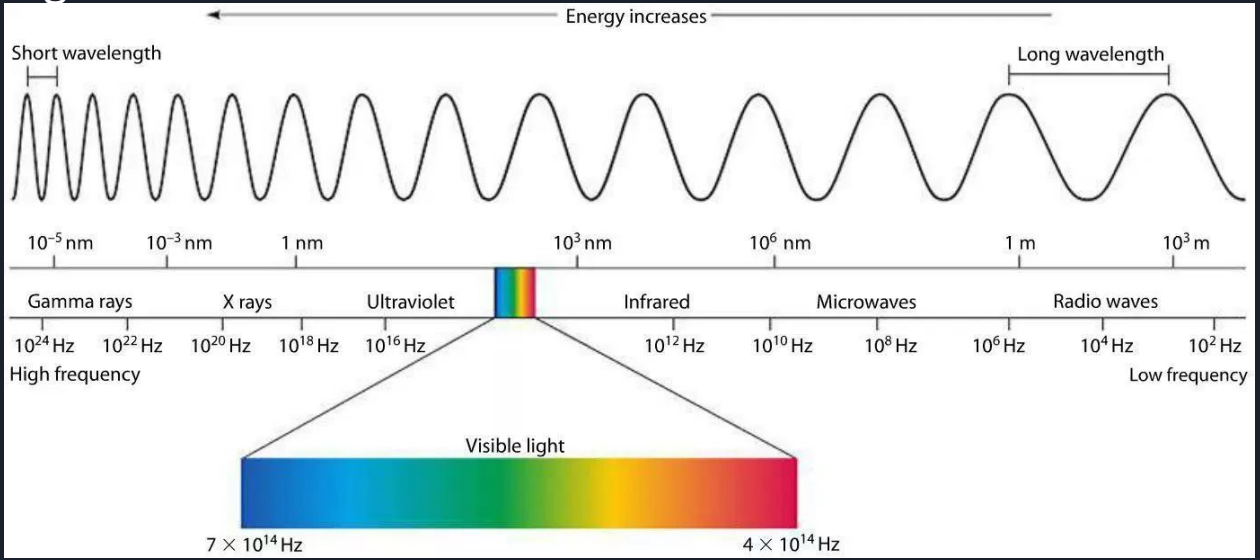
Light

Group A

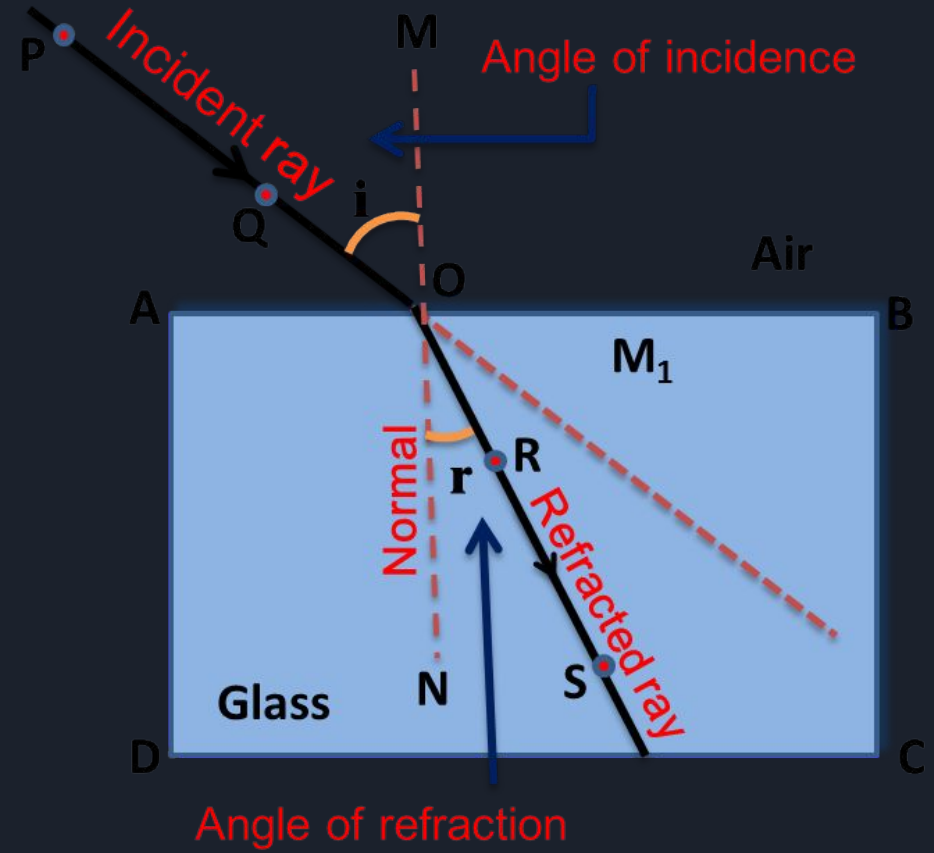
William Kim, Teddy Braun, and
Rubin “Mars is Tall” Hassaman

