

Unit 3: Matter vs. ENERGY

1. I understand that ENERGY exist as packets (Photons) or waves of Energy.

- a. The behavior of waves tends to be describe by 3 characteristics
- Wavelength (λ): tells how compact the Energy is.
 - Frequency (Hz): tells us how quickly the energy is being delivered.
 - High/Low Energy: Qualitative description of the wave.

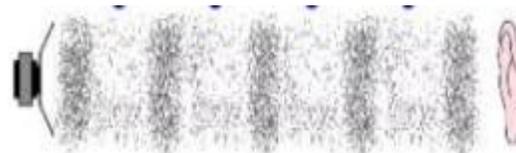
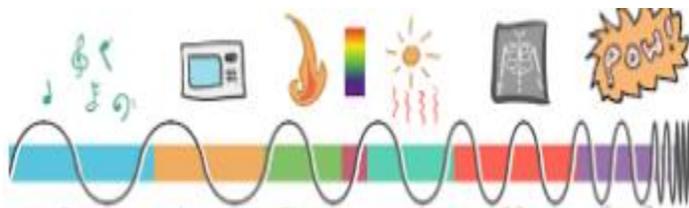
A PHOTON CHECKS INTO A HOTEL AND IS ASKED IF HE NEEDS ANY HELP WITH HIS LUGGAGE.



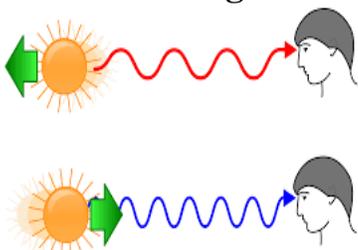
"NO, I'M TRAVELLING LIGHT."

2. I can discuss & differentiate between Electromagnetic Waves & Mechanical Waves.

- a. Electromagnetic Waves are commonly referred to as Light waves, but don't be fooled our human eyes are not capable of seeing all types of light.
- Travel at speed of light, (300,000,000 m/s)
 - Look as though you would expect wave to look with peaks (crest) and valleys (troughs)
 - Travel fastest through a vacuum and slowest through a solid
 - Radio, micro, IR, visible light (ROYGBIV), UV, X-ray, Gamma
- b. Mechanical Waves are commonly referred to as sound waves, which is nothing more than vibrating matter.
- Travel at the speed of sound (343 m/s)
 - Look like a slinky laid out on a table that is being compressed and stretched out.
 - Travel fastest through a solid, slowest in a gas, and is unable to travel through a vacuum
 - Travel by vibrations through matter.



3. I understand how the doppler effect allows us to track the movement of a source of sound or light.



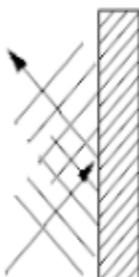
- a. The doppler effect is a change in frequency (Hz) and Wavelength (λ) due the movement of the source.
- When you experience the doppler effect of sound you will hear a higher or lower pitch
 - When you see the doppler effect of light you will see either a more red or more blue light than normal.



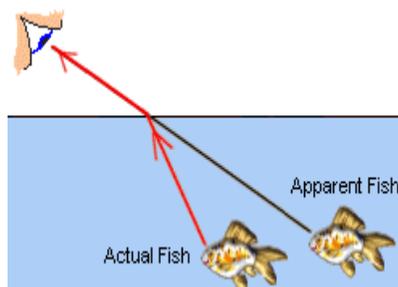
4. Waves can be manipulated by humans, natural obstacles, or by a change in medium.

- a. I understand the following concepts in terms of manipulation of waves.

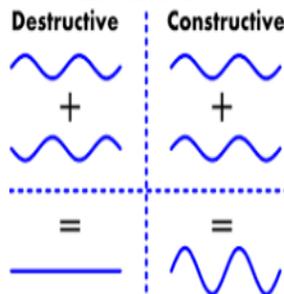
→ Reflection



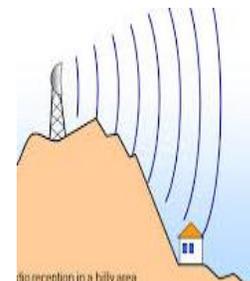
→ Refraction



→ Interference



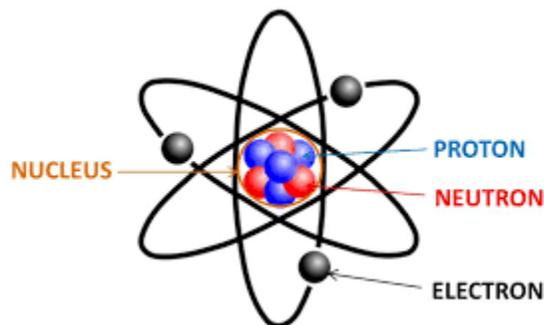
→ Diffraction



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5. I understand that the most basic form of matter is the Atom.

- a. An atom is the smallest piece of matter that can maintain chemical and physical properties.
 - Proton (+)
 - Neutron (o)
 - Electron (-)
- b. An atom of an element does have different forms that it can exist in depending on environmental triggers.
 - Ions: a form of the atom that has an electrical charge (Δ in electrons)
 - Isotopes: a form of the atom that has varying amounts of neutrons (Δ in mass).
 - The periodic table includes decimals for mass because it is the average mass of ALL isotopes that exist.



6. I can discuss the organization of the periodic table based on the trends of properties associated with the arrangement of the atoms into groups and periods.

- a. I can differentiate and identify all of the following Periodic Trends.
 - i. Atomic Number
 - ii. Average Atomic Mass
 - iii. Valence Electrons
 - iv. Metals, Metalloids, and Nonmetals
 - v. Halogens
 - vi. Noble Gases
 - vii. +/- Ions

