Physics Study Chapter 19/20

A type of wave in which the particles of the medium move parallel to the direction of energy movement LONGITUDINAL WAVE

A type of wave in which the particles of the medium move perpendicular to the direction of energy movement TRANSVERSE WAVES

Sound moves by means of LONGITUDINAL waves; electromagnetic energy moves by means of TRANSVERSE waves

On a sine wave the "rest" position (essentially the "x" axis) is called THE EQUILIBRIUM POSITION

The maximum displacement of the curve to either side of equilibrium is AMPLITUDE

The maximum displacement of the curve to positive side of equilibrium is A CREST; to negative A TROUGH

The distance successive identical parts of a wave WAVELENGTH

The points where the curve crosses equilibrium traveling in either a positive or negative direction NODES

The relation $v = f\lambda$ is referred to as THE WAVE EQUATION

Through wave motion ENERGY is transferred from place to place without transfer of MATTER between points

Longitudinal waves consist of areas of higher particle density called COMPRESSIONS alternating with areas of lower particle density called RAREFACTIONS

The unit of frequency THE HERTZ

BOUNDARY BEHAVIOR

Medium fixed at boundary:

Reflected pulse: amplitude SAME , Speed SAME , wavelength SAME, character INVERTED

Medium free at boundary:

Reflected pulse: amplitude SAME, Speed SAME , wavelength SAME, character SAME

Medium denser beyond boundary:

Reflected pulse: amplitude LOWER , Speed SAME , wavelength SAME, character INVERTED

Transmitted pulse: amplitude LOWER , Speed LOWER , wavelength SHORTER, character SAME

END 19-4

When two waves meet while traveling along the same medium it is called INTERFERANCE When more than one wave occupies the same space at the same time the displacements add at every point defines the SUPERPOSITION PRINCIPLE

Stable regions of constructive & destructive interference produced when two sets of waves of equal amplitude and λ pass through each other as they travel in opposite directions the STANDING WAVES

Change in frequency due to motion of the source (and/or the receiver) is called THE DOPPLER EFFECT

END 19-5

The study of sound is called ACOUSTICS

Sound is really tiny fluctuations of AIR PRESSURE

Because air molecules are not physically attached to one another, sound is transmitted when AIR MOLECULES BUMP INTO ONE ANOTHER

The frequency of sound is referred to as PITCH

Sounds with frequencies below 20 Hz are called INFRASONIC ; those above 20000 Hz ULTRASONIC

End 20-1

The hair-like structures in the inner ear which if damaged/lost will have a permanent negative effect on hearing are called CILIA

The snail-like structures in the inner ear where various pitches are sorted before being sent by the auditory nerve to the brain are called COCHLEA

The large eardrum of the middle ear along with the very small bones of the middle and inner ear aid hearing through a kind of MECHANICAL AMPLIFICATION

End 20-2

Sound can be transmitted by ANY ELASTIC MATERIAL

The denser a medium the FASTER sound will travel

The reflection of sound is called AN ECHO

Bending of sound waves is called REFRACTION

An important tool of modern medicine that uses of sound waves is called ULTRASOUND

The decrease in energy in a wave caused by the medium through which the wave is moving is called DAMPING

High frequency sound dissipates to THERMAL ENERGY more rapidly than low frequency sound which therefore has GREATER RANGE

An object is made to vibrate by another vibrating object is example of A FORCED VIBRATION

A frequency at which an elastic object naturally tends to vibrate NATURAL FREQUENCY

The response of a body when a forcing frequency matches its natural frequency is called RESONANCE

Two tones of slightly different frequency produce a fluctuation in loudness called BEATS

In the case of sound waves the pitch is DIRECTLY proportional to the frequency

When astronomical features are receding from us they display a RED shift in their spectrum