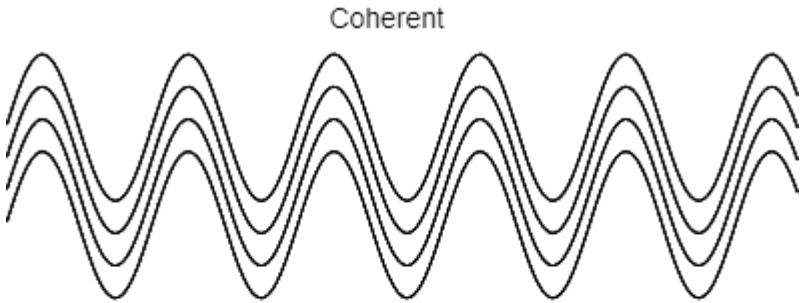
Physics Honors: Light as a Wave And Diffraction

Light as a Wave

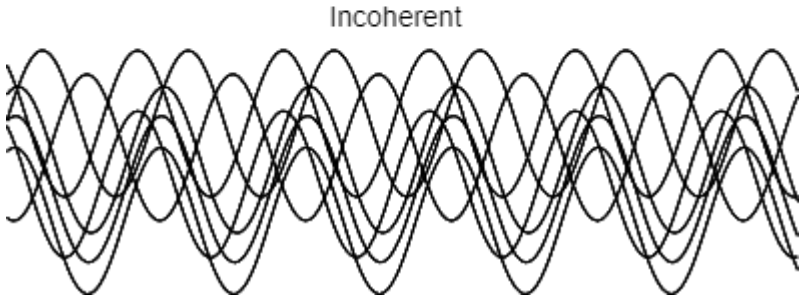
So far, we have mostly discussed light acting as a ray. However, we also know that light sometimes acts like a wave. Scientists know this is true because light waves create interference and diffraction patterns, which something that waves do.

Incoherent Light vs Coherent Light

When all of the light from a source is in the same phase, it is called coherent light. An example of coherent light is a laser pointer



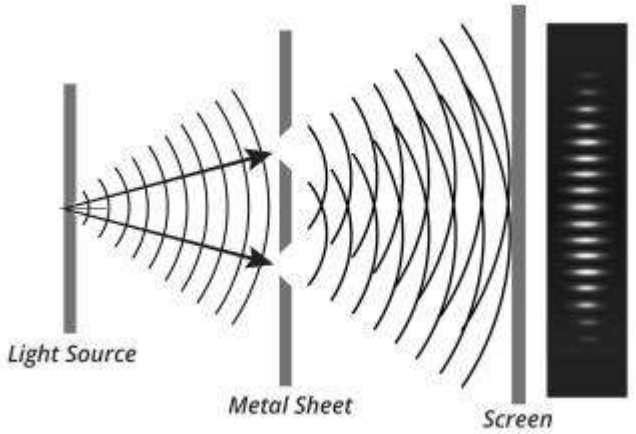
When all of the light from a light sources is not in phase, it is called incoherent light. An example of incoherent light is a flashlight



Interference Patterns

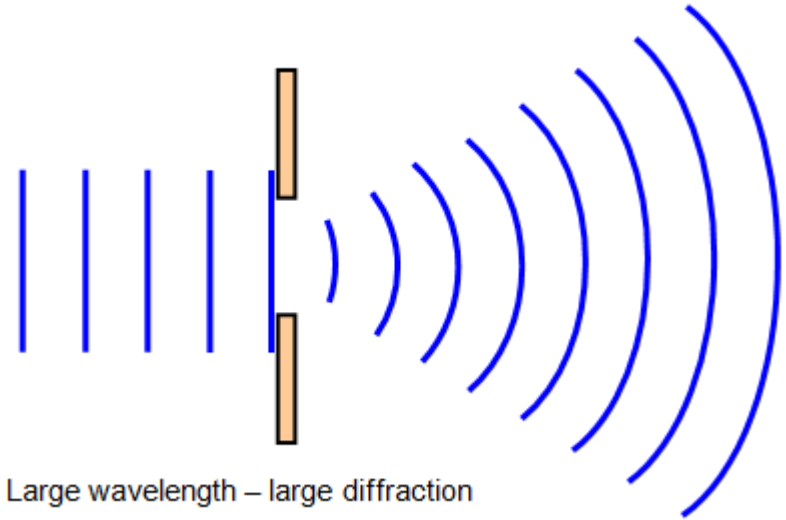
When coherent light passes through two slits, it creates an interference pattern due to the principal of superposition.

