01 - Foundations: Exploring the Sky

Content Area: **Science**
Course(s): **Astronomy**
Time Period: **Semester 1**
Length: **6 weeks**
Status: **Published**

Standards

	Patterns
PS2.A	Forces and Motion
HS-PS2-4	Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.
	Constructing Explanations and Designing Solutions
	Developing and Using Models
	Systems and System Models
	Scale, Proportion, and Quantity
HS-ESS1-4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
ESS1.B	Earth and the Solar System

Enduring Understanding

- Our experience of life on Earth, both physical and metaphysical (such as the nature of our seasons and our conception of the passing of time), is a product of the relative motion of astronomical bodies.
- The same basic theories that explain the physical world at the human scale explain the universe at the astronomical scale.
- All objects in the universe effect on another.
- All elements on Earth and in space were created during the big bang.
- Light and the electromagnetic spectrum are the keys to studying the universe.
- Mass, distance and time are measured using mathematical models.
- The universe is always evolving.
- We live in the local group within a spiral arm of the Milky Way galaxy

Essential Questions

1. How does the relative motion and geometry of the Earth in relation to other astronomical bodies impact our experience of life on Earth?

2. How does the evolution of human understanding of the universe itself mirror the evolution of human understanding of the nature of science?

3. How can the same theories that explain small scale interactions at the human scale explain observed phenomena at the astronomical scale?

4. How can interactions at the microscopic scale of the structure of an atom provide data about phenomena at the astronomical scale?

5. How does astronomy answer the question: What are we?

6. What can astronomy tell us about the human race and planet Earth?

7. How do we know so much about distant space if we can't travel there?

8. How big is "big" and how long is a "long time"?

9. How do modern astronomers study the universe?

Knowledge and Skills

Students will come to acquire the following content knowledge and skills

Knowledge

- The rotational period of the Earth and the period of its revolution with the sun define the basic units of human timekeeping, the day and the year.

- The axial tilt of the Earth with respect to its orbital plane result in seasonal variations on Earth.

- The revolution of the Earth around the sun results in the annual differences in perspective of the constellations in the night sky.

- The relative motion of the Earth-Moon-Sun system explain the phases of the moon and the periodic nature of lunar and solar eclipses.

- The degree to which precise observations of the heavens could be made influenced the evolution of human understanding of the universe from the Ptolemy's geocentric model to Copernicus's heliocentric model.

- Gravity, in conjunction with Newton's laws, explain Kepler's laws of planetary motion and provide the theoretical basis for astronomical motion.

- The light that provides the basic information about the location and movement of astronomical bodies is but one frequency band of the electromagnetic spectrum, and the remainder of this electromagnetic spectrum provides additional useful data regarding astronomical bodies, such as the body's

temperature.

- A gaseous atom's behavior in response to changes in energy lead to emission or absorption spectra that provide useful data regarding the elemental composition of astronomical bodies.
- The ability of electromagnetic waves, such as light, to reflect and refract allow for the creation of telescopes and explains their limitations and design challenges (atmospheric blurring, chromatic aberrations, etc.)
- Revolution vs. Rotation
- Terrestrial vs. Jovian
- Kuiper Belt
- Characteristics of the 8 planets and their moons
- Water in space
- Composition of meteorites, asteroids, and comets
- Missions to the Moon and other planets

Skills

- Make calculations using various astronomical units and conversions within the metric system.
- Use scientific concepts and data to make informed decisions.
- Identify objects in the night sky using a telescope and the naked eye.
- Assemble an accurately scaled model of the solar system.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit?usp=sharing