ch 16 waves

Chapter 16: Wave Motion

Conceptual problems

16.C.1 (5.00) Many children are lined up at an ice cream stand. If the child at the back pushes the child in front of him, and she in turn pushes the child in front of her, and so on, will they create a transverse or longitudinal wave in the line? Explain.

- ○ Transverse
- ○ Longitudinal

16.C.2 (5.00) When sports spectators do "the wave," are they making a transverse or longitudinal wave? Explain.

- ○ Transverse
- ○ Longitudinal

16.C.3 (5.00) Suppose a wave is moving along a chain at 10 m/s. Does that mean each link of the chain moves at 10 m/s? Explain.

- ○ Yes ○ No

16.C.4 (5.00) A wave is traveling through a particular medium. The wave source is then modified so that it now emits waves at a higher frequency. Does the wavelength increase, decrease, stay the same, or does it depend on other factors? Explain.

16.C.5 (5.00) Radio waves all travel through space at the same speed. If an AM station broadcasts at a frequency 7×10^5 Hz and an FM station broadcasts at 90.3×10^6 Hz, which station's radio waves have the longer wavelength? Explain.

16.C.6 (5.00) You have two strings of different linear densities tied together and stretched end-to-end between a pair of supports. What happens to the speed of a wave that passes from the more dense string to the less dense one?

16.C.7 (7.00) Waves of identical frequency and amplitude are simultaneously launched down two identical wires of equal mass and length, although one wire is tauter than the other. Which wave will arrive at the other end first, or will they arrive at the same time?

16.C.8 (5.00) Earthquake waves in the substance of our planet occur in two types: P waves, which are longitudinal waves, and S waves, which are transverse waves. In seismology, P and S usually stand for primary and secondary. Explain how either of the following could also be valid associations of the letters P and S. (a) P is for push-pull waves, S is for sideways waves. (b) P is for pressure waves, S is for shearing waves.

(a)

(b)

Section 0: Introduction

16.0.1 (5.00) Use the simulation in the interactive problem in Section 16.0 to answer the following questions. (a) Does changing the frequency of a wave in the simulation change its wavelength? (b) Does changing the frequency of a wave in the simulation change its amplitude? (c) Does changing the amplitude in the simulation cause the the wave to move noticeably faster or slower down the

string?

(a) ◯ Yes ◯ No
(b) ◯ Yes ◯ No
(c) ◯ Yes ◯ No

Section 4: Amplitude

16.4.1 **(5.00)** What is the amplitude of the wave that is shown? Enter the answer using two significant figures.

_____ m

Section 5: Wavelength

16.5.1 **(5.00)** What is the wavelength of the wave that is shown? Enter the answer using two significant figures.

_____ m

Section 6: Period and frequency

16.6.1 **(5.00)** A wave has a frequency of *f* Hz. What is its period?

_____ s

16.6.2 If 12 wave crests pass you in *t* seconds as you bob in the ocean, what is the

(5.00) frequency of the waves?

Hz

Section 7: Wave speed

16.7.1 **(5.00)** An important wavelength of radiation used in radio astronomy is 21.1 cm. (This wavelength of radiation is emitted by excited neutral hydrogen atoms.) This radiation travels at the speed of light, 3.00×10^8 m/s. Compute the frequency of this radio wave.

Hz

16.7.2 **(5.00)** A wave has a speed of 351 m/s and a wavelength of *lambda* meters. What is its period?

s

Section 8: Wave speed in a string

16.8.1 **(5.00)** A wave is traveling through a *L*-meter-long cable strung with a tension of 35,000 newtons. The mass of this length of cable is 10.2 kilograms. What is the speed of a wave that is traveling in the cable?

m/s

Section 11: Mathematical description of a wave

16.11.2 **(5.00)** A wave is defined by the equation $y = 2.1 \sin (4.2\pi x + 6.4\pi t)$. Time is measured in seconds and lengths are in meters. What are the wave's (a) direction of motion; (b) amplitude; (c) wavelength; (d) frequency?

(a)

(b) m

(c) m

(d) Hz

Back to assignments list

Current server time is: 2008-02-17 16:33