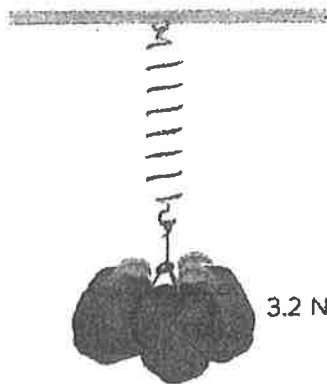


1. What is the difference between frequency and period? How are they related?

2. Does the period of a pendulum depend on the mass of the bob? The length of the string? The amplitude of oscillation? What else does the period depend on?

3. A spring stretches 0.12 m when some apples are suspended from it, as shown. What is the spring constant of the spring?



4. A spring with a spring constant of 27 N/m is stretched 16 cm. What is the spring's potential energy?

5. **Rocket Launcher** A toy rocket launcher contains a spring with a spring constant of 35 N/m. How far must the spring be compressed to store 1.5 J of energy?

6. How long must a pendulum be to have a period of 2.3 s on the Moon, where  $g = 1.6 \text{ N/kg}$ ?

7. What is the wavelength of a wave?

8. What are the differences among transverse, longitudinal, and surface waves?

9. What is the difference between a wave pulse and a periodic wave?

10. Describe the difference between wave frequency and wave velocity.

11. Describe the relationship between the amplitude of a wave and the energy it carries.

12. **Building Motion** The Willis Tower in Chicago sways back and forth in the wind with a frequency of about 0.12 Hz. What is its period of vibration?

13. **Ocean Waves** An ocean wave has a length of 12.0 m. A wave passes a fixed location every 3.0 s. What is the speed of the wave?

14. The speed of sound in water is 1498 m/s. A sonar signal is sent straight down from a ship at a point just below the water surface, and 1.80 s later the reflected signal is detected. How deep is the water?

15. The wavelength of water waves in a shallow dish is 6.0 cm. The water moves up and down at a rate of 4.8 oscillations/s.

- What is the speed of the waves?
- What is the period of the waves?

16. Water waves in a lake travel 3.4 m in 1.8 s. The period of oscillation is 1.1 s.

- What is the speed of the water waves?
- What is their wavelength?

17. How does a wave pulse reflected from a rigid wall differ from the incident pulse?