Practice Problems

For problems 19–20, see Sample Problem B.

19. Find the length of a pendulum that oscillates with a frequency of 0.16 Hz.

20. A pendulum that moves through its equilibrium position once every 1.000 s is sometimes called a *seconds pendulum.*

- **a.** What is the period of any seconds pendulum?
- **b.** In Cambridge, England, a seconds pendulum is 0.9942 m long. What is the free-fall acceleration in Cambridge?
- **c.** In Tokyo, Japan, a seconds pendulum is 0.9927 m long. What is the free-fall acceleration in Tokyo?

For problem 21, see Sample Problem C.

21. A spring with a spring constant of 1.8×10^2 N/m is attached to a 1.5 kg mass and then set in motion.

- **a.** What is the period of the mass-spring system?
- **b.** What is the frequency of the vibration?

PROPERTIES OF WAVES

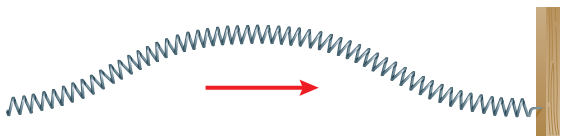
Review Questions

22. What is common to all waves?

23. How do transverse and longitudinal waves differ?

24. The figure below depicts a pulse wave traveling on a spring.

- **a.** In which direction are the particles of the medium vibrating?
- **b.** Is this wave transverse or longitudinal?



25. In a stretched spring, several coils are pinched together and others are spread farther apart than usual. What sort of wave is this?

26. How far does a wave travel in one period?

27. If you shook the end of a rope up and down three times each second, what would be the period of the waves set up in the rope? What would be the frequency?

28. Give three examples of mechanical waves. How are these different from electromagnetic waves, such as light waves?

Conceptual Questions

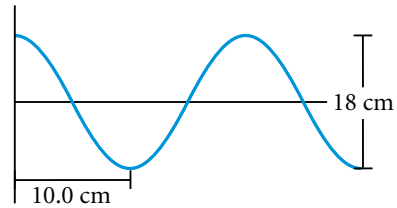
29. How does a single point on a string move as a transverse wave passes by that point?

30. What happens to the wavelength of a wave on a string when the frequency is doubled? What happens to the speed of the wave?

31. Why do sound waves need a medium through which to travel?

32. Two tuning forks with frequencies of 256 Hz and 512 Hz are struck. Which of the sounds will move faster through the air?

33. What is one advantage of transferring energy by electromagnetic waves?



34. A wave traveling in the positive x direction with a frequency of 25.0 Hz is shown in the figure above. Find the following values for this wave:

- **a.** amplitude
- **b.** wavelength
- **c.** period
- **d.** speed

Practice Problems

For problem 35, see Sample Problem D.

35. Microwaves travel at the speed of light, 3.00×10^8 m/s. When the frequency of microwaves is 9.00×10^9 Hz, what is their wavelength?