Light can tell us about objects in space: temperature, composition, speeds, and more

Use telescopes to collect light

An accelerating charged particle can create electromagnetic waves moving at the speed of light

Transverse wave, similar to a drop of water creating ripples

* Wavelength: length between crests
  + Long wavelength = low frequency
  + Short wavelength = high frequency
* Amplitude: height
* Frequency: number of waves that pass by each second
* Period: Time to complete one cycle
* Speed of light, c, is a constant (in a vacuum)

Wavelengh = Speed/Frequency

Light also behaves as both a wave and a particle

* Photon: particle of light
* Photons carry energy and can have different amounts of energy
  + High energy photons = light with high f
  + Low energy photons = light with low f
    - Blue photon has more energy than a red

Two kinds of telescopes

* Refracting telescopes use lenses
  + Primary lens: refracts
  + Focal length: distance between lens and the image (longer = larger image)
  + Aperture sets the light-gathering power
    - Larger = better
* Reflecting Telescopes
  + Use mirrors
  + There are primary and secondary mirrors
  + Focal length is determined by reflecting light off the mirrors

Photography opened the door to modern astronomy

* Process refined in the late 1800s
* Deficiencies, though
  + Faint images require very long exposure times
  + Expensive
* CCD’s (charged coupled devices, like digital cameras)
  + Electronic detectors record the photons as pixels
  + Photons create a signal in the array

Spectrum: light sorted by frequency

* Visible spectrum is the rainbow
* Sorted by frequency and wavelength
  + Red is the longest wavelength
  + Violet is the shortest
  + Other colors inbetween