



STARGAZING

By: Kyra A., Catherine A., & Lily S.

ASTRONOMY

the branch of science which deals with celestial objects, space,
and the physical universe as a whole.

Astronomy vs. Astrology

ASTROLOGY

- ☆ "study of the stars"
- ☆ Not science
- ☆ Resulted from the sun/weather controlling the market
- ☆ Resulted in people studying the stars + searching for patterns
- ☆ However people only remember the successes of the predictions
- ☆ Not very accurate

ASTRONOMY

- ☆ "Law or culture of the stars"
- ☆ Science
- ☆ Based on observation
- ☆ Resulted from Newton applying mathematics to prove his point
- ☆ Resulted in the geocentric model being replaced by heliocentric
- ☆ Puts us in our place

EARLY ASTRONOMERS

- ☆ Ptolemy, Plato, and Aristotle endorsed geocentric model
- ☆ Copernicus invented heliocentric model, Brahe and Kepler improved upon it
- ☆ Isaac Newton applied and enhanced our mathematics
- ☆ Galileo made telescopes better and Newton better still
- ☆ Hipparchus cataloged the stars
- ☆ Abd Al-Rahman Al-Sufi translated and named the stars
- ☆ Eratosthenes measured the circumference of Earth
- ☆ Aristarchus measured distances from Earth to the moon and sun

STARS IN OUR SKY

- ☆ Hipparchus created the first catalogue of stars, ranking them in brightness or magnitude
- ☆ the lower the magnitude, the brighter the star

☆ Prominent stars in our night sky include:

- | | | |
|----------------|-----------|-------------|
| ☆ * Sirius | * Polaris | * Arcturus |
| ☆ * Betelgeuse | * Rigel | * Aldebaran |

CONSTELLATIONS - PATTERNS IN THE SKY

- ☆ Orion → comprised of seven main stars: Betelgeuse, Rigel, Bellatrix, Alnilam, Saiph, and Sigma Orionis.
- ☆ Ursa Minor (also known as little bear or little dipper) → comprised of stars: Polaris (North Star), Kocab, Pherkad, Yildun, and Pherkad Minor.
- ☆ Ursa Major (also known as big bear or big dipper) → main stars include: Alpha Ursae Majoris, Beta Ursae Majoris, and Eta Ursae Majoris.
- ☆ Stars receive names based on the constellation they are found in and their brightness; most are assigned a number

COLOR SHIFTS

- ☆ Objects in our sky can appear different colors, due to the Doppler effect
- ☆ A red shift implies the object is moving away from our point of reference.
- ☆ A blue shift implies the object is moving towards our point of reference.
- ☆ Most objects in our sky are red-shifted → universe is expanding

TWINKLING

- ☆ Twinkling occurs due to turbulent air in Earth's atmosphere, which distorts incoming light and makes it appear to shift position and brightness.
- ☆ Stars that do not twinkle are mostly planets.
- ☆ Naked eye planets: Mercury, Venus, Mars, Jupiter, & Saturn.

LESSONS FROM THE MOON

☆ Waxing: Leading up to a full moon

☆ Waning: Leading up to a new moon

☆ The cycle lasts approximately 29.5 days

☆ Using the size of Earth and through the moon phases, the distance to the sun can be calculated



☆ Light moves right to left:

☆ New moon, waxing crescent, first quarter, waxing gibbous, full moon, waning gibbous, third quarter, waning crescent

WHAT TIME DOES THE MOON RISE?

☆ Rise times

- New Moon: Sunrise
- 1st Quarter: Noon
- Full Moon: Sunset
- 3rd Quarter: Midnight

☆ Shares the sky with the sun

☆ opposite sides of Earth see the same phase

☆ southern hemisphere sees the same phase, but flipped



ECLIPSES: SOLAR AND LUNAR

Solar Eclipse:

- ☆ Occurs when the moon passes between the Earth and the Sun.
- ☆ casts a shadow on the Earth, and in the middle, most concentrated section of shadow is the area of totality, where people will experience a total solar eclipse.

Lunar Eclipse:

