

Unit 6: Beyond Earth

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

State Mandated Topics Addressed in this Unit

This unit aligns with the following NJ Student Learning Standards for Science (NJSL-S) and supports understanding of space science, celestial phenomena, and the Earth-Moon-Sun system:

NJSL-S Performance Expectations:

- **HS-ESS1-1:** Develop a model based on evidence to illustrate the life span of the Sun and the role of nuclear fusion in the Sun's core to release energy that eventually reaches Earth.
- **HS-ESS1-2:** Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
- **HS-ESS1-3:** Communicate scientific ideas about the way stars, over their life cycle, produce elements.
- **HS-ESS1-4:** Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Integrated Mathematics Standards (NJSL-M):

- **F-IF.B.4:** For a function that models a relationship between two quantities, interpret key features of graphs and tables.
- **A-SSE.A.1:** Interpret expressions that represent a quantity in terms of its context.

Science & Engineering Practices (SEPs):

- SEP 2: Developing and Using Models
- SEP 4: Analyzing and Interpreting Data
- SEP 5: Using Mathematics and Computational Thinking
- SEP 6: Constructing Explanations and Designing Solutions
- SEP 7: Engaging in Argument from Evidence

Crosscutting Concepts:

- Patterns
- Scale, Proportion, and Quantity
- Systems and System Models
- Energy and Matter

These standards support instructional objectives including:

- Understanding the Earth-Moon-Sun system, eclipses, tides, and seasons
- Modeling the motion and interaction of celestial bodies
- Analyzing star formation, nuclear fusion, and stellar life cycles
- Interpreting spectral data and astronomical observations
- Exploring galaxy formation and the expansion of the universe
- Evaluating how space phenomena impact Earth's systems and technological applications

Unit Summary

This unit introduces students to the structure and behavior of celestial bodies beyond Earth and how these dynamic systems influence our planet. Students will investigate the interactions between the Earth, Moon, and Sun, including eclipses, tides, and seasons. They will explore the organization and motion of the solar system, the characteristics and life cycles of stars, and the formation of galaxies. The unit also addresses modern tools and methods scientists use to study space, such as telescopes, satellites, and spectral analysis. Through evidence-based models and simulations, students will gain a clearer understanding of Earth's place in the universe and how cosmic phenomena affect conditions on Earth.

Learning Objectives

- How are other objects in our universe formed?
- How do astronomers study space?
- How do modern technologies help scientists explore and understand space?
- How do the life cycles of stars contribute to the formation of elements?
- How does nuclear fusion power the sun and other stars?
- How does the interaction of the sun, moon and earth affect our planet?
- What are the biggest differences between the inner planets and the outer planets?
- What are the challenges and benefits of space exploration?
- What evidence supports the Big Bang theory and our understanding of the universe's origin?
- What forces govern the motion of objects in our solar system?

Essential Skills

- Describe ancient views of the universe and how early astronomy benefited civilizations.
- Describe and compare solar and lunar eclipses using labeled diagrams.
- Describe moon theory and the Big Bang Theory
- Describe the layers of the sun's atmosphere and their features.
- Draw out a picture of a solar eclipse and a lunar eclipse. Include where the umbra and penumbra would be.
- Explain how tides occur and how they are affected by the Moon and Sun.
- Explain the cause of seasons and identify key seasonal dates.
- Identify historical astronomers and their contributions to our understanding of space.
- Identify the number of tides and on Earth and how they are affected by space.
- List and describe characteristics of all eight planets, including order from the Sun.
- Name all of the famous astronomers learned about and their contribution to astronomy
- Name all of the phases of the moon
- Name and describe all 8 planets. (ex. Which is the hottest, which one has rings etc.) and put the planets in order starting with the one closest to the sun.
- Name and sequence the phases of the moon.
- Name the layers of the sun's atmosphere and their characteristics.
- Name the life cycle of a star.
- Name what ancient astronomers thought the universe revolved around and how they benefited from studying space.
- Outline the life cycle of a star from formation to end stage.
- Summarize the Moon formation theory and the Big Bang Theory.
- Write the changes in dates for our seasons and what causes seasons on our planet.

Standards

SCI.HS-ESS1-1	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.
SCI.HS-ESS1-2	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
SCI.HS-ESS1-3	Communicate scientific ideas about the way stars, over their life cycle, produce elements.
SCI.HS-ESS1-4	Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

Instructional Tasks/Activities

- Big Bang and Beginning of the Universe
- Build Your Own Universe Lab
- Common assessment chapter test
- Common assessment quiz

- Constructed response
- Do now's and/or exit slips
- Exit Cards (answer to daily objective questions)
- Graphic organizers or models
- Guided practice
- Homework
- Homework
- Individual, small, and large group work
- Intro to Space Science
- Laboratory investigations within small groups
- Moon Formation Theories and Lesson
- Moon Phases and Tides
- Orbits and Kepler Intro
- Orbits Virtual Lab
- Orbits/Kepler Lab
- Planet formation and our solar system
- Review Activity
- Section Review Questions
- Solar System and Planets Project
- Space Science Research Project
- Star formation lesson
- Star formation project
- Stars and star formation lesson
- Study Guide Packets
- Vocabulary flash cards or map (word, picture, sentence, example)

Assessment Procedure

- Flashcards and/or drill and practice
- Inquiry based activities with reflective discussion
- Laboratory groups
- Lecture with note taking or guided notes
- Online models and simulators
- Power point presentations
- Whole and small group discussions

Recommended Technology Activities

- Appropriate Content Specific Online Resource

- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers

- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1
- Resource 2
- Resource 3
- Resource 4
- Resource 5

