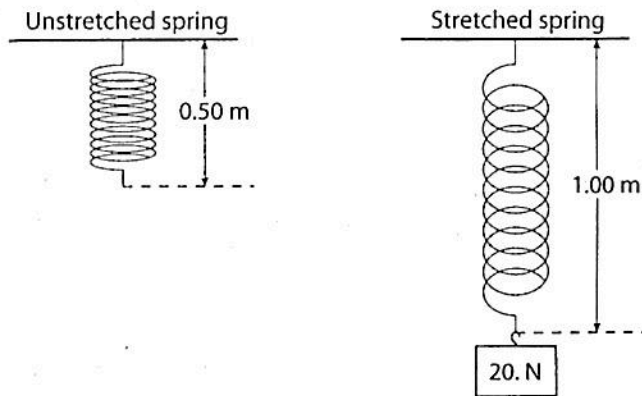


ELASTIC POTENTIAL ENERGY

Name: _____

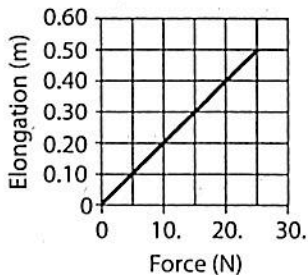
42. A 20.-newton weight is attached to a spring causing it to stretch, as shown in the diagram below.



What is the spring constant of this spring?

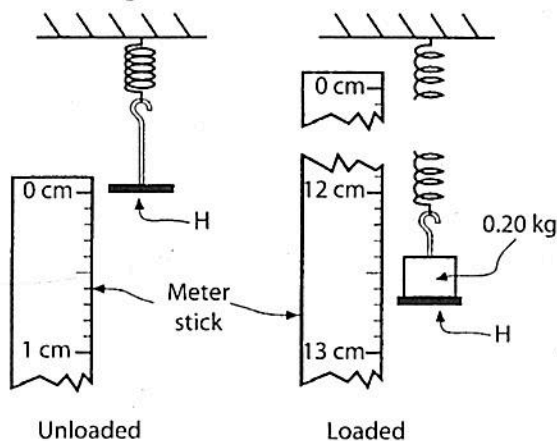
- (1) 0.050 N/m (3) 20. N/m
 (2) 0.25 N/m (4) 40. N/m
43. The graph below shows the relationship between the elongation of a spring and the force applied to the spring causing it to stretch.

Elongation vs. Applied Force



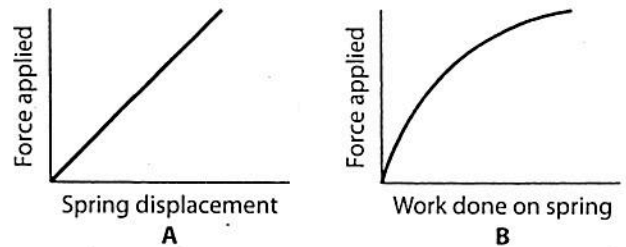
What is the spring constant for this spring?

- (1) 0.020 N/m (3) 25 N/m
 (2) 2.0 N/m (4) 50. N/m
44. A mass hanger is attached to a spring, as shown in the diagrams below.



What is the magnitude of the displacement of the mass hanger H after a 0.20-kilogram mass is loaded on it? [Assume the hanger is at rest in both positions.]

45. Graphs A and B represent the results of applying an increasing force to stretch a spring. The spring did not exceed its elastic limit.



The spring constant can be represented by the

- (1) slope of graph A
 (2) slope of graph B
 (3) reciprocal of the slope of graph A
 (4) reciprocal of the slope of graph B
46. Force F is applied to a spring causing it to stretch a distance x . If force $2F$ is applied to the spring and the elasticity of the spring is not exceeded, the spring will stretch a distance
- (1) x (3) $\frac{x}{2}$
 (2) $2x$ (4) $\frac{x}{4}$

47. Which combination of fundamental units can be used to express the elastic potential energy stored in a compressed spring?

