



# Space PAT Review

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The (4th Last) Final Frontier

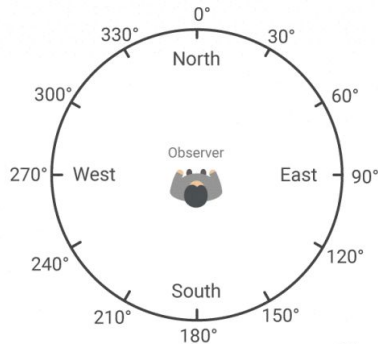
# Frame of Reference

- Our early concepts of Earth's place in the universe evolved due to our limited frame of reference
- Early humans could see the constellations made by unchanging stars
- Certain celestial bodies had repeating patterns, were named planets meaning wanderer

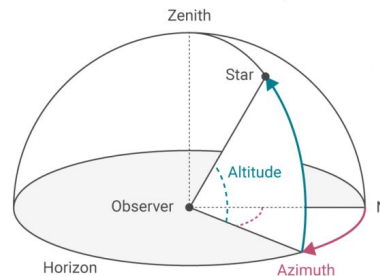


# Sky Coordinates

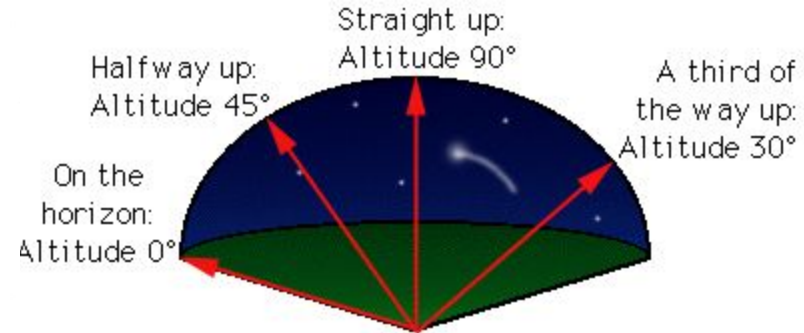
- To locate celestial bodies humans developed altitude and azimuth
- Altitude is the vertical angle of the object in the sky
- Azimuth is the angle of rotation from North
- A sextant is used to measure altitude
- A compass is used to measure azimuth



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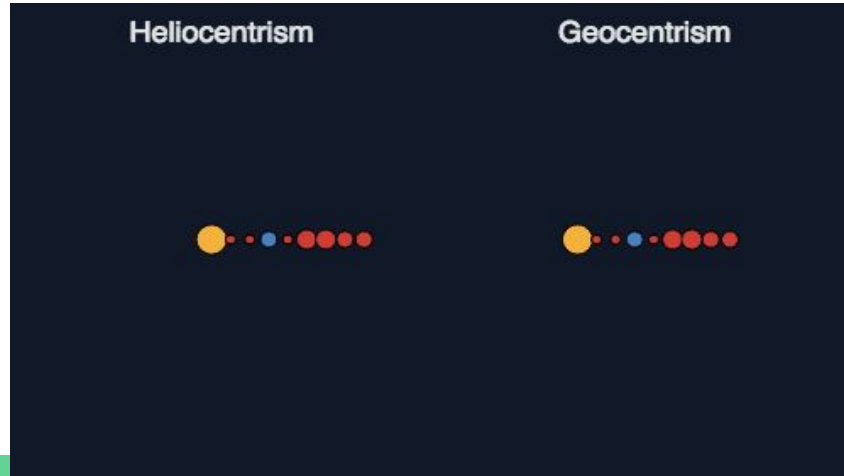


