Guiding Questions: What are the parts of a transverse wave?

Learning Goal: Identify and define the parts of a wave.

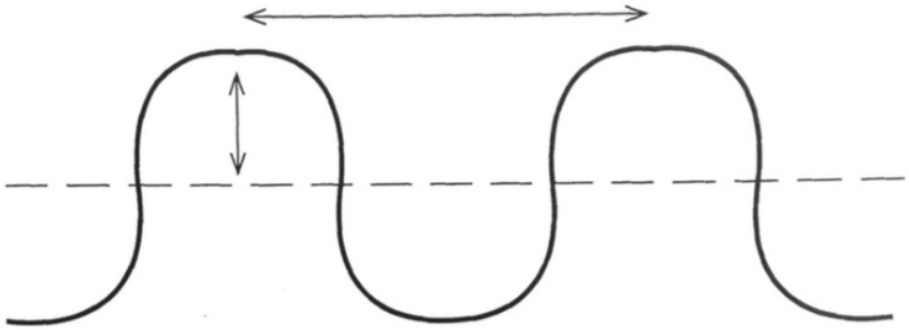
Agenda
1) Study Flash cards (9th Period only
2) Take Test (9th period only)
3) Take Pretest
4) Introduction to wave parts

Words of the day
Amplitude
wavelength
crest
rest position
trough

WAVE DIAGRAM

Name _____

On the following diagram, place the following terms in their correct places: amplitude, wavelength, crest, trough, rest position.



Define the terms below.

amplitude _____

_____

wavelength _____

_____

crest _____

_____

trough _____

_____

Open Chap 10 Waves from Conceptual Physics, Scroll to Section 2: Wave Properties (p. 294-295) and complete Wave Diagram Notebook page 68.

section 2

Wave Properties

Reading Guide

What You'll Learn
- **Define** wavelength, frequency, period, and amplitude.
- **Describe** the relationship between frequency and wavelength.
- **Explain** how a wave's energy and amplitude are related.
- **Calculate** wave speed.

Why It's Important
Waves with different properties can be used in different ways.

Review Vocabulary
vibration: a back and forth movement

New Vocabulary
- crest
- trough
- rarefaction
- wavelength
- frequency
- period
- amplitude

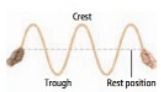
The Parts of a Wave

What makes sound waves, water waves, and seismic waves different from each other? Waves can differ in how much energy they transfer and in how fast they travel. Waves also have other characteristics that make them different from each other.

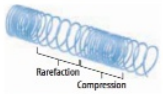
Suppose you shake the end of a rope and make a transverse wave. The transverse wave in **Figure 8** has alternating high points, called **crests**, and low points, called **troughs**.

On the other hand, a compressional wave has no crests and troughs. When a compressional wave passes through a medium, it creates regions where the medium becomes crowded together and more dense, as in **Figure 8.** These regions are compressions. When you make compressional waves in a coiled spring, the compressions are regions where the coils are close together. **Figure 8** also shows that the coils in the regions next to a compression are spread apart, or less dense. These less-dense regions of a compressional wave are called **rarefactions**.

Figure 8 Transverse and compressional waves have different features that travel through a medium and form the wave.

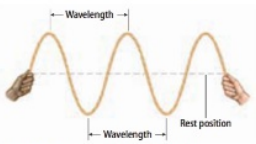


A transverse wave is made of crests and troughs that travel through the medium.

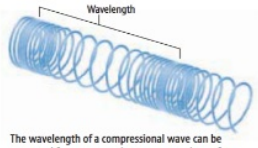


A compressional wave is made of compressions and rarefactions that travel through the medium.

Figure 9 One wavelength starts at any point on a wave and ends at the nearest point just like it.



For transverse waves, a wavelength can be measured from crest to crest or trough to trough.



The wavelength of a compressional wave can be measured from compression to compression or from rarefaction to rarefaction.

Wavelength

Waves also have a property called wavelength. A **wavelength** is the distance between one point on a wave and the nearest point just like it. **Figure 9** shows that for transverse waves, the wavelength is the distance from crest to crest or trough to trough.

A wavelength in a compressional wave is the distance between two neighboring compressions or two neighboring rarefactions, as shown in **Figure 9.** You can measure from the start of one compression to the start of the next compression or from the start of one rarefaction to the start of the next rarefaction. The wavelengths of sound waves that you can hear range from a few centimeters for the highest-pitched sounds to about 15 m for the deepest sounds.

Reading Check *How is wavelength measured in transverse and compressional waves?*

Frequency and Period

When you tune your radio to a station, you are choosing radio waves of a certain frequency. The **frequency** of a wave is the number of wavelengths that pass a fixed point each second. You can find the frequency of a transverse wave by counting the number of crests or troughs that pass by a point each second. The frequency of a compressional wave is the number of compressions or rarefactions that pass a point every second. Frequency is expressed in hertz (Hz). A frequency of 1 Hz means that one wavelength passes by in 1 s. In SI units, 1 Hz is the same as 1/s. The **period** of a wave is the amount of time it takes one wavelength to pass a point. As the frequency of a wave increases, the period decreases. Periods are measured in units of seconds.

Mini LAB

Observing Wavelength

Procedure
1. Complete the safety form.
2. Fill a **pie plate or other wide pan** with **water** about 2 cm deep.
3. Lightly tap your finger once per second on the surface of the water and observe the spacing of the water waves.
4. Increase the rate of your tapping, and observe the spacing of the water waves.

Analysis
1. How is the spacing of the water waves related to their wavelength?
2. How does the spacing of the water waves change when the rate of tapping increases?

Try at Home

Exit Ticket

In Showbie

1. How is the wavelength different from the amplitude of a wave

Open Day 1: Diagram of a wave Homework

Complete the homework assignment