**Wave Notes**

I. **Wave** – repeating disturbance or movement that transfers energy through matter or space.

A. **Electromagnetic (EM) waves**– can travel through space and do not need to travel through matter.

-Ex. light, radio waves, microwaves, x-rays, UV rays

B. **Mechanical waves** – waves that can only travel through matter.

-**medium** – the matter through which a wave travels

1. **Transverse waves** – medium moves up and down

at right angles to the direction the wave is moving

-Ex. ocean waves

A. Parts of a Transverse Wave

**Crest** – highest point of the wave

**Trough** – The lowest point of the wave

**Rest position** – beginning point (middle)

**Wavelength** – from crest to crest or trough to

trough

**Amplitude** – distance from resting position

to top of crest (or bottom of trough)

2. **Compressional waves** – molecules of the medium

are squeezed together and spread apart.

-Medium moves in the same direction as the

wave. Ex. sound waves, seismic waves

A. Parts of a Compression Wave

**Compression** – where molecules of the medium are

crowded together or denser.

**Rarefaction** – where molecules of the medium are

less dense or spread apart farther.

**Wavelength** – from compression to compression or

from rarefaction to rarefaction.

**Amplitude** – how close the molecules are during a

compression and how far apart during a

rarefaction.

II. **Frequency** – number of wavelengths that pass a given

point in one second.

A. Frequency is measured in hertz (Hz). 20 Hz means that

20 wavelengths pass by per second.

B. Frequency is inversely related to wavelength. The

longer the wavelength the lower the frequency and vice versa.

III. **Wave Speed** – depends on the properties of the medium it

is traveling through.

A. Transverse waves travel fastest in gases, then liquids,

and slowest in solids.

B. Compressional waves travel fastest through solids, then

liquids, and slowest in gases.

# C. Sound waves travel faster if the temperature of the

medium is higher.

D. Velocity of a wave = wavelength x frequency

- Units are m/s

IV. **Amplitude** – related to the amount of energy a wave carries.

-the more energy the greater the amplitude.

VI. The Behavior of Waves

1. **Reflection** – when a wave strikes an

object and bounces off of it.

**Incident wave** – incoming wave

**Reflected wave** – wave that

bounces off

1. **Law of Reflection**

the angle of incidence = angle of reflection

1. **Refraction** – The bending of a wave caused by the

change in speed as it moves from one medium to

another.

Drawing

1. **Diffraction** – the bending of a wave as it goes around

an object or through an opening.

-the longer the wavelength, the better it diffracts

1. **Interference** – when 2 or more waves overlap to form a

new wave

**Constructive interference** – the amplitudes of the

waves add together.

-waves are said to be in phase.

**Destructive interference** – the amplitudes of the

waves subtract from each other.

-waves are said to be out of phase.

1. **Standing waves** - wave pattern in which two waves are

equal in wavelength and amplitude, traveling in

opposite directions continuously interfering with each

other.

Drawing – nodes and internodes

1. Resonance

-Each object has a **natural frequency** at which it

vibrates

**Resonance** – the ability of an object to vibrate by

absorbing energy at its natural frequency

ex. Shattering glass, bridge