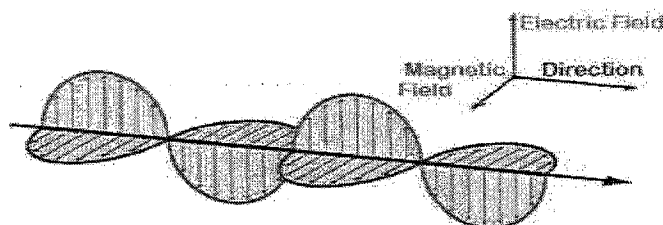


Name: _____

Light/Electromagnetic Spectrum Guided Notes

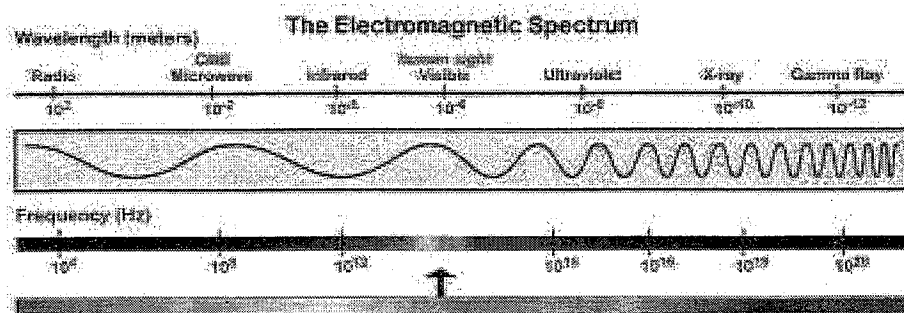
Dual Nature of light: Is light waves or particles? The answer is that it can be both! Particle theory: light moves in a straight line instead of spreading out like waves do. These particles are called PHOTONS. Within an atom, as electrons gain energy they jump to different levels (orbitals) and gain energy. When they fall back down to a lower level they release energy in the form of light.

WAVE theory: light is a type of energy that travels as an electromagnetic wave (transverse) and DOESN'T need a medium to travel! Electromagnetic waves are produced from a vibration of electrically charged particles which also produce a magnetic field.



Speed of light = 300,000 km/s. *It takes approximately 8 minutes for light from the sun to reach Earth. Based on this, how far is the sun away from the Earth? $d = vt$

Electromagnetic spectrum: range of waves with different energy levels.

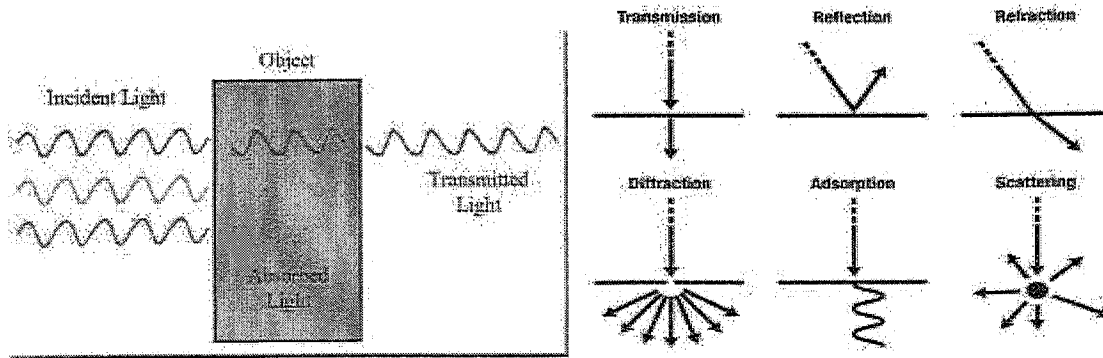


*Your cell phone acts as a transmitter and receiver. Your voice is converted to an electrical signal which is transmitted by radio waves to a cell tower. When receiving the radio wave signal, your phone converts this to sound waves. Radio waves are not sound waves though (they don't need a medium and are transverse waves)!!!

What happens when light strikes a material?

1. **Reflected** - bounces off. Angle of incidence = ANGLE OF REFLECTION
2. **Refracted** - enters a material and the speed of light slows down in the new medium so the result is the light bends.
3. **Absorbed** - the frequency of the incoming (incident) ray is the same as the medium it strikes and the light is taken in (absorbed).

4. **Transmitted** - passes through a material but the speed of light doesn't change so the light ray is NOT BENT OR REFRACTED.

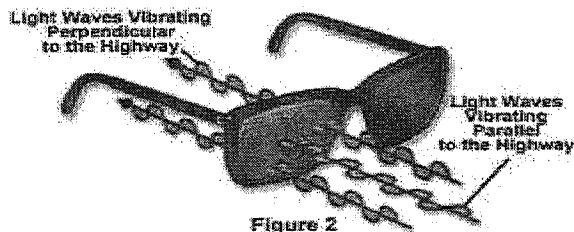


Material types:

1. **Transparent:** allows light to pass straight through. Examples include: air, water, and GLASS.
2. **Opaque:** does not allow light to pass through. The incident light ray is either reflected or ABSORBED. Wave frequency = medium frequency. Since light strikes the object with the same natural frequency of the material, resonance occurs which increases vibrations in electrons and is turned to heat energy. Wood, cardboard, books, and rocks are a few examples.
3. **Translucent:** material that allows some light through but the light rays are bent and the light scatters which causes an image to appear blurry. Translucent objects tend to glow when light hits them. Examples include: frosted glass, thin pieces of plastic, calcite or fluorite (mineral examples), wax paper, etc.

Shadows: shaded region that results when light strikes an object and can't pass through to the other side. The shadow is due to the absence of light behind the object.

Polarization: Restricting transverse light waves by filtering out the waves of a particular direction. Only light rays that align with the slits in a material are able to pass through. This makes it easier to see (blocking out some light, reducing glare, etc.)



*How do you think 3D glasses work?