

Astronomy

I. Enduring Understanding:

Organization of the solar system can be used to understand the motion of the stars, sun, moon and planets in the sky.

Essential Questions:

How can the position and motion of celestial bodies be used to understand what we see in the night sky?

How could people 200 years ago have thought the Earth was in the center of the solar system?

Student Outcomes: Students will:

- A. Understand that the position of the Earth, Sun and Moon be used to understand the phases of the moon and eclipses.
 1. Use the orbit and the moon and earth and the position of the sun to explain and predict the phases of the moon.
 2. Estimate the time of day knowing the position and phase of the moon.

- B. Understand that the Position and motion of the stars, sun, moon and planet be use to explain and predict the apparent motion of the stars, sun, moon and planets in the sky.
 1. Explain why many historic models of the solar system were reasonable given what they could observe.
 2. List and describe the discoveries that caused humans to change their understanding of the solar system (and why).
 3. Identify which historical models could account for various observations.

- C. Understand what is it about the arrangement of the Earth and Sun that accounts for the Seasons.
 1. *Use the arrangement and motion of the earth and Sun to explain the cause of seasons on Earth.*

II. Enduring Understanding:

The universe is an ever changing place of immense size and spectacular phenomena.

Essential Questions:

How do astronomers learn about places in the universe they cannot visit?

How can the laws of physics be used to explain the changes we see in stars, galaxies, and the universe?

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Student Outcomes: Students will:

- A. Understand how scientists use electromagnetic waves to learn about places they cannot visit.
 - 1. Use spectra from a star to determine some of the elements present in the star.
 - 2. Compare the temperatures of two stars if their peak EM wavelength is known.
 - 3. Appreciate why astronomers might view the same object at different wavelengths of EM waves.
 - 4. Sort the EM spectrum by wavelength and frequency.
 - 5. Relate the temperature of a main sequence star to its luminosity
 - 6. Distinguish between apparent brightness and luminosity.
 - 7. Know and be able to use relationship between distance and apparent brightness.

- B. Understand how the ideas from physics can be used to explain the evolution of planets, solar systems, stars, and the universe.
 - 1. *Describe formation of the solar system according to the solar nebula theory.*
 - 2. *Demonstrate that the solar nebula can account for many features of our solar system.*
 - 3. *Explain how gravity, rotation and nuclear fusion are required in the formation of the solar system*
 - 4. *Explain how gravity and nuclear fusion would cause a star to evolve.*
 - 5. *Describe the stages of a star's life, and the proper order of these stages.*
 - 6. Use a plot of temperature and luminosity to show where various life stages of a star occur on this plot.
 - 7. Describe and apply the relationship between star temperature and its color.
 - 8. *Discuss the evidence suggesting the value of the big bang theory in describing the origin and evolution of the Universe.*

III. Enduring Understanding:

Humans explore the planets, sun and moons to learn about the history future, and nature of the solar system, its planets and life.

Essential Questions:

What are the coolest (most scientifically interesting spots) in the solar system?

Why was landing on the moon such an impressive achievement?

Why do humans explore the solar system?

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Student Outcomes: Students will:

- A. Understand what is meant by a scientifically interesting place in the solar system
 - 1. Identify scientifically interesting places in the solar system.
 - 2. List of scientifically interesting places in our solar system and justify why the places are on the list.
 - 3. Describe why some places are scientifically interesting.
 - 4. *Explain the groupings and patterns of the planets*

- B. Understand the impressive achievement that is the exploration of space.
 - 1. Describe the small steps taken by NASA in the quest to land a man on the moon.
 - 2. Recognize the relationship between the politics and the effort to land a man on the moon.
 - 3. Be able to relate the small steps approach of exploring the moon to the exploration of other planets.

- C. Understand some of the reasons humans explore space
 - 1. List some of the reason humans explore the solar systems.