IMPORTANT TERMS:

- **Amplitude**
- **Antinodes**
- **Blue shift**
- **Bow wave**
- **Constructive interference**
- **Crest**
- **Destructive interference**
- **Doppler effect**
- **Frequency**
- **Hertz**
- **In phase**
- **Interference pattern**
- **Longitudinal wave**
- **Node**
- **Out of phase**
- **Period**
- **Red shift**
- **Shock wave**
- **Simple harmonic motion**
- **Sine curve**
- **Sonic boom**
- **Standing wave**
- **Transverse wave**
- **Trough**
- **Vibration**
- **Wave**
- **wavelength**

EQUATIONS:

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$$T = 2\Pi\sqrt{\frac{L}{g}}$$

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

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

$$v = \lambda f$$

UNIT IV: SOUND AND LIGHT

Chapter 25-31

Chapter 25: Vibrations and Waves

I. Vibrations and Waves

A. **Vibration**- a "_____ in time"

1. All things around us "wiggle" and "jiggle".

2. Cannot exist in one instant, but needs _____ to move back and forth.

B. **Wave**- a wiggle in _____ and _____

1. Cannot exist in one place, but must extend from one place to another

2. _____ and _____ are both forms of energy that move through space as waves

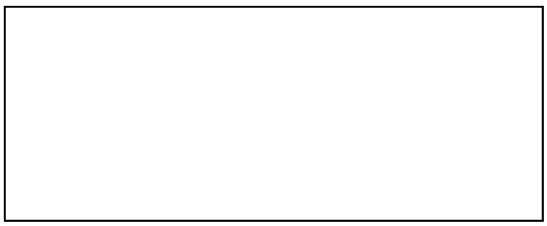
II. Vibration of a Pendulum (25.1)

A. **Pendulum**- swing back and forth with regularity

1. Galileo discovered time a pendulum takes to swing back and forth does not depend on mass of pendulum

2. Does not depend on _____ through which it swings

B. **Period**- _____ it takes to swing back and forth one time



T = _____ of pendulum

L = _____ of pendulum

g = acceleration due to _____

III. Wave Description (25.2)

A. **Simple harmonic motion**- often called **oscillatory motion**, is the back-and-forth vibratory motion of a swinging pendulum

1. Can be described by special curve (_____ **curve**)

2. Sine curve is pictorial representation of a wave.

B. Wave terms

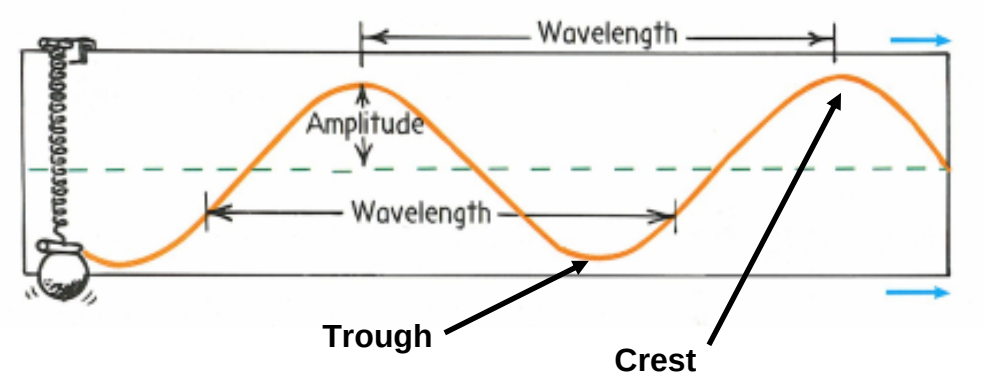
1. **Crests**- _____ points of wave

2. **Troughs**- _____ points of wave

3. **Amplitude**- _____ from the midpoint to crest (or trough) of a wave.

4. **Wavelength**- distance from _____ of one crest to _____ of the next crest

5. **Frequency**- how often a vibration occurs (usually number/second. Measured in _____ (cycles/second)



C. The source of all waves is a _____ _____

1. **Frequency** of vibrating object and frequency of wave it produces are the _____

2. Can calculate the _____ of vibrating object if **frequency** is known (and vice versa)

IV. Wave Motion (25.3)

A. Most of the information around us gets to us in waves

1. **Sound** is energy that travels to our ears as a wave

2. _____ is energy that travels as electromagnetic waves

3. **Radio** and **television** travel in _____

B. The **energy** transferred from a vibrating source is carried by a _____ in a medium, not by the _____ moving from one place to another within the medium

V. Wave Speed (25.4)

A. Speed of wave depends on _____ it moves through

1. Whatever medium, **speed**, **wavelengths**, and **frequency** of wave are related.

2. Equation:

Wave speed = wavelength x frequency

***v* = _____**

λ* = _____ *(Greek letter lambda)

