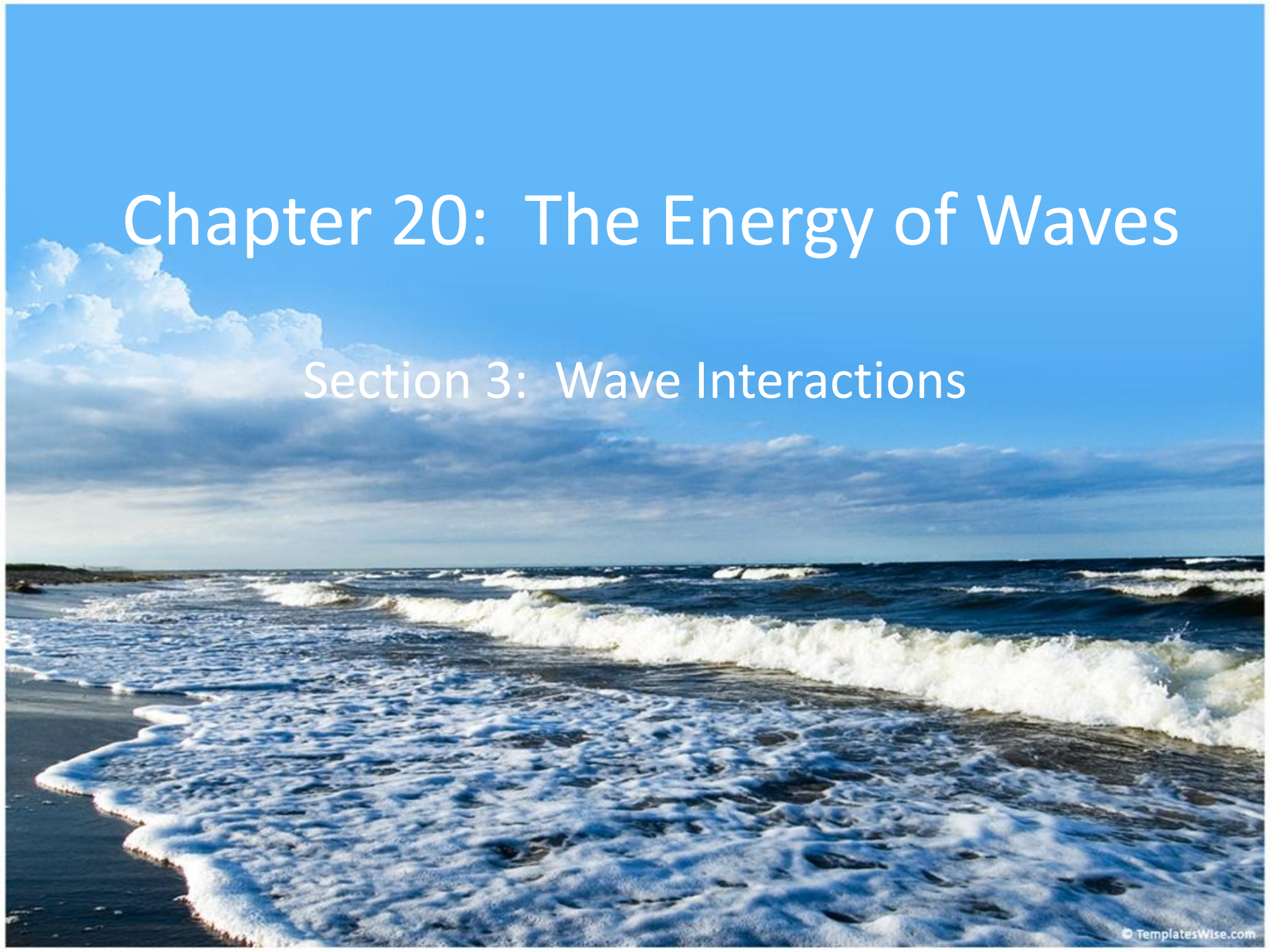


# Chapter 20: The Energy of Waves

## Section 3: Wave Interactions





# Vocabulary

- Reflection: when a wave bounces back after hitting a barrier
- Refraction: the bending of a wave when the waves speed changes
- Diffraction: the bending of waves around a barrier or through an opening
- Interference: two or more waves combining into one



# Vocabulary

- Standing wave: looks like it is standing still; some parts are always at rest and some parts always have a large amplitude
- Resonance: sound from one object causes the other to vibrate



# Reflection

- Reflection: when a wave bounces off an object
- ALL waves – including water, sound, and light waves can be reflected
  - Reflection of light allows us to see an object (ex: light from the sun reflects off the moon)
  - Sound reflection produces an echo
- Waves are not always reflected when hitting a barrier
  - When a wave is transmitted through a substance when it passes through it



# Refraction

- Refraction: the bending of a wave as it passes from one medium to another
  - When a wave changes mediums, it changes **BOTH** speed and wavelength
  - The wave is then traveling in a new direction



# Refraction

- Refraction of color occurs in different amounts so light is dispersed, or spread out
- Why?
  - The speed of the light wave depends on its' wavelength.
  - Different colors have different wavelengths, and therefore different speeds. This makes light refract in different amounts.
  - As a result, the colors are spread out and you can see each different color

# Diffraction

- The bending of waves around a barrier or through an opening is diffraction
- Amount of diffraction depending on the wavelengths of the wave and the size of the barrier or opening



# Interference

- Waves are energy, NOT matter
- More than one wave can be in the same space at the same time
  - Waves can meet, share space, or pass through each other
- The result of two or more waves overlapping is interference
- Constructive interference: when crests and troughs of two or more waves overlap, causing the wave to have a larger amplitude (grow bigger)



# Interference

- Destructive interference – when the crest of one wave overlaps the trough of another
  - Waves have a smaller amplitude (get smaller)
  - If waves involving destructive interference have the same amplitude meet, they cancel out



# Interference

- Standing waves: certain parts of the wave are always at rest (destructive interference) and other parts have a large amplitude (constructive interference)
  - The wave looks as if it is standing still, but is actually going in both directions
  - Standing waves can be formed with transverse or longitudinal waves

# Interference

- Resonant frequencies: the frequency of a standing wave
- Resonance: when an objects vibrations cause a second object to vibrate
  - A resonating object absorbs energy from a vibrating object and begins to vibrate
  - Ex: some musical instruments or singing in the shower