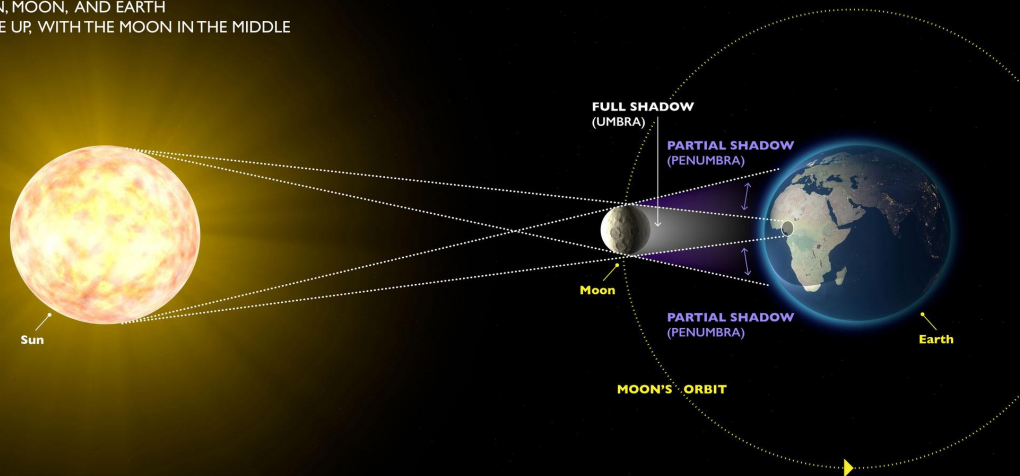
- ☆ Occurs when the Earth passes between the moon and the sun
- ☆ The Earth blocks light from the sun, resulting in a shadow cast over the moon.
- ☆ Shadow of the earth on the moon can be tracked and measured to calculate how far the moon is from Earth

SOLAR ECLIPSE:

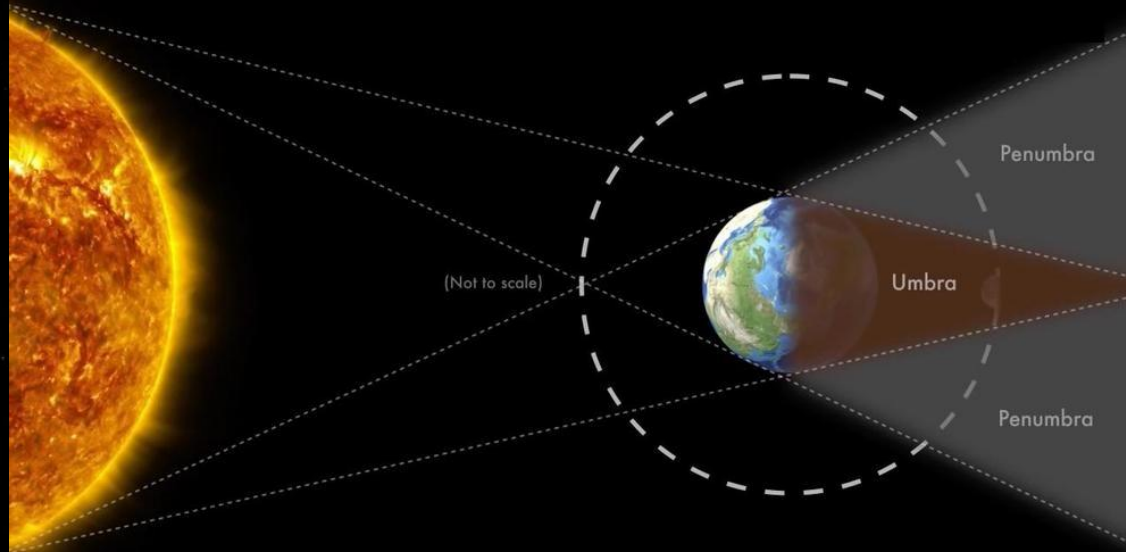


SOLAR ECLIPSE

SUN, MOON, AND EARTH
LINE UP, WITH THE MOON IN THE MIDDLE



LUNAR ECLIPSE:



TELESOPES

Little can be seen with our naked eye, but with the aid of telescopes, much more can be revealed. Telescopes make things easier to see: to make the invisible visible, and to make things already visible visible more clearly.

Refracting vs. Reflecting

THE TWO TYPES OF TELESCOPES:

Refracting

- ☆ First invented by Hans Janssen
- ☆ Magnifies light through refraction, and uses converging lenses
- ☆ More magnification → larger lenses

Reflecting:

- ☆ First invented by Isaac Newton
- ☆ Magnifies light through reflection and mirrors
- ☆ Modern day telescopes, such as Hubble or Mt Wilson use the reflecting models

THE TWO TYPES OF TELESCOPES (CONT.):

Refracting:

Advantages:

- ☆ Objects that look like a dot from a distance can be magnified and made much more visible.

Disadvantages:

- ☆ Lenses bend different frequencies of light by different amounts.
- ☆ Bigger lenses are more difficult to make, and easier to break.

Reflecting:

Advantages:

- ☆ You only have to polish one side of a mirror.
- ☆ Mirrors can be supported by the back, and are easier to make.

Disadvantage (also applies to refracting telescopes):

- ☆ The Earth's atmosphere blocks many frequencies of light, so the telescope cannot see everything.

A landscape photograph of a sunset. The sun is low on the horizon, casting a warm orange glow across the sky and reflecting on a body of water in the distance. The foreground is a dark, textured field. The sky is a deep blue with several white streaks, likely from aircraft or satellites. The overall mood is serene and contemplative.

Remember... we can only see 4% of the observable
universe with the naked eye...