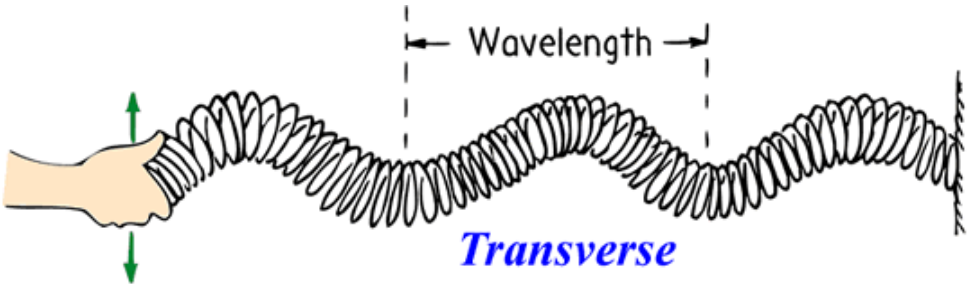
***f* = _____**

3. Wavelength and frequency vary _____

VI. Transverse waves (25.5)

A. **Transverse wave**- motion of medium is at _____ angles to the direction in which the wave travels.

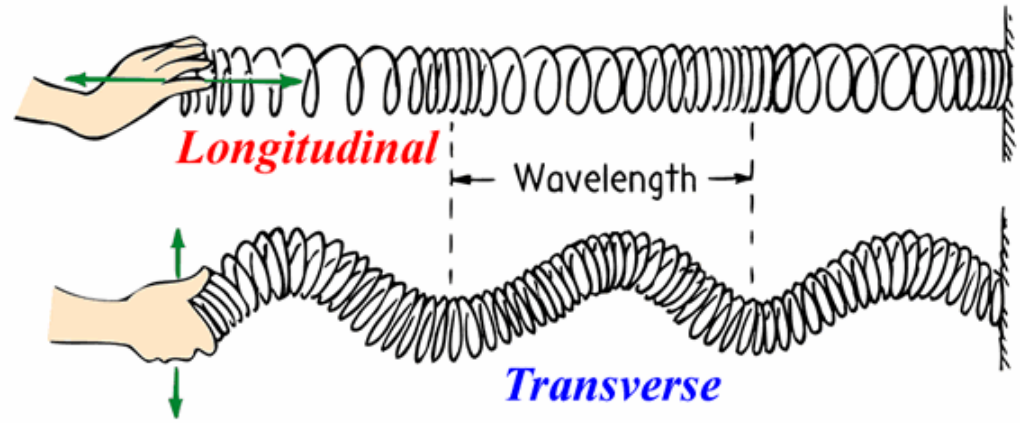
B. Examples: waves in strings of musical instruments, waves upon surface of liquids, electromagnetic waves (radio and light)



VII. Longitudinal waves (25.6)

A. **longitudinal waves**- particles move along the direction of the wave rather than at right angles to it.

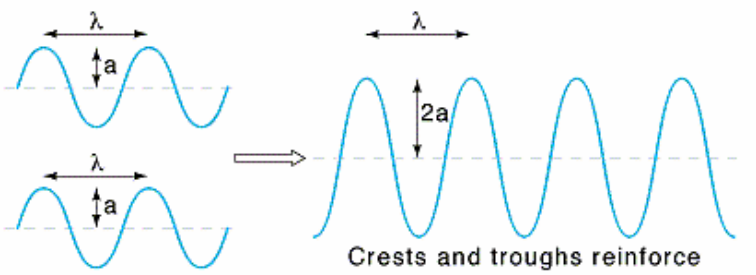
B. both types of waves can be demonstrated with a slinky



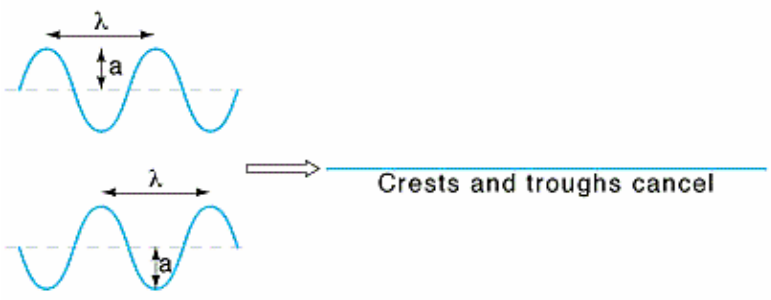
VIII. Interference (25.7)

A. **Wave interference**- when more than one vibration or wave exists at the same _____ in the same _____- they effect each other (**increased, decreased, or neutralized**)

1. _____ **interference**- when one crest of one wave overlaps the crest of another. Effects **add** together



2. _____ **interference**- when crest of one wave and trough of another, individual effects are <u>reduced</u>.