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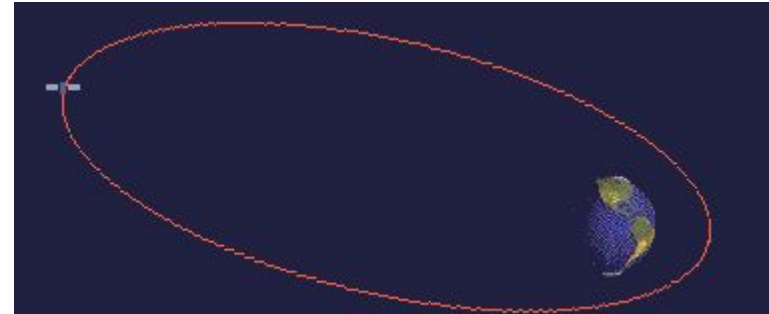
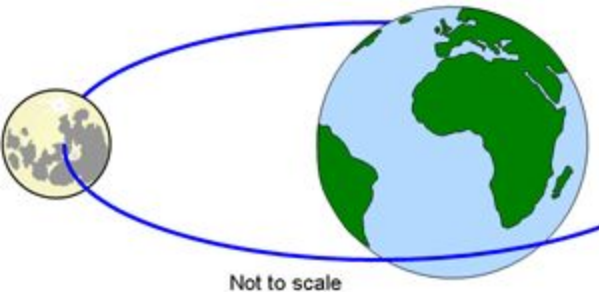
# The Solar System

- The Earth was originally thought to be the centre of the solar system with all celestial bodies revolving around the Earth - known as the Geocentric model
- We now know that the Sun is the centre of the solar system - known as the Heliocentric model
- Geocentric model had retrograde motion in order to match our observations with the model



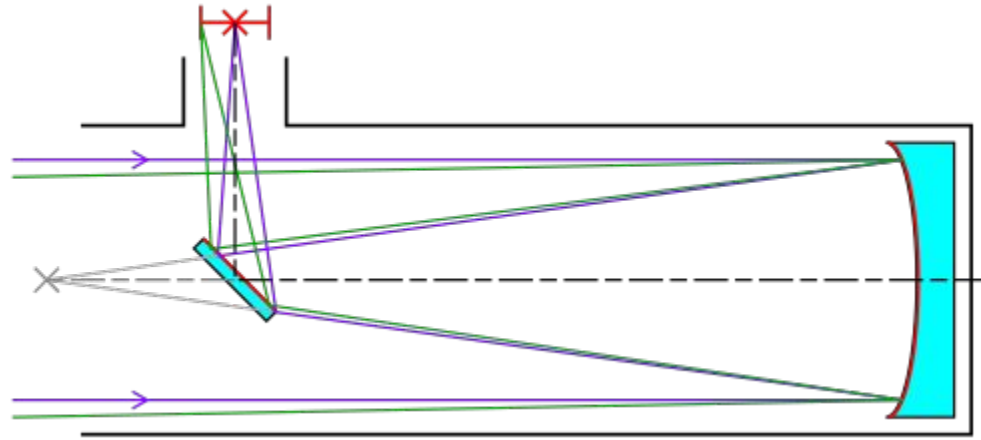
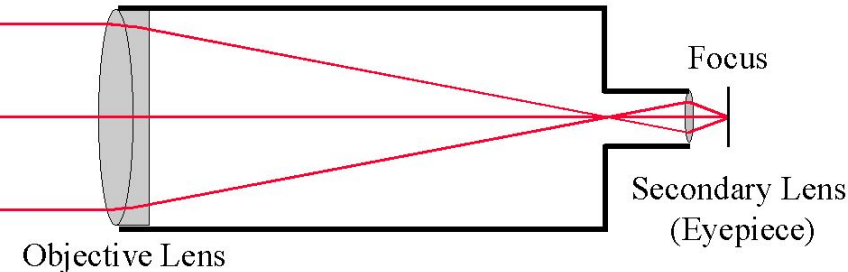
# Universal Gravitation

- Everything with mass has gravity
- Everything with gravity is attracted to everything else with gravity
- Due to these force interactions planets will “slingshot” around the Sun during their orbit
- This creates an elliptical orbit rather than a circular one



# Telescopes

- A simple telescope has two lenses to magnify objects at great distances
- Objective lens is closer to the object you are looking at
- Ocular lens is the eyepiece lens
- Telescopes with great resolving power have greater detail when looking at objects
- Refracting vs reflecting telescopes



