

1. What is periodic motion?
2. Weights are hung from a spring. When more weight is added, the spring gets longer. Plot the Length of the spring versus the Weight on the spring on a graph. Draw a line through the three points and calculate the slope of the line. The slope is equal to the spring constant for the spring. What is the spring constant for this spring?

Length (meters)	Weight (Newtons)
3	9.3
4	11.8
5	14.3

3. Which spring is easier to stretch: Spring A with a spring constant of 2 N/m or Spring B with a spring constant of 8 N/m?
4. A spring ($k = 1.7 \times 10^3$ N/m) is at equilibrium. When a weight is hung from the spring, the length changes from 2.1 meters to 3.8 meters. What is the restoring force of the spring?
5. You hang a 0.6 kg object from a spring that has a spring constant of 12.4 N/m. How far does the spring stretch?
6. What is simple harmonic motion?
7. A mass-spring system is at equilibrium. When it is displaced, 0.2 meters, the period of its motion is 2 seconds. When it is displaced 0.4 meters, what will the period be?
8. A mass-spring system is displaced from equilibrium by 27.5 cm and then the mass is released.
 - a. What is the amplitude of its motion?
 - b. Where does the mass reach its maximum speed?
 - c. Where does the mass reach its minimum speed?
 - d. Where does the mass have its greatest acceleration?
9. A 5-kg mass bounces on the end of a spring ($k = 1.42$ N/m). What is the period of its motion?
10. A spring has a spring constant of 19.4 N/m.
 - a. Find the period if a 2-kg mass on the spring is displaced 0.5 m.
 - b. Find the period if a 2-kg mass on the spring is displaced 1.0 m.
 - c. Find the period if a 4-kg mass on the spring is displaced 0.5 m.
11. Honors: A 0.8-kg mass is attached to a spring and set into simple harmonic motion. If its period is 3.5 seconds, what is the spring constant?
12. Honors: A mass on a spring ($k = 42$ N/m) oscillates back and forth with a period of 1.6 seconds. What is the object's mass?



13. For a mass-spring system, where is:
- the potential energy the greatest?
 - the kinetic energy the greatest?
 - the potential energy the least?
 - the kinetic energy the least?
14. A spring ($k = 420 \text{ N/m}$) has a 5-kg mass attached. The spring is stretch 0.4 m, then released.
- What is the maximum potential energy of the system?
 - What is the potential energy when the mass is 0.1 m from equilibrium?
 - What is the kinetic energy when the mass is 0.1 m from equilibrium?
 - What is the speed of the mass when it is 0.1 m from equilibrium?
15. A spring ($k = 8900 \text{ N/m}$) has a 16-kg mass attached. The spring is compressed 0.37 m, then released. If the mass moves in simple harmonic motion, what is its speed when it is 0.11 m from equilibrium?
16. A 60-kg mass on a spring is moving in simple harmonic motion. If its amplitude is 0.25 m and the maximum speed of the block is 4 m/s, what is the spring constant?
17. When does a pendulum move with simple harmonic motion?
18. If a pendulum's period is measured on the earth and on the moon, where will its period be the longest? Explain why.
19. The clock pendulum in Big Ben in London is 3.9 m long. What is the period of the pendulum?
20. The world's largest clock pendulum in Tokyo has a period of 6 seconds. How long is its pendulum?
21. Honors: On planet Boingo, a 5-meter pendulum has a period of 12 seconds. What is the acceleration due to gravity on planet Boingo?
22. Honors: What is a Foucault pendulum? What does it demonstrate?

