N/m, k_2 = 5 N/m 4a) 24 N/ 15 N b) 36J / 22.5J 5) 3.10m
7) -3N 8b) 0.20m 9a) 3 x more b) 2x more c) 4x more