

**Module 3: Sensation and Perception**  
**Topic 3 Content: Sound Waves and Limits Notes**

**Introduction**

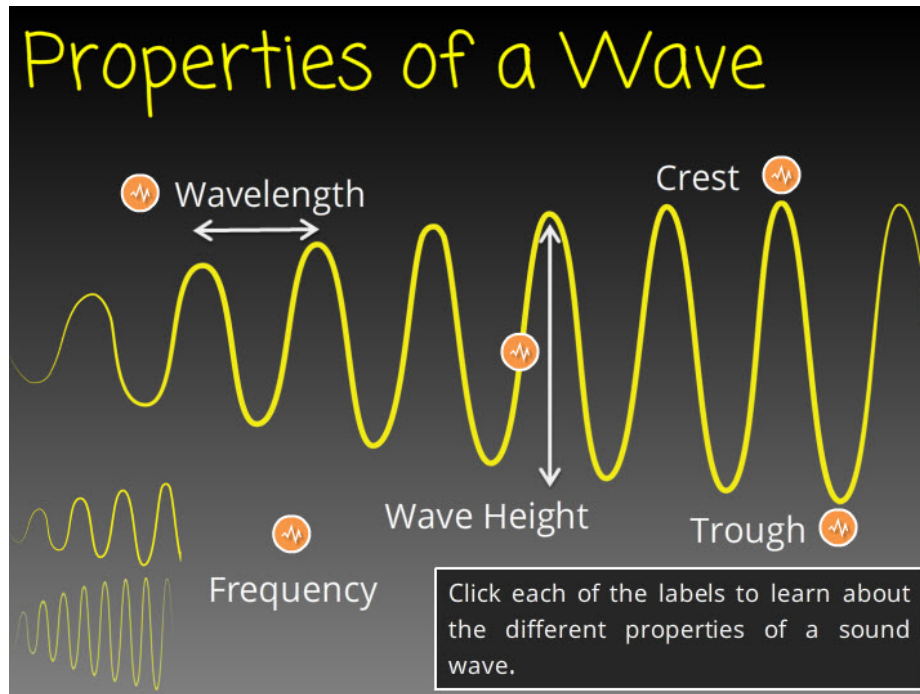


Sound Waves and Limits

Click **NEXT** to begin.

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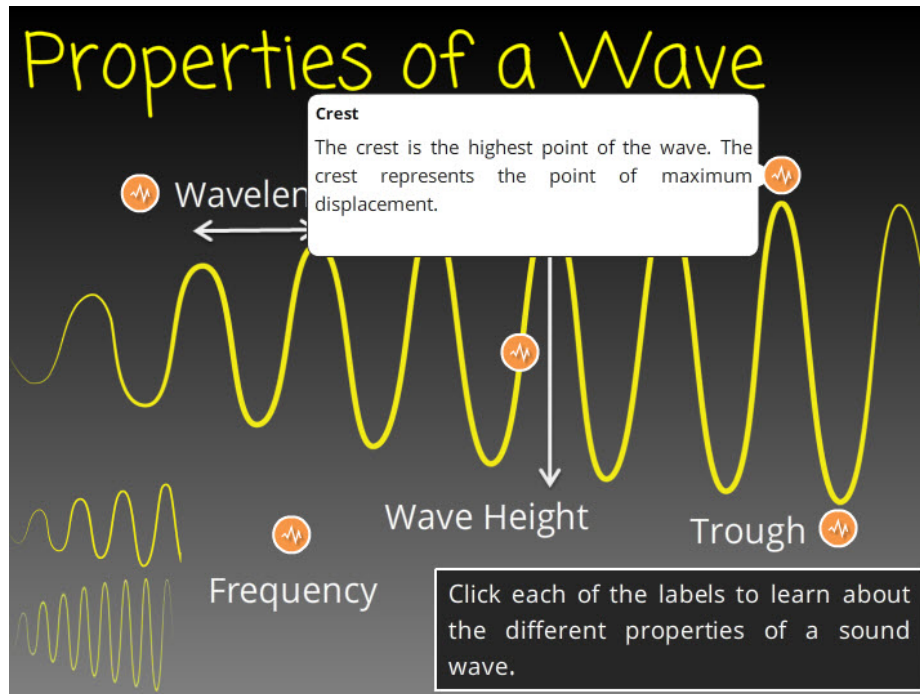
**Sound Waves**



The characteristics of sound waves give the sound its properties. Click each of the labels to learn about the different properties of a sound wave.

