Skill Sheet 12   Waves
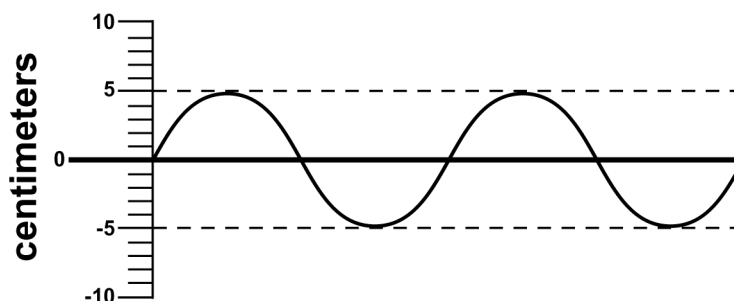
What is a wave? How do you calculate the speed of a wave? In this skill sheet you will review how to answer these questions as you review wave properties.

1. The parts of a wave

1. On the graphic below label the following parts of a wave: one wavelength, half of a wavelength, the amplitude, the crest, and the trough.

2. In the graphic above, how many wavelengths are represented?

3. Define *amplitude* of a wave in your own words. What is the amplitude of the wave in the graphic?

4. How do you calculate the *frequency* of a wave?

5. If took 0.05 seconds for the number of wavelengths in the graphic to pass a certain point, what is the frequency of this wave?

2. The speed of a wave

Below is the formula for the speed of a wave. Use this formula to answer the questions on the next page. Be sure to show your work.

$$\textbf{Speed} = \frac{\text{Distance Traveled}}{\text{Time Taken}} = \frac{\text{Wavelength}}{\text{Period}} = \text{Wavelength} \times \left(\frac{1}{\text{Period}}\right)$$

$$\textbf{Speed = Wavelength} \times \textbf{Frequency}$$

The speed of a wave

Frequency (hertz)

Speed (m/sec) → $v = f \lambda$ ← Wavelength (meters)

1. The wavelength of a wave is 50 centimeters. The frequency is 100 Hz. What is the speed of this wave?

2. The frequency of wave A is 250 hertz and the wavelength is 30 centimeters. The frequency of wave B is 260 hertz and the wavelength is 25 centimeters. Which is the faster wave?

3. The frequency of a wave is 40 Hz. The speed of the wave is 100 meters per second. What is the wavelength of this wave?

3. Identifying harmonics

Let's say you have a machine that supports a 3 meter piece of string. Using this machine you can measure the frequency at which the string vibrates at each harmonic. Table 1 is partially filled with data. Use your understanding of harmonics to fill in the rest of the table.

Harmonic #	Frequency (Hz)	Wavelength (m)	Speed of the Wave Frequency times wavelength (m/sec)
1 (fundamental)	3		18
2	6		18
3		2	
4	12	1.5	18
5	15		18
6		1	

1. When you are looking at a vibrating string, what is the easiest way to determine its harmonic?

2. What is the wavelength of the fundamental harmonic of a string that is 5 meters long?