

# Waves

# Waves

- ◆ Besides ocean waves what do we know about waves?



# Learning Goal B1

- ◆ describe the properties associated with waves, including amplitude, frequency, period, wavelength, phase, speed, and types of waves

# Definition

- ◆ Waves transfer energy from one place to another through a medium. Although the waves (and thus the energy) is moving the medium does not



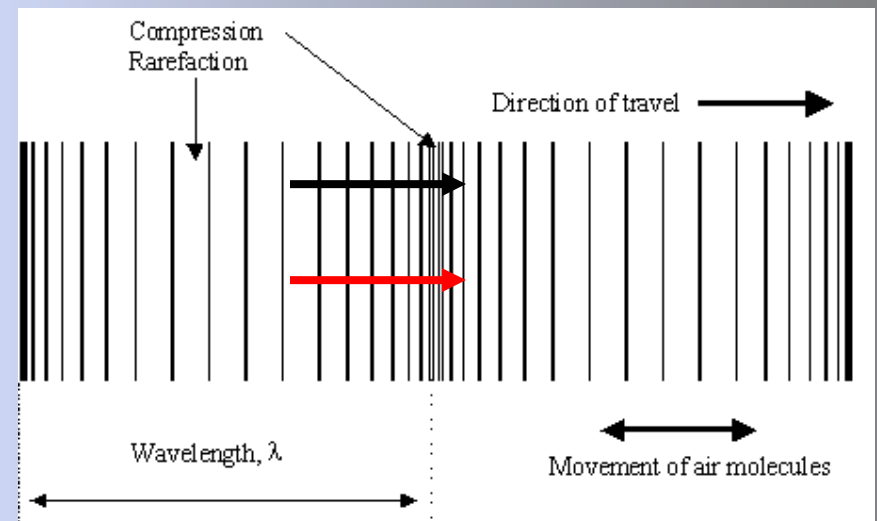
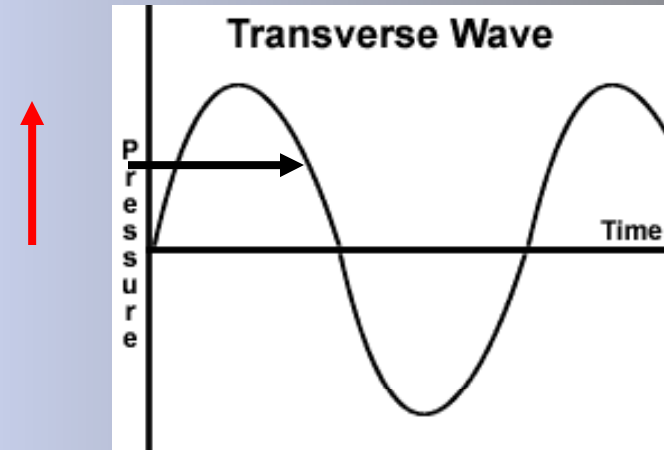
# Wave Types

- ◆ Mechanical
  - ◆ Ocean waves
  - ◆ Sound Waves
  - ◆ Flapping Flag
- ◆ Electromagnetic
  - ◆ Light
  - ◆ Gamma
  - ◆ X-ray
  - ◆ Ultraviolet
  - ◆ Infrared
  - ◆ Radio waves
  - ◆ Microwaves



