Optics, we see the universe

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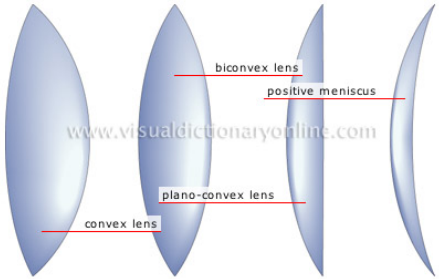
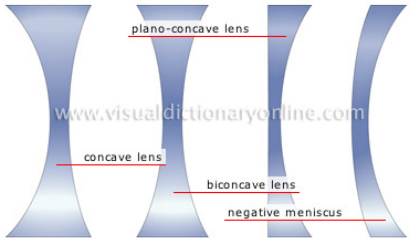
Why optics?

- Optics are our way of expanding our limited resolution of eyesight
- We use larger and larger groundbased and space based telescopes to gather more light
- We also observe over multiple wavelengths to ensure we are covering a range of objects.

What optics?

- We use mirrors to reflect the recieved light and concentrate them into the objective
- Different forms of telescopes can be used, Keplerian, Galilean, Newtonian etc.
- The Newtonian is a reflector which uses mirrors, and the other two uses lenses and are refractors.
- The lenses refract light and there is magnification based on the ratio of focal lengths $\frac{f_o}{f_e}$





How do you measure optics

- You will use the plain mirrors to measure mirror properties like the θ_i, the angle of incidence, and θ_r the angle of reflection
- You will have $\theta_i = \theta_r$
- This is the crucial characteristic that lets astronomers use telescope.
- You will build telescopes in this lab!!(No but its still cool;))
- You will measure the magnifications from two different types of telescopes built with different kinds of lenses, called Keplerian and Galilean and you will have to evaluate the usefulness of each
- There are positive and negative lenses, you will determine which is better,for a telescope
- Positive lenses magnify and negative lenses don't

Lens formulae

- The important idea we will take out of this lab is the formula for calculating the focal length of the telescope
- The formula is

$$\frac{1}{f} = \frac{1}{a} + \frac{1}{b}$$

  where a is the distance between the lens and the screen and b is the distance from the second lens to the eye and f is the focal length.
- Talk to me if you have trouvble with adding fractions.