

## Wave Speed

Read from Lesson 2 of the Waves chapter at The Physics Classroom:

<http://www.physicsclassroom.com/Class/waves/u10l2d.html>  
<http://www.physicsclassroom.com/Class/waves/u10l2e.html>

**MOP Connection:** Waves: sublevels 3 and 4

1. A physics teacher attaches a slinky to the wall and begins introducing pulses with different amplitude. Which of the two pulses below will take the least amount of time to reach the wall?



Justify your answer:

2. The physics teacher then begins introducing pulses with a different wavelength. Which of the two pulses below will take the least amount of time to reach the wall?



Justify your answer:

3. Stan and Anna are conducting a slinky experiment. They are studying the possible effect of several variables upon the speed of a wave in a slinky. Their data table is shown below. Fill in the blanks in the table, analyze the data, and answer the following questions.

Medium	Wavelength	Frequency	Speed
Zinc, 1-in. dia. coils	1.75 m	2.0 Hz	
Zinc, 1-in. dia. coils	0.90 m	3.9 Hz	
Copper, 1-in. dia. coils	1.19 m	2.1 Hz	
Copper, 1-in. dia. coils	0.60 m	4.2 Hz	
Zinc, 3-in. dia. coils	1.82 m	2.2 Hz	
Zinc, 3-in. dia. coils	0.95 m	4.2 Hz	

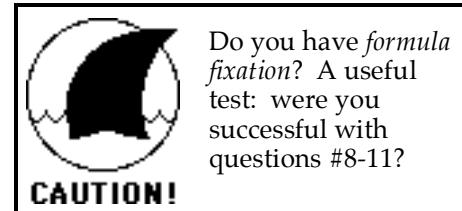
## Wave Basics

4. As the wavelength of a wave in a uniform medium increases, its speed will \_\_\_\_.  
a. decrease                      b. increase                      c. remain the same
5. As the wavelength of a wave in a uniform medium increases, its frequency will \_\_\_\_.  
a. decrease                      b. increase                      c. remain the same
6. The speed of a wave depends upon (i.e., is causally effected by) ...  
a. the properties of the medium through which the wave travels  
b. the wavelength of the wave.                      c. the frequency of the wave.  
d. both the wavelength and the frequency of the wave.
7. A water gun fires 5 *squirts* per second. The speed of the *squirts* is 15 m/s.



- a. By how much distance is each consecutive *squirt* separated?
  - b. What happens to the distance between the *squirts* if the rate of fire is increased?
  - c. Explain how this example is analogous to the relationship between wave frequency and wavelength.
8. What is the speed of a wave that has a frequency of 200 Hz and a wavelength of 0.50 m? **PSYW**

9. Waves are observed to splash upon the rocks at the shore every 6.0 seconds. The distance measured from crest to adjacent crest is 8.0 m. The distance measured from the lowest to the highest point on the medium is 10.0 m. Determine the frequency, wavelength and speed of these waves. **PSYW**



10. The period of a wave is 0.0300 seconds. It travels at a velocity of 10.0 m/s. Determine the frequency and the wavelength of the wave. **PSYW**
11. A wave having a wavelength of 4.0 meters and an amplitude of 2.5 meters travels a distance of 24 meters in 8.0 seconds. Determine the frequency and the period of the wave. **PSYW**
12. Two boats are anchored 7.0 meters apart. They bob up and down, returning to the same up position every 10.0 seconds. The boats rise a vertical distance of 7.0 meters between their lowest and their highest point. When one is up the other is down. There are never any wave crests between the boats. Determine the period, frequency, wavelength, amplitude and speed of the waves. **PSYW**