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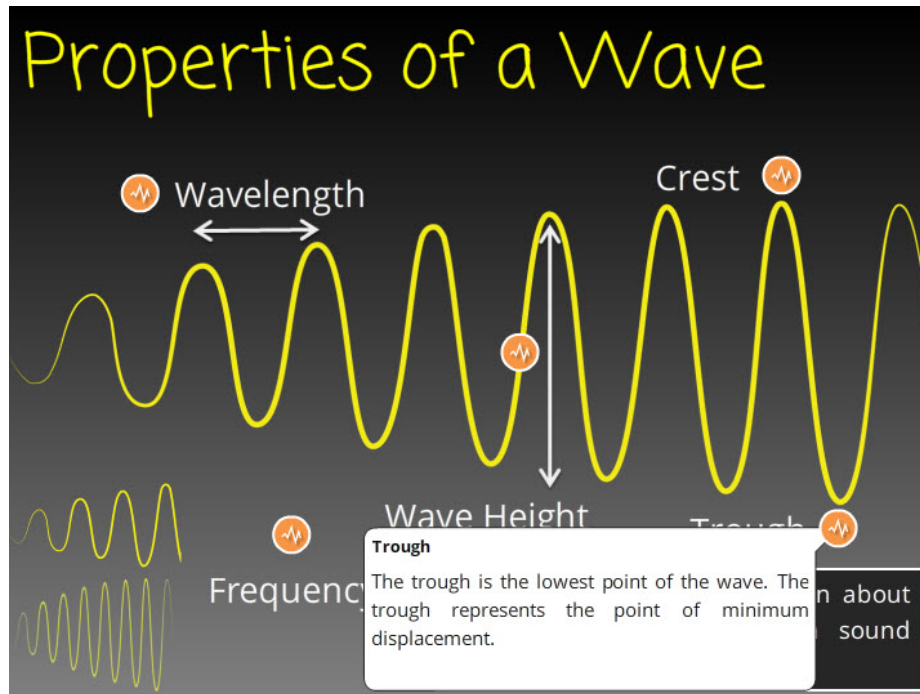
**Crest**



The crest is the highest point of the wave. The crest represents the point of maximum displacement.

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**Trough**



The trough is the lowest point of the wave. The trough represents the point of minimum displacement.

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### Wave Height

The image shows a digital learning interface with a dark background. At the top, the title "Properties of a Wave" is written in a yellow, handwritten-style font. Below the title, there are two main sections. On the left, a white box titled "Wave Height" contains the text: "Wave height is the difference between the trough and crest of the wave. If the difference between the trough and crest is large, a person will hear the sound as loud." Below this text is a small diagram of a black wave with a vertical double-headed arrow indicating its height. To the right of this box is a larger yellow wave. A vertical double-headed arrow labeled "Height" spans from a trough to a crest of this wave. The peak is labeled "Crest" and the valley is labeled "Trough", both with small orange circular icons containing a white wave symbol. Below the yellow wave, the word "Frequency" is written in white, with a small yellow wave icon to its left. At the bottom right, a white box contains the text: "Click each of the labels to learn about the different properties of a sound wave."

Wave height is the difference between the trough and crest of the wave. If the difference between the trough and crest is large, a person will hear the sound as loud.