- 299,792,458 m/s - speed of light - experiment created by Albert Michelson
- Light is energy emitted by vibrating electric charges
- Electromagnetic waves include radio waves, microwaves, X-rays, and gamma rays, plus visible light
- Light below 430 THz are infrared
- Light above 770 THz are ultraviolet



- When light hits matter, the electrons in that matter are forced into vibration
- If the frequency of the light matches the natural frequency of the electrons, the atom resonates
- If natural frequency does not match, the electrons won’t sustain forced vibration
- In order to “settle down” into sustainable motion, the electron re-emits the light, passing it to the next atom. Continues until light reaches other side of the material

- Reflection — When a wave reaches a boundary between two mediums, some or all of the wave bounces back into the first medium
- If a material reflects mostly red, the material will appear red
- White is a reflection of all light
- Black is when all frequencies are absorbed
- The Law of Reflection - The angle of incidence = angle of reflection
- When the incident ray comes in contact with a substance, it refracts across a line perpendicular to the surface, called the Normal Line.
- The Reflected line and the Incident line both have the same angle compared to the Normal Line.

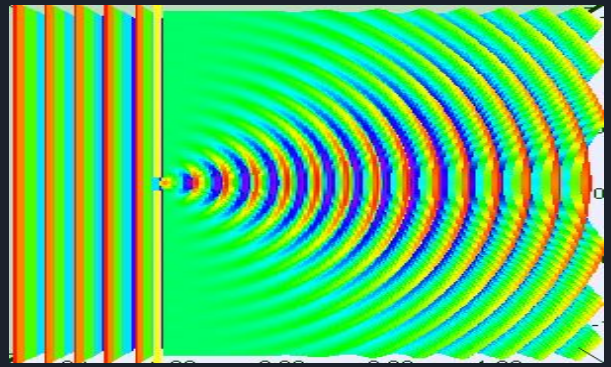


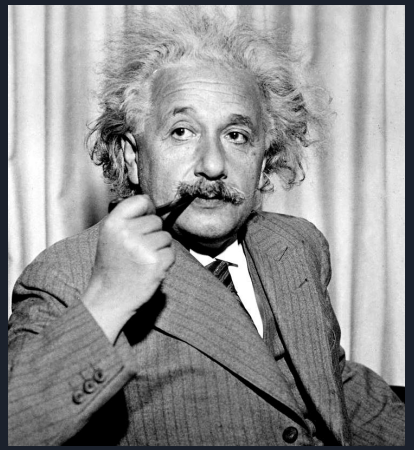
Refraction of light

- Index of refraction
  - n = speed of light in vacuum / speed of light in material
  - Always greater than or equal to 1
- Snell's Law
  - $n_1 \sin \theta_1 = n_2 \sin \theta_2$
- Index of refraction inside a medium depends on frequency
- Light of frequencies closer to to the natural frequency of the medium refract more
- A lens - A piece of glass bent in a way to refract parallel light to form an image

- Specular reflection - When all the light is reflected in the same direction on a smooth surface
- Diffuse reflection - When light is reflected in many directions on a rough surface
- Refraction - Waves similarly deflect when they pass from one medium to another
- Focal point - When light converges to a point through a lens from straight on
    - Focal Length - The distance from the center of the lens to the focal point
- Diffraction - How a wave spreads out when it meets a small opening or the edge of a barrier
    - Light produces a diffraction pattern when passed through a single-slit as well as an interference pattern when passed through a double-slit

- Light in terms of photons(particles) helped explain the photoelectric effect
  - Photoelectric effect - When light hits certain metals and the metal ejects electrons
- High-frequency light, even if from a dim source, is capable of ejecting electrons
- Low-frequency light, even if from a very bright source, cannot dislodge electrons
- Photons have energy proportional to frequency, brightness is proportional to photons





- Einstein - One and only one photon is completely absorbed by each electron ejected from the metal
    - Dislodging an electron depends on the energy per photon (the frequency) not the number of photons (the brightness)
- Light is a particle, In its interaction with matter, light can be observed and measured in discreet, localized quantities
- Light is considered to be neither a wave or particle

Group B

By: Jing Yu Yan, Matthew Fong, and Thomacito

Light

Color

1. Color is our brain's interpretation of the frequency of light

   Lower frequency = redder WHILE Higher frequency = bluer

2. Some people call lights particles in books, but light is actually not a particle or wave. It's neither, and should have its own name.

3. People see you differently than you see yourself through a mirror, as your left is their right.

Light Continued

4. People believe that brightness is based on the object, but brightness is just the brain's interpretation of light intensity

5. Glasses only change the path of the light that enter your eyes., they don't actually magnify it.

6. A common misconception is that light can only reflect from shiny surfaces (such as a mirror), but all objects reflect and absorb light to different degrees.

Kahoot

https://create.kahoot.it/share/physics-s2-light-questions/dbcaed1e-8562-477c-8d66-cd09b1043691