Chapter 11-3 Notes

Property of Waves

Wave Motion

- The medium is what a wave or disturbance travels through.
- Molecules vibrate up and down as the wave passes through.
- The medium does not actually travel with the waves.
- After the wave passes, the medium returns to its original position.

Mechanical Waves

- Waves that require a medium are called mechanical waves.
- Sound requires air or water to travel.
- Light does not need a medium. It can travel through a vacuum.

Wave Types

- A wave that consists of a single traveling pulse is called a pulse wave.
- If you have more than one wave, it is called a periodic wave.

Sine Wave

- A wave whose source vibrates with simple harmonic motion is called a sine wave.
- It is called a sine wave because a graph of the trigonometric function y = sine x produces this curve when plotted.



Transverse Wave

 Vibrations of a transverse wave are perpendicular to the wave motion.



Crest, Trough, Wavelength

- The highest point on the wave is called crest.
- The lowest point on the wave is called trough.
- Wavelength distance between two points on a wave.



Longitudinal Wave

 When the particles of a medium vibrate parallel to the direction of the wave motion, the wave is called a longitudinal wave.



Longitudinal Waves

 Sound waves in the air are longitudinal waves because air particles vibrate back and forth in a direction parallel to the direction of wave motion.

Period, Frequency, Speed

- Wave frequency describes the number of crests or troughs that pass a given point in a unit time.
- The period of a wave is the amount of time required for one complete vibration of the particles of the medium.
- Speed = frequency x wavelength

The Speed of Light

(relationship between frequency and wavelength)



Chapter 11-4

Wave Interactions

Wave Interference

Two different material objects can never occupy the same space at the same time. When two waves come together they do not bounce back as bumper boats. Because mechanical waves are not matter but rather the displacement of matter, two waves can occupy the same space at the same time.



The combination of two overlapping waves is called superposition.

Displacement in the same direction produce constructive interference.

When two waves are added together, the resultant wave is larger than the individual displacements. This is called constructive interference.





- **Displacements in opposite directions produce destructive interference.**
- When positive and negative displacements
- are added, the resultant wave is the difference
- between the pulses.
- This is called destructive interference.

Destructive Interference



Reflection At a free boundary, waves are reflected but not inverted.





P1+P2 = 0



Reflection

At a fixed boundary, waves are reflected and inverted.



Standing Waves

Standing Wave – a resultant wave pattern that does not move along the string Standing waves have nodes and antinodes.



- The points at which the two waves cancel each other are called nodes.
- Where the string vibrates with the largest amplitude it is called antinode.

Assignment

11.3 and 11.4 Worksheet