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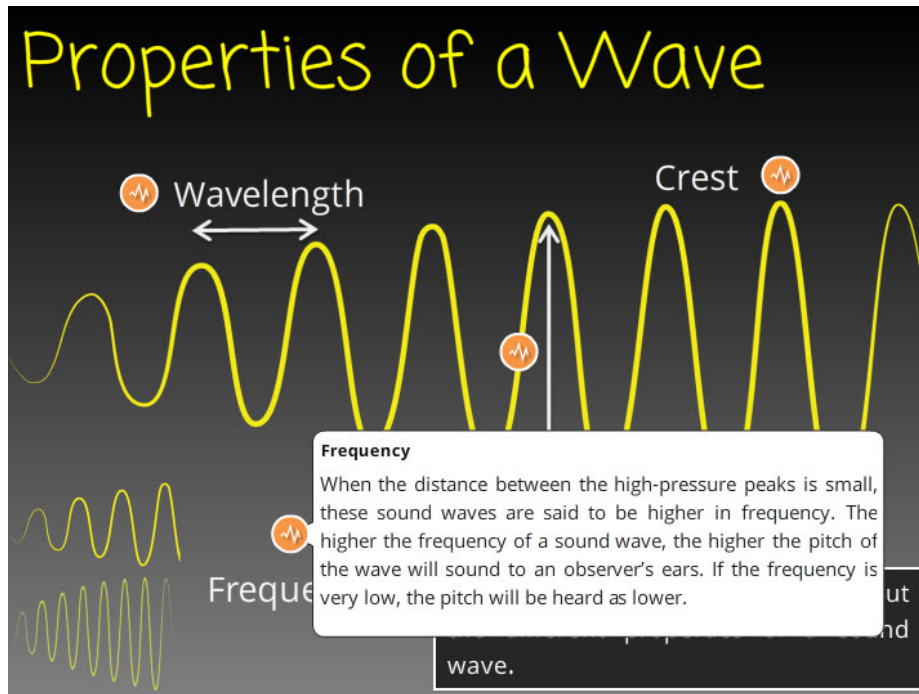
### Wavelength

The graphic features a dark background with the title 'Properties of a Wave' in yellow. It includes three yellow sine waves of varying frequencies. A central white box titled 'Wavelength' contains a definition and a diagram of a wave with a double-headed arrow indicating the distance between two peaks. To the right, labels 'Crest' and 'Trough' are placed above and below a wave peak and valley respectively, each with a small orange icon. At the bottom, a dark box contains the text 'Click each of the labels to learn about the different properties of a sound wave.' The word 'Frequency' is partially visible at the bottom left.

The length of the distance between peaks of pressure is considered the length of the sound wave. The length of the wave determines the amount of time the sound is heard.

