Activity Measuring Wave Properties

Lab Preview

Directions: *Answer these questions before you begin the Activity*

1. What materials are used to create waves in this activity?

2. How do you create waves of different wavelengths in this activity?

Some waves travel through space; others pass through a medium such as air, water, or earth. Each wave has a wavelength, speed, frequency, and amplitude. In this activity, you will make waves in the classroom, and observe, measure, and change some of the properties of these waves.

What You'll Investigate

How can the speed of a wave be measured?
How can the wavelength be determined from the frequency?

Materials

long spring, rope, or hose
meterstick
stopwatch

Goals

- **Measure** the speed of a transverse wave.
- **Create** waves with different amplitudes.
- **Measure** the wavelength of a transverse wave.

Safety Precautions

Procedure

1. With a partner, stretch your spring across an open floor and measure the length of the spring. Record this measurement in the data table. Make sure the spring is stretched to the same length for each step.

2. Have your partner hold one end of the spring. Create a single wave pulse by shaking the other end of the spring back and forth.

3. Have a third person use a stopwatch to measure the time needed for the pulse to travel the length of the spring. Record this measurement in the "Wave Time" column of your data table.

4. Repeat steps 2 and 3 two more times.

5. **Calculate** the speed of waves 1, 2, and 3 in your data table by using the formula:

speed = distance/time

Average the speeds of waves 1, 2, and 3 to find the speed of waves on your spring.

6. **Create** a wave with several wavelengths. Have one person stand at the center of the spring. Count the number of wavelengths that pass this student in 10 s. Record this measurement for wave 4 in the Wavelength Count column in your data table.

7. Repeat step 6 two more times. Each time create a wave with a different wavelength by shaking the spring faster or slower.

8. **Calculate** the frequency of waves 4, 5, and 6 by dividing the number of wavelengths by 10 s.

9. Calculate the wavelength of waves 4, 5, and 6 using the formula:

wavelength = wave speed/frequency

Use the average speed calculated in step 5 for the wave speed.

Activity (continued)

Data and Observations

Spring and Wave Measurements			
	Spring length	**Wave time**	**Wave count**
Wave 1			
Wave 2			
Wave 3			
	Wavelengths	**Wave speed**	**Frequency**
Wave 4			
Wave 5			
Wave 6			

Conclude and Apply

1. Was the wave speed different for the three different pulses you created? Why or why not?

2. Why would you average the speeds of the three different pulses to calculate the speed of waves on your spring?

3. How did the wavelength of the waves you created depend on the frequency of the waves?

Communicating Your Data

Ask your teacher to set up a contest between the groups in your class. Have each group compete to determine who can create waves with the longest wavelength, the highest frequency, and the largest wave speed. Record the measurements of each group's efforts on the board. **For more help, refer to the Science Skill Handbook.**