- (1) $\text{kg} \cdot \text{m/s}^2$
 (2) $\text{kg} \cdot \text{m}^2/\text{s}$
 (3) $\text{kg} \cdot \text{m}^2/\text{s}^2$
 (4) $\text{kg} \cdot \text{m}^2/\text{s}^3$

48. A force is applied to a spring causing it to stretch. If the applied force is halved, the potential energy stored in the spring will be

- (1) halved
 (2) doubled
 (3) quartered
 (4) quadrupled

49. A vertically hung 0.50-meter-long spring is stretched from its equilibrium position to a length of 1.00 meter by a weight attached to the spring. If 15 joules of elastic potential energy are stored in the spring, what is the value of the spring constant?

- (1) 30. N/m
 (2) 60. N/m
 (3) 120 N/m
 (4) 240 N/m

50. A spring has a spring constant of 120 newtons per meter. Calculate the elastic potential energy stored in the spring when it is stretched 2.0 centimeters.

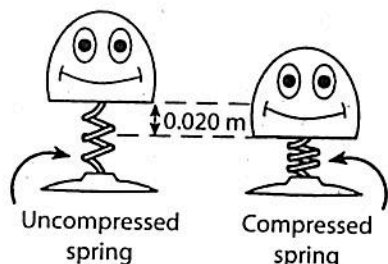
51. A force of 0.2 newton is needed to compress a spring a distance of 0.02 meter. The potential energy stored in this compressed spring is

- (1) 8×10^{-5} J (3) 2×10^{-5} J
 (2) 2×10^{-3} J (4) 4×10^{-5} J

52. A spring of negligible mass with a spring constant of 2.0×10^2 newtons per meter is stretched 0.20 meter. How much potential energy is stored in the spring?

- (1) 8 J (3) 4 J
 (2) 8.0 J (4) 4.0 J

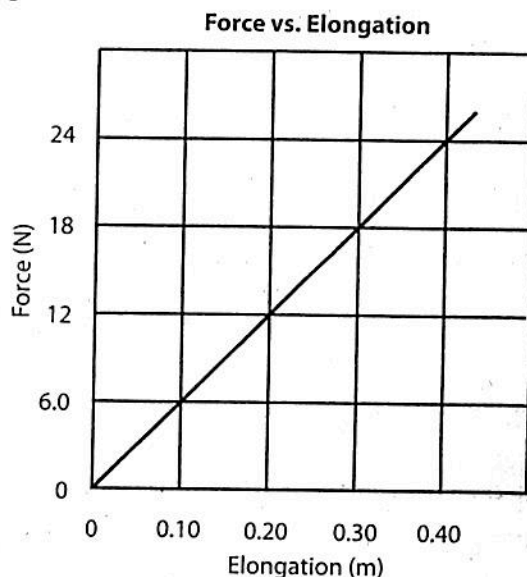
53. In the diagram below, a child compresses the spring in a pop-up toy 0.020 meter.



If the spring has a spring constant of 340 newtons per meter, how much elastic potential energy is being stored in the spring?

- (1) 0.068 J (3) 3.4 J
 (2) 0.14 J (4) 6.8 J

Base your answers to questions 54 through 56 on the graph below, which represents the relationship between the force applied to a spring and its elongation.



54. What is the total work done to stretch the spring 0.40 meter?

- (1) 4.8 J (3) 9.8 J
 (2) 6.0 J (4) 24 J

55. Calculate the spring constant k for the spring.

56. On the grid, sketch a line that represents the relationship between applied force and elongation for a stiffer spring.

Review Questions

39. A spring has a spring constant of 25 newtons per meter. Calculate the magnitude of the minimum force required to stretch the spring 0.25 meter from its equilibrium position.

40. When a spring is stretched 0.200 meter from its equilibrium position, it possesses a potential energy of 10.0 joules. What is the spring constant for this spring?

- (1) 100. N/m (3) 250. N/m
 (2) 125 N/m (4) 500. N/m

41. Which graph best represents the relationship between the force applied to a spring and the elongation of the spring? (Assume the spring's elastic limit has not been reached.)