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**Frequency**

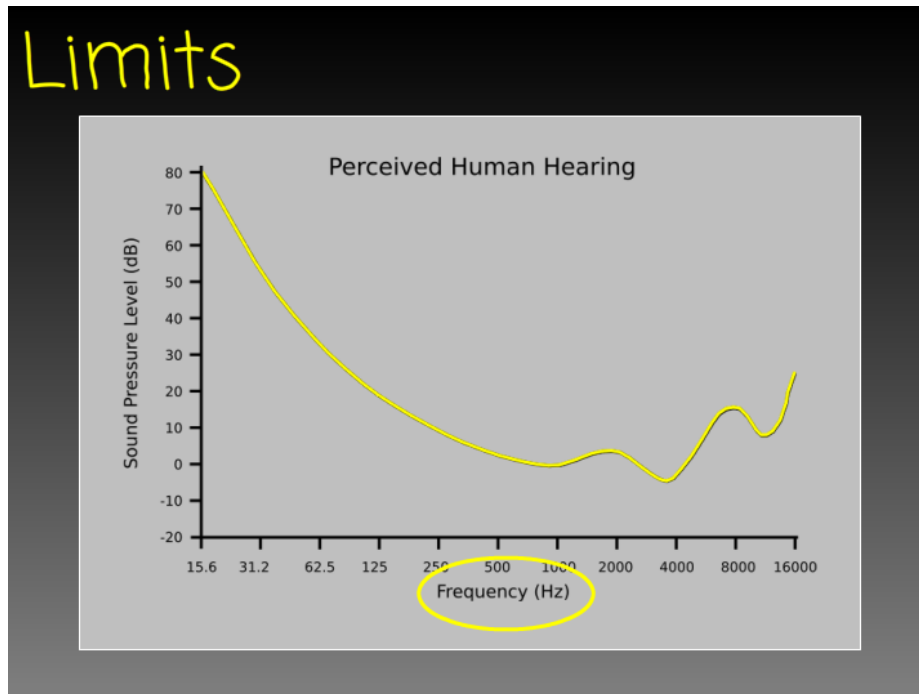


When the distance between the high-pressure peaks is small, these sound waves are said to be higher in frequency. The higher the frequency of a sound wave, the higher the pitch of the wave will sound to an observer's ears. If the frequency is very low, the pitch will be heard as lower.

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#### Limits



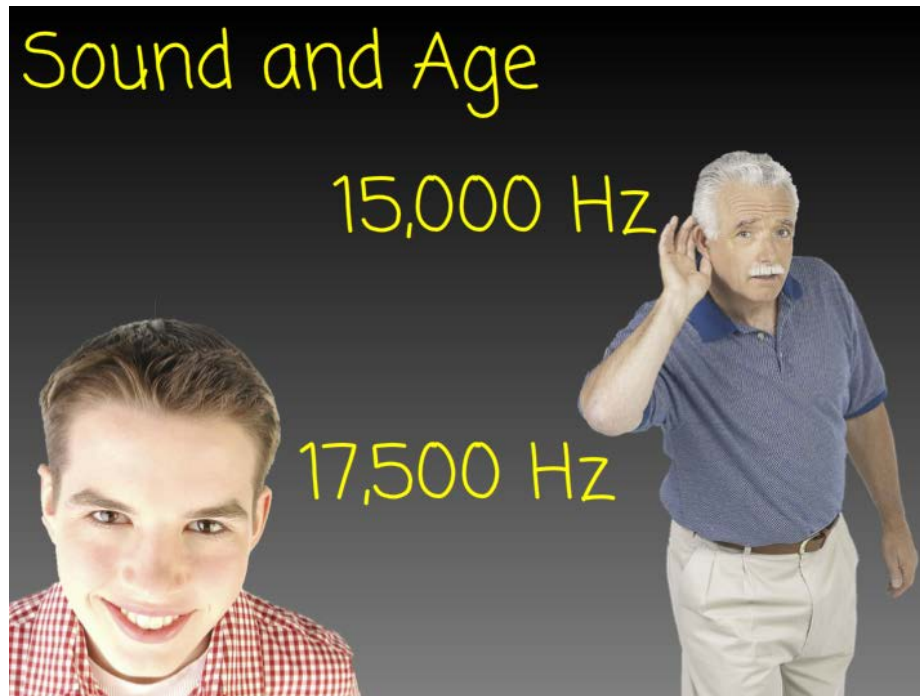
Just as there are limits to the frequencies of light waves that humans can perceive with their eyes, there are limits to the range sound waves that humans can perceive with the ears as well. Sound waves are measured in hertz, or cycles per second. Humans' range of hearing extends from as low as 15.6 Hz to as high as 16,000 Hz, as indicated by the graph.



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#### Sound and Age



As you age, you begin to lose the ability to perceive the highest frequencies in this range. While most teenagers can hear sounds as high as 17,500 Hz, older adults can often not hear sounds above 15,000 Hz. This discrepancy has led to some shop owners using high-pitched tones as a way to annoy teens, and prevent them from loitering around malls and shops; this is a somewhat controversial invention called the Mosquito alarm, because of its high pitched, annoying noise. However, teens have also adopted the high-pitched tones as ringtones, allowing them to send messages that older adults are often unable to hear.

Click the speaker icon to listen to an example of the Mosquito alarm. Can you hear it?