

Chapter 20: The Energy of Waves

Section 2: Properties of Waves



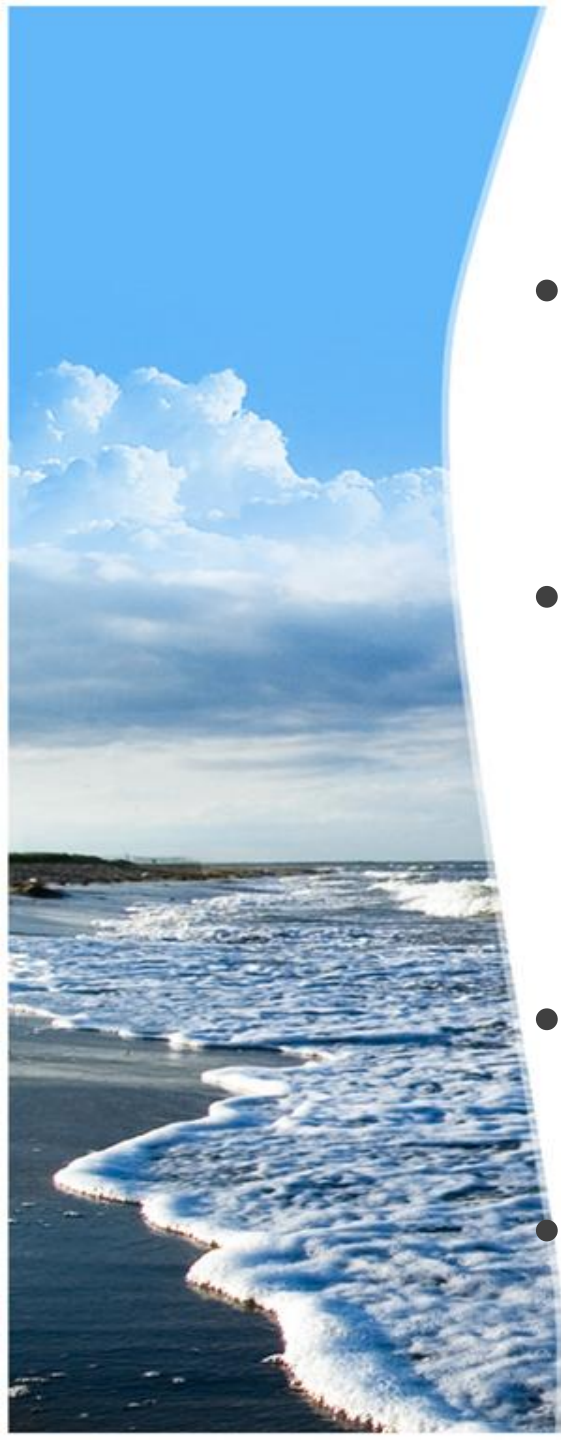


Essential Questions

- What are the four properties of waves?
- How are frequency and wavelength related to the speed of a wave?

Vocabulary

- Amplitude: distance between the highest (and lowest) part of a wave and the rest position (middle)
- Wavelength: distance from any point on one wave to the SAME point on another wave
 - Ex: Crest to crest
- Frequency: number of waves in a given amount of time
- Wave speed: how fast a wave travels





Amplitude

- The amplitude of a wave is related to its' height
 - Distance between the rest position (middle) and the highest or lowest point
- Larger amplitude = more energy

Wavelength

- Wavelength – distance between any two adjoining crests or compressions; or between any two adjoining troughs or rarefactions
 - Can be measured from any point on a wave to the corresponding point on the next wave
- Shorter wavelength = more energy





Frequency

- Frequency: number of waves in a given amount of time
 - Expressed in hertz (Hz): one hertz = one wave/second
- Higher frequency = more energy

Wave Speed

- Wave speed: speed at which a wave travels
 - Wave speed (v) is wavelength (λ) times frequency (f). This is called the wave equation:

$$\frac{v}{\lambda \cdot f}$$





Wave Speed

- Wave speed, frequency and wavelength are all related: if you know two, you can find the third
- The wave equation shows that frequency and wavelength are inversely related
 - Frequency goes up, wavelength goes down
 - Frequency goes down, wavelength goes up

Wave Speed, continued

- Speed of a wave in a certain medium is the same no matter what the wavelength
 - Wavelength and frequency depend on wave speed, not the other way around