Name _____ Date _____

Properties of Waves: Wavelength, Frequency, Amplitude and Wave Speed Calculations

Directions: In number questions, type only the number; the unit is shown next to the box. Every calculation question gives you the formula you need.

1. These terms describe a smooth, repeating wave traveling along a rope. Match each term to its meaning.

Write the letter of the matching answer on each line.

1. _____ Crest
2. _____ Trough
3. _____ Wavelength
4. _____ Amplitude
5. _____ Frequency

A. The distance from a crest down to a trough

B. The time it takes one whole wave to pass a point

C. The number of waves that pass a point each second

D. The distance from one crest to the next crest

E. A low point of the wave

F. The distance from the rope's resting position up to a crest

G. A high point of the wave

2. Wave speed = frequency × wavelength. A student shakes one end of a long jump rope, sending 2 waves along it each second, a frequency of 2 hertz. Each wave is 3 meters long. What is the speed of the waves?

_____ m/s

3. Frequency = wave speed ÷ wavelength. A wave travels along a long, tight rope at 12 meters per second, and its wavelength is 4 meters. What is its frequency?

_____ Hz

4. Two sounds, one at 200 hertz and one at 2,000 hertz, start at the same moment from the same speaker and travel through the same room's air. Which one reaches a listener across the room first?

A. The louder sound, no matter which frequency it has

B. They arrive at the same time, because in the same air, sounds of different frequencies travel at the same speed

C. The 2,000-hertz sound, because higher-frequency waves travel faster

D. The 200-hertz sound, because longer waves travel faster

5. A guitarist plays a higher note, and its sound travels through the same air as before, at the same speed. Compared with the lower note, what is different about the higher note's sound wave?

A. It has a larger amplitude, but the same frequency.

B. It has a lower frequency and a shorter wavelength.

C. It has a higher frequency and a longer wavelength.

D. It has a higher frequency and a shorter wavelength.

6. Wavelength = wave speed ÷ frequency. Sound travels through air at 20 °C at about 343 meters per second. Using 343 meters per second, what is the wavelength of a low bass note with a frequency of 49 hertz?

_____ m

7. Maya turns up the volume on a speaker that keeps playing the same note. Which property of the sound wave increases?

A. Its wavelength

B. Its amplitude

C. Its speed through the air

D. Its frequency

8. Wavelength = wave speed ÷ frequency. Sound travels through fresh water at 20 °C at about 1,480 meters per second. Using 1,480 meters per second, what is the wavelength of a 740-hertz sound in a lake?

_____ m

9. Far out in space, a small rock smashes into a satellite with a bright flash. An astronaut floating nearby, not touching anything, sees the flash but hears no sound. Why?

A. Both light and sound need air, but light is too fast to stop.

B. Sound needs matter to travel through, and space has almost none, but light can travel through empty space.

C. Sound travels so slowly in space that it has not arrived yet.

D. The sound was too high-pitched for the astronaut to hear.

10. A rubber duck floats on a calm pond on a windless day while a series of small waves passes underneath it. What happens to the duck as the waves go by?

A. It bobs up and down in about the same spot, because the wave carries energy forward, not the water itself.

B. It sinks, because the waves push it under.

C. It stays perfectly still, because waves move only deep underwater.

D. It moves along with each wave at the wave's speed until it reaches the shore.