It will be brighter at the places where the crests overlap, and dimmer where they cancel each other out.



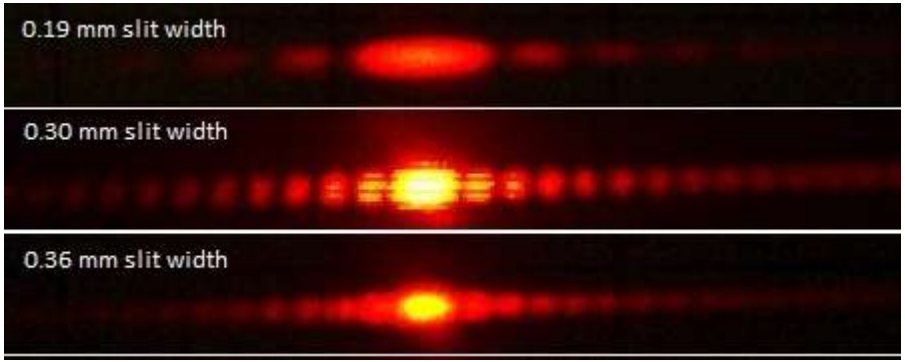
Diffraction

The definition of diffraction is the bending of a wave around a barrier



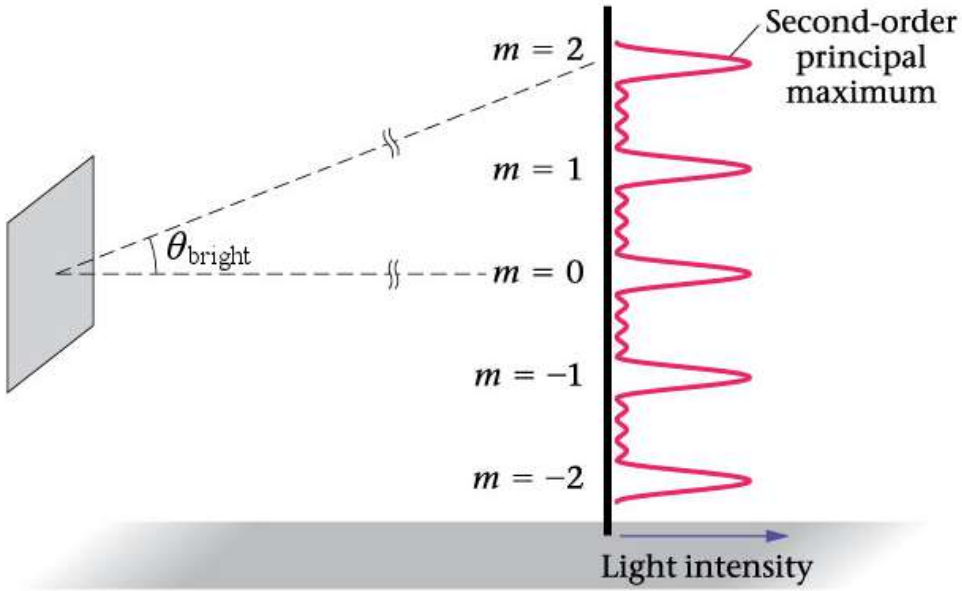
Single Slit Diffraction

When light is diffracted, it forms a diffraction pattern. You'll see the largest brightest bands in the center, with narrower, dimmer bands on the side.



Diffraction Grating

A diffraction grating is a device that is made up of many small slits that diffract light and form a pattern that is an overlap of of single slit diffraction patterns.



Wavelength from a Diffraction Grating

You can identify the wavelength of light coming from a diffraction grating using the equation below

$$\lambda = d*\sin(\quad)$$

λ - wavelength (m)
d - slit separation (m)
    - angle (degrees)