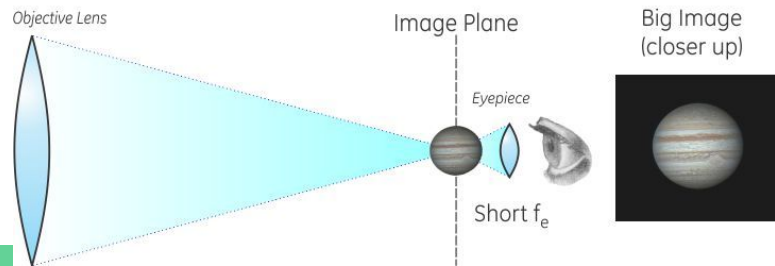
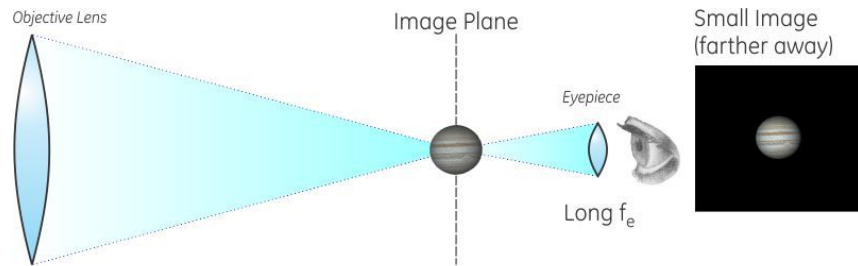
# Magnification

- To increase the resolving power of the telescope we must increase the amount of light brought in by the telescope
- To calculate the magnification of a telescope

Objective lens diameter

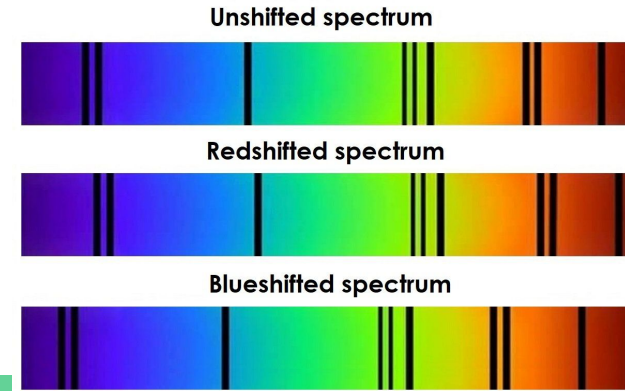
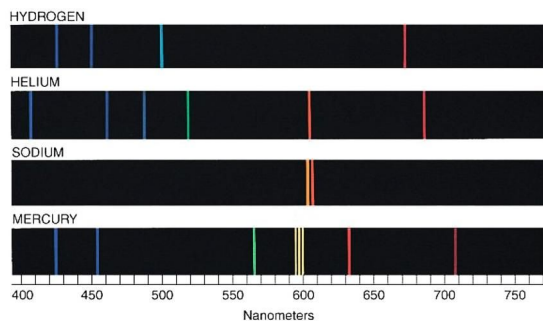
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Eyepiece lens diameter



# Spectroscopy

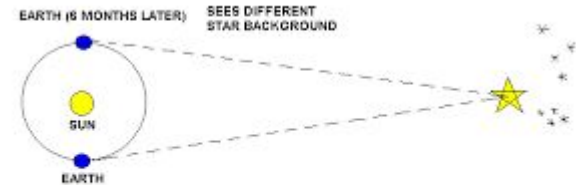
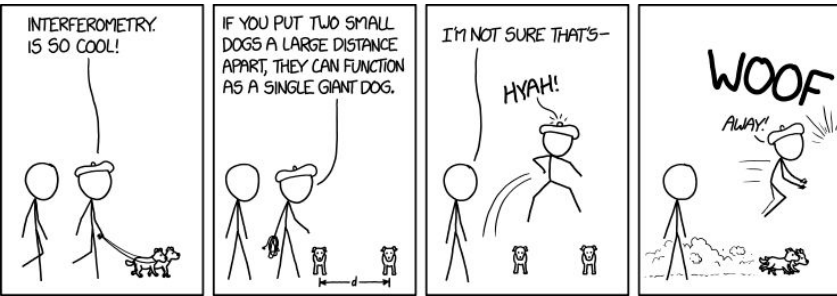
- Light can be broken down into a spectrum of colours through a spectroscope
- This spectrum creates a fingerprint for each star out of the unique spectral lines
- Each spectral line is due to a different elements being present in the star
- As stars move away from us the light is shifted to the red
- As stars move closer to us the light is shifted to the blue





