LIGHT
THE GREATEST CLUE IN THE UNIVERSE

1. Parallax: (PAR uh laks) is the apparent shift in the position of an object when viewed from various angles. (textbook)
   Parallax: the difference in apparent direction of an object as seen from two different points. (dictionary)
2. luminous body emits light an illuminated body reflects light.
3. Light: is the range of frequencies of electromagnetic waves that simulates the retina of the eye. Light waves have wavelengths from about 400nm to 700 nm.
4. transmission (power lines), radio, microwave, infrared, visible light, ultraviolet, x rays, gamma rays, cosmic rays
5. ROYGBIV
6. We locate objects by assuming that light travels from them to our eyes in straight lines. (causes us to see mirages, and illusions)
7. The Danish astronomer Ole Roemer (1644-1710) was the first to determine that light did travel with a measurable speed. When Jupiter was at opposition the orbital period of IO was 22 minutes shorter than six months later when the earth had moved the diameter of its orbit. Roemer's value for the speed of light was 2.2×10^8 m/s.
   Albert A Michelson (1852-1931) calculated the speed of light by measuring the time required to make a round trip between two California mountains 35 km apart.

SPASH PHYSICS Name _____ Period ____

ABSOLUTE & APPARENT MAGNITUDE OF A STAR, PARSEC, 10 PARSECS

LUMINOUS FLUX, ILLUMINANCE, CANDELA (Page 450 in textbook, #'s 8 & 9 Hmwk #1)

A **stars MAGNITUDE** pertains to the **stars brightness**. Originally (B.C.) the brightest stars were all 1's (second to none) and the dimmest stars a magnitude of 5. After telescopes were invented they realized that the brightest stars, Sun, Moon, visible planets could not all be 1's so the devised a better system where the stars one could barely see remained magnitude 5 but if a star was 100 times brighter, it would be 5 magnitudes less. So a 0 magnitude object is 100 times brighter than a 5 and a -2 magnitude object 100 times brighter than a +3 magnitude. Now **one magnitude** smaller would be the **fifth root of 100** or about 2.51 times brighter.

The **apparent magnitude** would be how bright a star is at its current distance in space but the absolute magnitude would be how bright the star would appear to us Earthlings 10 parsecs away. A parsec is the distance an object is if it has a parallax of one second of arc (about 3.26 L.Y. where 1 L.Y. is the distance light travels in one year). Our Sun's apparent magnitude is -26 but our Sun's +4.8 magnitude (barely visible to the naked eye.)

A **luminous body emits** light waves (like stars and light bulbs) where an **illuminated body reflects light** (like the moon and the planets and satellites).

Luminous flux (P) is the rate at which light is emitted from a source. The unit of luminous flux is the **lumen (lm).**

Incandescent lights:	40 watts approx. 35 cd., or 440 lm.
	100 watts or 130 cd. or 1634 lm.
Fluorescent:	100 watts approx. 200 cd. Or 2513 lm.

In 1979, because of the experimental difficulties in realizing a Planck radiator at high temperatures and the new possibilities offered by radiometry, i.e., the measurement of optical radiation power, the 16th CGPM (1979) adopted a new definition of the candela:

> The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540×10^{12} hertz and that has a radiant intensity in that direction of 1/683 watt per steradian.

The illuminance of a surface is called the **illuminance, E**. Iluminance is measured in lumens per square meter, lm/m^2, or **lux**.

Some light sources are specified in candela, cd, or candle power. A candela is not a measure of luminous flux, but of luminous intensity.

The **luminous intensity** of a point source is the luminous flux that falls on one square meter of a sphere one meter in radius. Thus luminous intensity is luminous flux divided by 4 π.

$I = P/4\pi$ units? cd = lm/4π **$E = P/(4 \pi d^2)$ units? Lux = lm/m^2**