

Ancient Astronomy

Myths, folklore and legends were used to explain observations in the night sky.

First Nations people of the Pacific Northwest – believed the night sky was a pattern on a great blanket overhead, which was held up by a spinning 'world pole' resting on the chest of a woman named Stone Ribs.

Inuit in the high Arctic – used a mitt to determine when seal pups would be born, by holding the mitt at arm's length at the horizon.

The **Ancient Egyptians** built many pyramids and other monuments to align with the seasonal position of certain stars.

Aboriginal Peoples of Southwestern Alberta used key rocks, which aligned with certain stars, in their medicine circles.

Solstice

– the shortest and longest periods of daylight
Winter solstice - shortest period of daylight
(N. Hemisphere - Dec. 21)
Summer solstice – longest period of daylight
(N. Hemisphere - June 21)

The **Ancient Celts** set up megaliths, in concentric circles, at Stonehenge to mark the winter and summer solstices.

Ancient African cultures set large rock pillars into patterns to predict the timing of the solstices as well.

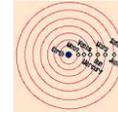
Equinox

– represents periods of equal day and night
Autumnal equinox – occurs in the fall
(N. Hemisphere – Sept. 22)
Vernal equinox – occurs in the spring
(N. Hemisphere - Mar. 21)

The **Mayans of Central America** built an enormous cylinder shaped tower, at Chichen Itza, to celebrate the two equinoxes.

Planetary Models

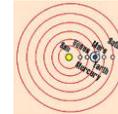
Ancient cultures tried to explain the motions of the stars and planets. Two models of how the planets moved in space evolved over time.



GEOCENTRIC

Aristotle's Model
Assisted by Pythagoras and Euclid

The Earth is the center of our Solar System



HELIOCENTRIC

Copernicus' Model
Confirmed by Galileo and Kepler (Elliptical orbits were proposed by Kepler)

The Sun is the center of our Solar System

Discovery through Technology

The earliest astronomers used several tools to chart the position of objects in the sky and to predict where the sun, moon, and certain stars would move. Objects in the night sky served as a timekeeper and navigational aid.

Early Telescope
Quadrant
Armillary Sphere
Astrolabe
Sextant
Merket
Cross-staff



When you view an object in the sky you are seeing it as it was in the past. It has taken the light a very long time to reach the Earth. The Hubble telescope is capturing light from 12 billion years ago.

Distance in Space

The **astronomical unit** is used for measuring 'local' distances in the solar system. It is equal to the distance from the center of the Sun to the center of the Earth (approximately 149,599,000 kms).

A **light year** is equal to the distance light travels in 1 year (approximately 9.5 trillion kms). It is used for longer distances – to stars and galaxies. The distance to our nearest star, **Proxima Centauri** is a little over 4 light years.

A **parsec** is a basic unit of length for measuring distances to stars and galaxies, equal to 206,265 times the distance from the earth to the sun, or 3.26 light-years. The nearest star, **Proxima Centauri** is about 1.31 parsecs from the Earth.

STARS

Birth of Stars - Stars form in regions of space where there are huge accumulations of gas and dust called **nebulae**. **Interstellar matter**, which makes up part of the nebulae, originated from exploding stars. The process of 'star-building' is known as **fusion**, which releases great amounts of energy and radiation.

A star is a hot, glowing ball of gas (mainly hydrogen) that gives off light energy. Stars vary in their characteristics. Very hot stars look blue, while cooler stars look red.

Stars fall into distinct groupings. In the 1920's, Ejnar **Hertzsprung** and Henry Norris **Russell** compared the surface temperature of stars with its brightness (luminosity). They graphed their data to show the relationship between **brightness and temperature** of stars was not random.

GALAXIES

A galaxy is a grouping of millions or billions of stars, gas and dust. It is held together by gravity.



The **Milky Way Galaxy** is the galaxy our solar system is a part of. It is shaped like a flattened pinwheel, with arms spiraling out from the center.



Black holes are actually invisible to telescopes. Their existence is only known by an indirect method – when celestial material comes close to a black hole it becomes very hot and very bright

The formation of our solar system is based on the '**protoplanet hypothesis**', which follows three steps:

1. A cloud of gas & dust in space begin swirling
2. Most of the matter (more than 90% of it) accumulates in the center – forming the Sun
3. The remaining materials accumulate (forming planets) and circle the Sun

Star Groups

Constellations are the groupings of stars we see as patterns in the night sky. There are 88 constellations and many are explained in Greek Mythology.

Asterisms are also groupings of stars but are not officially recognized as constellations.

TRACKING OBJECTS IN SPACE

Elliptical paths can help Astronomers and scientists to trace and predict where bodies in space are, have been and will be in the future. The understanding of orbits has led to the discovery of many different comets.

NASA tracks asteroids, comets and meteors that have been discovered by observatories and amateur astronomers.

Planet summary cards
Other Bodies in Space

(Use the **SPACE Content Card Set** to review details about the planets and objects in space)