

Unit 6: Are we alone? The Universe

Unit Overview:

Inquiry Statement – Characteristics of systems leave evidence that provide patterns in which to examine our orientation in place and time.

Global Context – Orientation in place and time

Key Concept – Systems Related Concepts - Evidence and Patterns

Standards (TEKS):

8B recognize that the Sun is a medium-sized star near the edge of a disc-shaped galaxy of stars and that the Sun is many thousands of times closer to the Earth than any other star

8D model and describe how light years are used to measure distances and sizes in the universe

8A describe components of the universe, including stars, nebulae, and galaxies, and use models such as the Hertzsprung-Russell diagram for classification

8C explore how different wavelengths of the electromagnetic spectrum such as light and radio waves are used to gain information about distances and properties of components in the universe

8E research how scientific data are used as evidence to develop scientific theories to describe the origin of the universe

Review Material (incorporated into unit):

7.9A analyze the characteristics of objects in our solar system that allow life to exist [on Earth] such as the proximity of the Sun, presence of water, and composition of the atmosphere

(Some) Unit Questions:

- What are the characteristics and location of the sun within our galaxy?
- How do we use light years to measure distance and size in the universe?
- How do scientists describe the components of the universe?
- How is the HR Diagram used to classify stars?
- How are different wavelengths of the EM spectrum used to gain information about distances and properties within the universe?
- What evidence supports scientific theories on the origin of the universe?

Student Understandings:

- The sun is a medium sized star near the edge of a disc-shaped galaxy close to the earth.
- The light year is used to measure distances and sizes in the universe.
- Components of the universe include stars, nebulas, and galaxies.
- HR Diagrams are used to classify stars.
- The EM spectrum provides information about the components of the universe.
- Data supports scientific theories about the origin of the universe

Key Vocabulary Words:

Big Bang Theory – the Big Bang hypothesis states that all of the current and past matter in the Universe came into existence at the same time, roughly 13.8 billion years ago

EM Spectrum – (electromagnetic spectrum) The entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light.

Frequency - the number of crests of a wave that move past a given point in a given unit of time

Galaxy - A large, self-contained mass of stars

HR Diagram - The Hertzsprung–Russell diagram, is a scatter plot of stars showing the relationship between the stars' absolute magnitudes versus their temperatures

Light Year – a unit of astronomical distance equivalent to the distance that light travels in one year, which is 9.4607×10^{12} km (nearly 6 trillion miles)

Magnitude – The brightness of a celestial body (can also mean size)

Nebula – a cloud of gas and dust in outer space, visible in the night sky either as a bright patch

Relativity – a theory developed by Albert Einstein which says that the way that anything except light moves through time and space depends on the position and movement of someone who is watching

Spectroscope – A device used to breakup light into its component colors; different elements can be identified by the different colors

Star - An object in the sky that sends out its own light, generated by nuclear reactions in its center

Universe – space and all of the matter and energy in it

Waves (light) - A light wave is a type of electromagnetic wave. Light waves on the electromagnetic spectrum include those that are visible as well as those that are invisible to the human eye

Where to find resources –

- Unit 6 on teacher website – flippedoutscience.com

Look not only through the power points, but also at the review section

- Textbook – Unit 6 starts on p. 265
- You will be given resources such as handouts, study pages and packets as well as class notes and activities