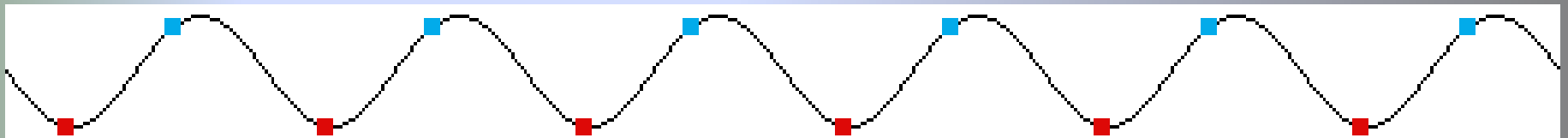
# Waves Travel in 2 Ways

- ◆ Transverse:
  - ◆ Black = Wave direction
  - ◆ Red = Particle direction
  
- ◆ Longitudinal:
  - ◆ Black = Wave direction
  - ◆ Red = Particle direction



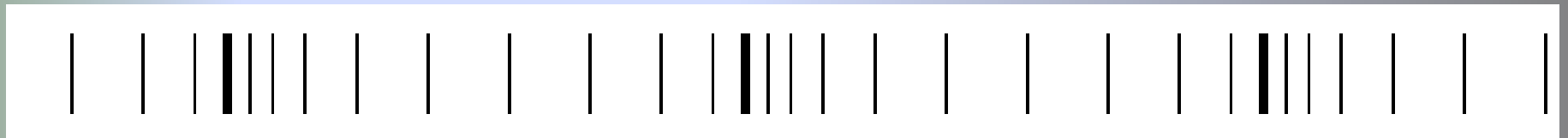
# Waves Travel in 2 Ways

Transverse:



(Ocean, guitar string)

Longitudinal:



(Sound, deep earthquake)

# Waves Travel in 2 Ways

- ◆ Transverse:
  - ◆ Wave direction is perpendicular to particle direction
  
- ◆ Longitudinal:
  - ◆ Wave direction is parallel to particle direction



# Waves

All waves are caused by vibrations

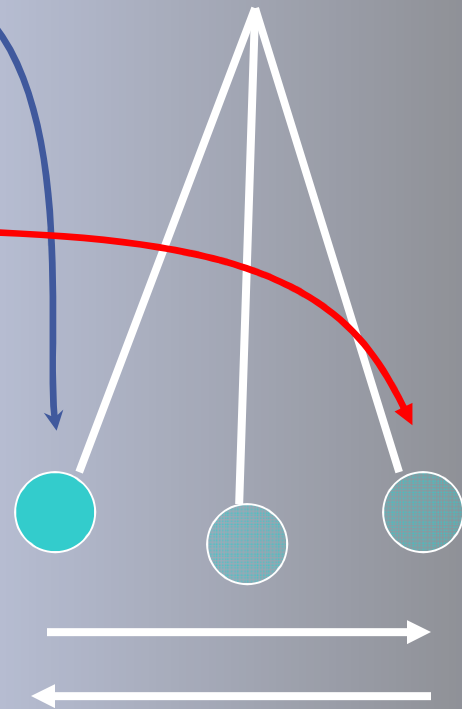


# Measuring Vibrations

- ◆ Frequency = number of complete vibrations per second
- ◆ Frequency = cycles / second
- ◆ Frequency is measured in Hertz (Hz)
- ◆ 1 Hz = 1 cycle / second

# Cycle

- ◆ 1 cycle = the time it takes to go from here
- ◆ To here
- ◆ And then back again



# Frequency

- ◆ HSBC Pendulum



# Period

- ◆ Period (  $T$  ) is the amount of time for a single vibration to occur.
- ◆ Period = 1/frequency or
- ◆ Period is measured in seconds

$$T = \frac{1}{f}$$

Thus

$$T = \frac{1}{f} \text{ and } f = \frac{1}{T}$$

# Practice Questions

- ◆ Heath - Physics
- ◆ Pg. 309: 1 - 4

# Summary

- ◆ A wave is a transfer of energy through a medium.
- ◆ All waves originate from a vibrating source.
- ◆ Frequency (Hz) = # of cycles per second
- ◆ Period (s) = time required for 1 cycle to occur
- ◆ Transverse waves – Wave direction is perpendicular (T) to particle direction
- ◆ Longitudinal waves – Wave direction is parallel (||) to particle direction

# Homework

- ◆ Heath - Physics
- ◆ Pg. 339: -13

