Name Answer Key

Honors Physics

Period _____

A

Date _____

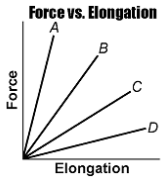
Energy WS #9H

Mrs. Nadworny

Springs

Directions: Read online textbook pages 437 – 442. Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

1. The graph below represents the relationship between the force applied to a spring and spring elongation for four different springs. Which spring has the greatest spring constant?



(A) A (B) B (C) C (D) D

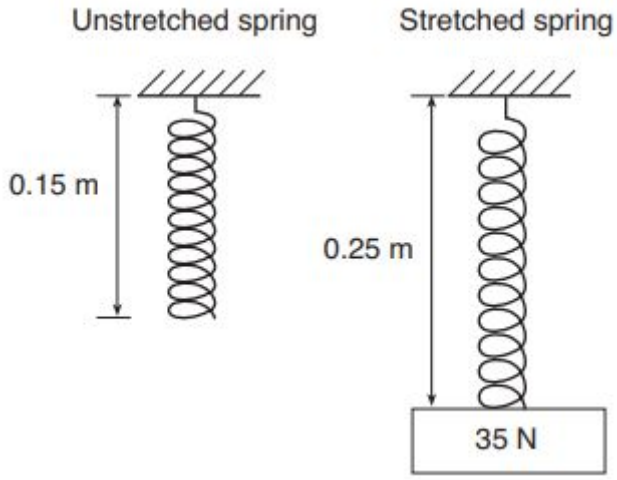
2. A spring has an unstretched length of 0.40 meter. The spring is stretched to a length of 0.60 meter when a 10.-newton weight is hung motionless from one end. The spring constant of this spring is

(A) 10. N/m (B) 17 N/m (C) 25 N/m (D) 50. N/m

3. A vertical spring has a spring constant of 100. newtons per meter. When an object is attached to the bottom of the spring, the spring changes from its unstretched length of 0.50 meter to a length of 0.65 meter. The magnitude of the weight of the attached object is

(A) 1.1 N (B) 15 N (C) 50. N (D) 65 N

4. The diagram below represents a 35-newton block hanging from a vertical spring, causing the spring to elongate from its original length.



Determine the spring constant of the spring.

$$F = kx \qquad k = \frac{F}{x} = \frac{(35\ N)}{0.10\ m} = 350\ N/m$$

Continued on next page

5. Cy Dwoks applies 317 N of force to a spring with a spring constant of 104 N/m. How far does he get it to stretch?

$$x = \frac{F}{k} = \frac{317N}{104\,\frac{N}{m}} = 3.05m$$

6. It takes a force of 24.7 N to hold a spring stretch a distance of 41.9 cm. What is the elastic potential energy of the spring in this position? [Hint: Watch your units!]

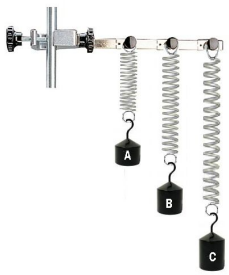
$$k = \frac{F}{x} = \frac{24.7N}{0.419m} = 58.9\,N/m$$

$$PE_{elastic} = \frac{1}{2}kx^2 = \frac{1}{2}(58.9\,N/m)(0.419m)^2 = 5.17J$$

7. The largest meteorite of lunar origin reportedly has a mass of 19.0 grams. If the meteorite produces a compression of 2.24 mm when placed on a spring scale, what is the spring constant of the spring? [Hint: Watch your units!]

$$F = kx \rightarrow k = \frac{F}{x} = \frac{mg}{x} = \frac{(.0190kg)(9.81\,\frac{m}{s^2})}{.00224m} = 83.2\,\frac{N}{m}$$

8. A 0.250 kg mass is attached to a spring which has a spring constant of 35 N/m, as shown. It is pulled down and released so that it bobs up and down. Position A is the mass' highest point. Position C is the mass' lowest point. Position B is the mass' equilibrium position.



a. Where does the mass have the most gravitational potential energy? A

b. Where does the spring have the most elastic potential energy? C

c. Where is the mass traveling the fastest? B

d. Where does the mass have the most kinetic energy? B

e. Calculate the period of the spring.

$$T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{0.250kg}{35}} = 0.53s$$

Answers in size order: 0.53, 3.05, 5.17, 83.2, 350