Astronomy Stations Lab Name:

1. Telescopes

1. Why are some telescopes used on Earth while others are launched into orbit above Earth’s atmosphere?
   1. The atmosphere can distort the image making it difficult get fine resolution in your images. Additionally the atmosphere can block certain wavelengths we want to look at such as IR and UV light
2. Different types of telescopes collect different wavelengths of light. Describe three different telescopes.
   1. Visible light telescopes: Reflecting and Refracting telescopes
   2. Radio Telescopes: uses a large dish with a receiver
   3. X-ray telescopes: used above the atmosphere so the x-rays aren’t absorbed by the atmosphere. They detect emission from hot regions
3. Describe the difference between how a refractor & reflector telescope work.
   1. Refractive Telescopes use a convex lens to bend and focus the light.
   2. Reflective Telescopes use a concave mirror and produce better focused images
4. Which is more important: telescope length or width? Why? Width, because it allows more light in
5. How do you increase the magnification power of a telescope? Change the eyepiece - there’s no zoom button

2. Microscopes

1. What is the major difference in the image seen in a compound microscope vs. the image seen in a dissecting microscope?
   1. Image in compound microscope was upside down, while the dissecting microscope was right side up
2. Why are we looking through microscopes during an astronomy unit? What is the parallel in astronomy?
   1. Looking through the compound microscope was like looking through the telescopes

3. Magnifying Glasses

Take some time to familiarize yourself with the magnifying glass.

1. List 3 observations when playing with the magnifying glass.  
   you can make things bigger, smaller, right side up and upside down
2. Describe how to make the image upside down.  
   move the magnifying glass farther away to view the object
3. Describe how to make the image actual orientation (right side up).   
   move the magnifying glass closer to view the object

4. Spectroscopes & Spectral Tubes

Take some time to look through the spectroscopes and the diffraction grating at the lights in the classroom and the spectral tube.

1. What is spectroscopy?
   1. Examining the spectra produced when matter emits electromagnetic radiation
2. How is it utilized in astronomy?
   1. It allows astronomers to examine the chemical and physical properties of stars and classify them
3. List 2 characteristics of stars astronomers can observe through their spectrum.
   1. Composition of stars, relative motion (doppler shift), temperature, density
4. What do you see when viewing the spectral tube?
   1. Brightly colored vertical lines unique to the element hydrogen

5. Binoculars

Take some time to look through the binoculars and become familiar with their operation.

1. What astronomical instrument are binoculars similar to?
   1. Refracting telescope
2. Who first utilized this instrument to study stars?
   1. Galileo
3. What is the drawback to this type of instrument?
   1. Chromatic aberration (color distortion) a failure of a lens to focus all colors to the same point that produces a rainbow of colors around the image. Light bends differently as it passes through the lens based on the wavelength.
4. What are the pros and cons of a pair of binoculars versus a telescope?
   1. Binoculars see images upright, telescopes see images upside down (doesn’t matter)
   2. Binoculars don’t have the range or light collection that telescopes have

6. Parallax

Stand near the file cabinet with the basketball on it. Look at the red star. Move to the other filing cabinet with the globe on it. Look at the red star. Examine how your view changed with respect to the background. Repeat this process with the green star.

1. Which color star seemed to move the most compared to the background? Why is this?  
   the red star seemed to move the farthest, while the green star didn’t seem to move as much. The parallax angle is larger the closer you are to the star. This is why it is difficult to use parallax when objects are far away – the angle is so so small.
2. Draw a picture and explain how scientists use parallax to measure the distance to stars.
3. What are the limitations of parallax?
   1. If a star is too far away, the parallax angle is too small and difficult to measure.
4. Describe one other method scientists use to measure the distance to a star.
   1. Astronomers use Cepheid variables & Type IA Supernova

7. Mirrors

Take some time to look into the mirrors and the images they make.

1. How do you observe the focal point of a mirror?
   1. Where the image flips (concave), behind the mirror (convex)
2. Why advantage do mirrors have over lenses?
   1. Mirrors are smooth which results in an undistorted image, reflects all EM waves the same way
3. What is the largest mirror used in a modern day telescope?
   1. meters (Large Binocular Telescope in 2004), 10.4 meters (Gran Telescopio Canarias in 2006-9)