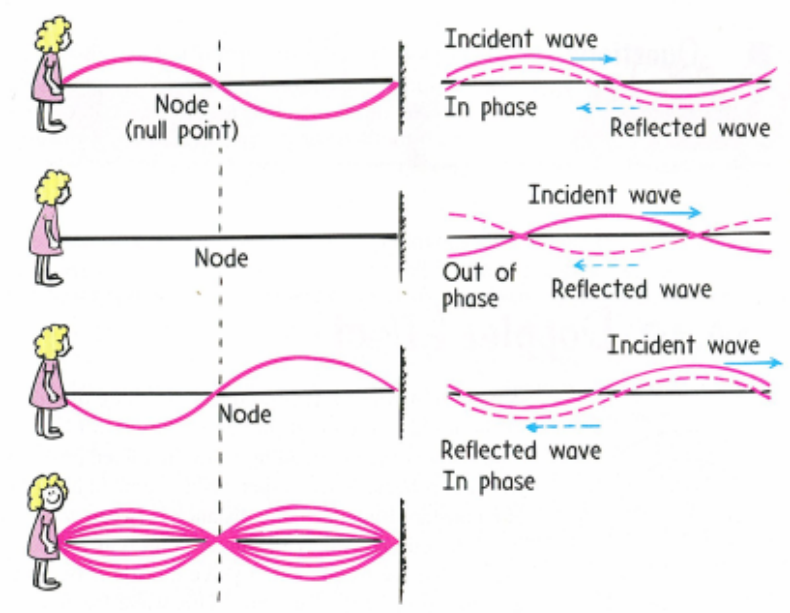


B. Interference is **characteristic** of <u>all wave motion</u>, whether they are water waves, sound waves, or light waves.

IX. Standing waves (25.8)

A. standing waves-certain parts of the wave, called _____,

remain _____.

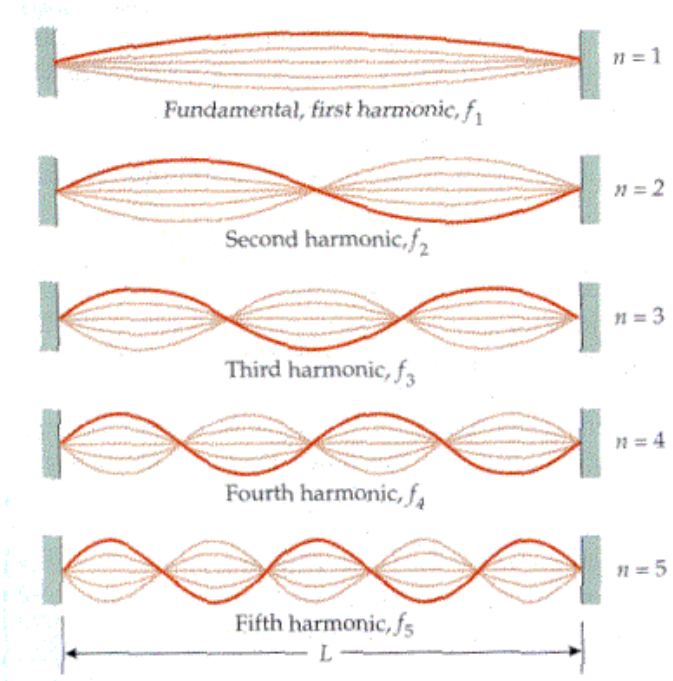


B. Standing waves are result of interference.

1. When two waves of equal _____ and _____ pass through each other in opposite directions, the waves are always **out of** _____ at the nodes.

2. You can produce a variety of standing waves by shaking the rope at different frequencies.

3. Standing waves are set up in the strings of musical instruments.



X. The Doppler Effect (25.9)

A. **Doppler effect**- the apparent change in _____ due to the _____ of the source (or receiver)

1. The _____ the speed of the source, the greater will be the Doppler effect

2. when source is traveling towards you the waves velocity is greater, thus its _____ will be greater

$$v = \lambda f$$

3. When source is traveling away from you the velocity of the wave hitting your ear will be _____, therefore the frequency will be _____

B. Doppler effect and sound-

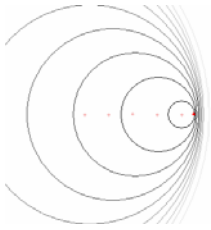
C. Doppler effect and light

1. approaching light increases its measured frequency. An increase is called a _____ **shift** (blue is toward high-frequency end of color spectrum

2. When it recedes, there is a decrease in frequency called _____**-shift** (referring to the low-frequency, or red, end of the color spectrum

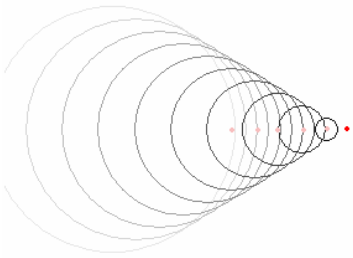
3. This is used to calculate star's spin rates and whether a star or galaxy is moving towards us or away.

XI. Bow waves (25.10)



A. Sometimes the speed of source in medium is as great as the speed of the waves it produces and waves "pile up"

B. Bow wave- When wave source is greater than the wave speed. Produces a __-_____



XII. _____ **Wave**- a three dimensional bow wave. Can produce a _____ _____ (compressed air that sweeps behind a supersonic aircraft