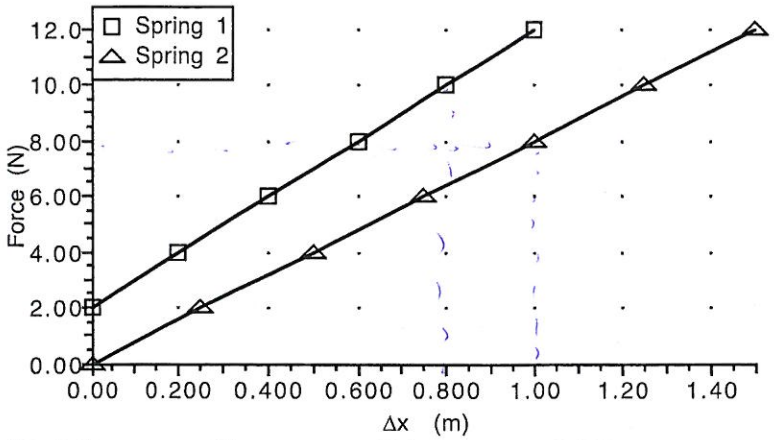
Name key

Date _____ Pd____

Unit VII: Review

The following data were collected for two springs:



Statistics:	Slope	Y Intercept	C.O.R.
Spring 1	10.0±1.46E-18	2.00±8.85E-19	1.00
Spring 2	8.00±0.00	0.00±0.00	1.00

Hookes law = $F = -k\Delta x$

$PE = \frac{1}{2}kx^2$

$Fd = \Delta K$

ΔK = change in kinetic energy

1. What are the spring constants of springs 1 and 2? slope find points

Spring 1: $\Delta x = .8m$ $k = 10$ $F = 8N$ $8 = -k \cdot 8$

Spring 2: $\Delta x = 1m$ $k = 8$ $F = 8N$ $8 = -k1$

2. How much elastic potential energy would be stored if spring 2 were stretched from 0 to 0.40 meters?

$k = 8$ $x = .4$ $PE = ?$

$PE = \frac{1}{2}8 \cdot .4^2$

$PE = .64J$

3. How much additional energy would spring 2 store if stretched from 0.40 to 0.80 m?

$k = 8$ $x = .8$ $PE = ?$

$PE = \frac{1}{2}8 \cdot .8^2$

$PE = 2.56J$

$2.56 - .64 = 1.92$

additional energy is 1.92J

4. A 1000 kg car is traveling at a constant speed of 30 m/s.

a. How much energy is dissipated as the car comes to rest?

$KE = \frac{1}{2}mv^2$

$KE = \frac{1}{2}1000 \cdot 30^2 = 450{,}000J$

b. If the car stops in 100 meters, what is the average force applied to the car?

$Fd = \Delta K$ $F = \frac{\Delta K}{d} = \frac{450{,}000}{100} = 4{,}500N$

5. A 1.5 kg kitten jumps down from a 2.0 meter high fence.

   a. What is the kitten's E_g?

   b. What will be the kitten's speed when it reaches the ground?

6. A 50. g dart rests up against a spring that has been compressed 0.050 meters.

   .05 kg

   a. If 1.25 J of work were required to compress the spring, what is its spring constant?

   $PE = \frac{1}{2}kx^2$ $\quad 1.25 = \frac{1}{2}k(.05^2)$

   $PE = 1.25J$

   $x = .05m$ $\quad 1,000 = k$

   b. What is the maximum velocity of the dart after the spring has transferred its energy to it?

   $KE = \frac{1}{2}mv^2$ $\quad 1.25 = \frac{1}{2}(.05)v^2$

   $KE = 1.25J$

   $m = .05kg$ $\quad 7.07 m/s = V$

   c. If the dart were fired vertically, what height would it reach?

   $PE = mgh$

   $PE = 1.25J$ $\quad g = 9.8 m/s^2$ $\quad \frac{1.25}{.05 \times 9.8} = h = 2.55m$

   $m = .05kg$

   d. Draw an energy bar graph for the above situation when the dart reaches a height of 1 m. Include a graph for both the initial (y = 0m) and final states.