Name _____ Date _____ Period _____

ZornScience
zornscience.org

Elastic Potential Energy

Physics

Part A: Springs and Stiffness

1. Spring A has k = 200 N/m. Spring B has k = 800 N/m.

a. Which spring is stiffer? Which one takes more force to stretch 0.10 m?

b. Spring A is stretched 0.10 m, then 0.20 m. By what factor does the force change? By what factor does the stored energy change? Explain.

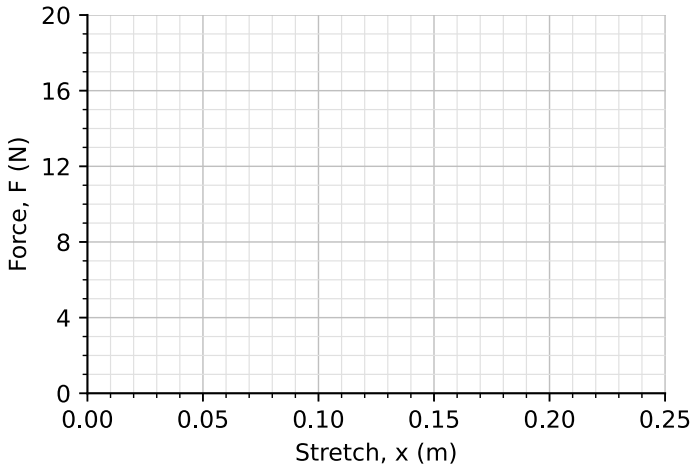
c. Does squeezing spring A 0.10 m store more, less, or the same energy as stretching it 0.10 m?

Part B: Finding *k* from a Graph

Jamal hangs weights on a spring and measures the stretch. Use his data for problems 2 and 3.

2. Plot Jamal's data on the grid. Draw one straight trend line of best fit through the origin. Then find the slope of your line and use it to state the spring constant k, with units.

Stretch (m)	Force (N)
0.00	0.0
0.05	4.1
0.10	7.9
0.15	12.0
0.20	16.0



3. Shade the area under your line from x = 0 to x = 0.20 m. Calculate this area, with units. Then check it using $PE_e = \frac{1}{2}kx^2$. What does the area represent?

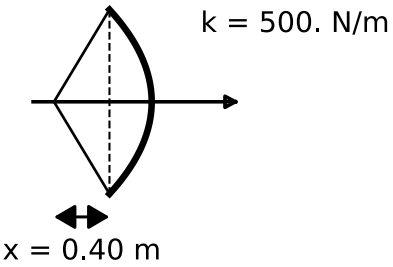
CC BY-NC-SA 4.0

Part C: Calculations

Show knowns, equation, substitution with units, and answer.

4. A car's suspension spring has k = 30,000 N/m. When a 1,500 N load is placed on it, how far does the spring compress? How much elastic potential energy does it store?

5. Priya draws back an archery bow as shown. Treat the bow like a spring.



a. How much force does she need to hold the string back?

b. How much elastic potential energy is stored in the bow?

6. A pinball launcher spring has k = 1,600 N/m. How far must it be pulled back to store 8.0 J?

7. An exercise resistance band stores 50. J when it is stretched 0.50 m. What is its spring constant?

CC BY-NC-SA 4.0