# Bigger and Better Telescopes

- We can combine the images from two or more telescopes through interferometry to create a larger image
- To lessen distortion in telescopes scientists will use computer technology such as filters or put the telescope outside of our atmosphere
- Distances to stars in space are measured in Astronomical Units - distance from Earth to Sun
- Telescopes will often use triangulation to calculate the distance to stars - longer baseline = more accurate calculation



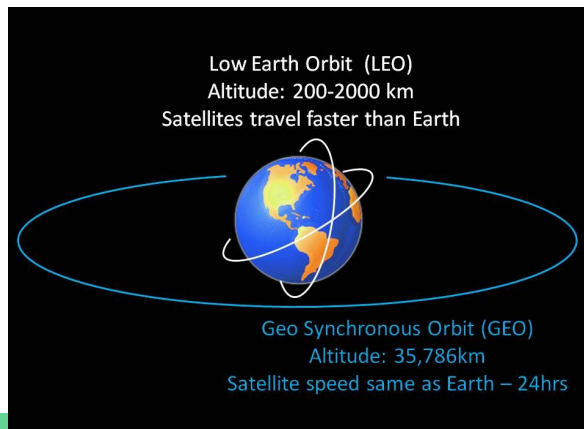
# Radio Telescopes

- Some telescopes can view non visible parts of the EMR spectrum
- Radio telescopes view radio waves which are not affected by atmospheric distortion



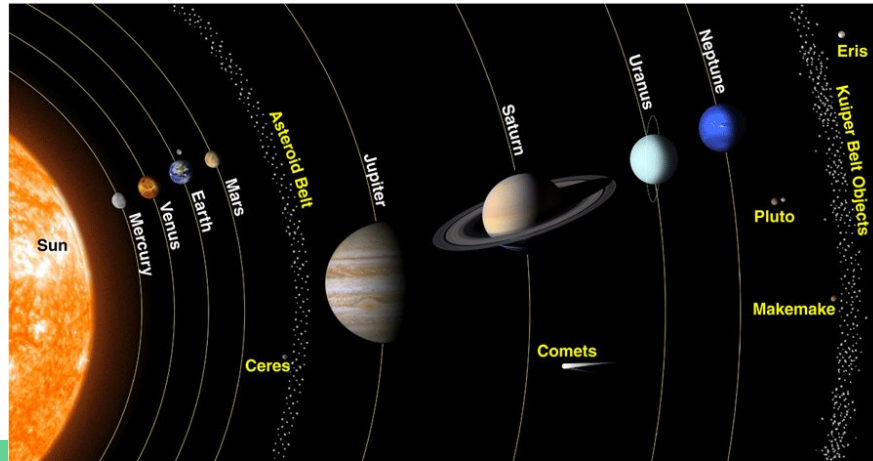
# Rockets and Satellites

- Rockets have 3 parts - payload, fuel and tube
- Satellites can be in a low Earth orbit or Geosynchronous orbit
- Low Earth is good for communication, travels very fast and low around the Earth Ex. ISS
- Geosynchronous is good for continuous signal, moves slowly and high around Earth Ex. Radio signals



# Planets

- First 4 planets are known as terrestrial planets (inner planets)
- Rocky, small, close to Sun, shorter orbits
- Asteroid belt separates first 4 planets from the last 4
- Next 4 planets are known as Jovian planets (outer planets)
- Gaseous, large, longer orbits



# Canada! And Space!

- Canada made the Canadarm and Canadarm 2

