# Unit 1 the Night Sky

Content Area: **Science**
Course(s): **Astronomy 1**
Time Period: **September**
Length: **4 weeks**
Status: **Published**

## Enduring Understandings

Various skills can be utilized to visualize and analyze content, concepts and data.

Students understand the concept of scale.

Stars are the most fundamental visible component of the universe. Roughly as many stars reside in the observable universe as there are grains of sand in all the beaches of the world-around a hundred sextillion, or About 10E23.

Identify Earth's place in the universe.

## Essential Questions

How can the scientific method of investigation be used in understanding the universe?

What is the difference between a theory and a hypothesis?

What makes up the universe?

How can scale be used to make sense of vast distances in the universe?

Is the type of structure we call life as common in the universe as the planets ,stars, and galaxies that we observe?

## Content

## Vocabulary

light year, supercluster, satellite, theory, hypothesis, cosmological principle, deduction,induction, scientific notation, ratios, geometry, algebra, proportionality

## Learning Objectives

Have a feel for the relative scales of our universe

Review scientific notation and metric conversions

Learn some of the basic units of measurement used in astronomy-the astronomical unit (AU) and the light-year (ly)

Learn to use the basics of “The Sky” Software to explore the solar system and universe

Describe how scientists combine observation, theory, and testing in their study of the universe.

Explain the concept of the celestial sphere and how we use angular measurement to locate objects in the sky.

Describe how and why the Sun and the stars appear to change their positions from night to night and from month to month.

Explain why Earth's rotation  axis shifts slowly with time, and say how this affects Earth's seasons.

Show how  the relative motions of Earth, the Sun, and the Moon lead to eclipses.

Explain the simple geometric reasoning that allows astronomers to measure the distances and sizes of otherwise inaccessible objects.

## Standards

NGSS: Science and Engineering Practices

**NGSS: 9-12**

Practice 1. Asking questions (for science) and defining problems (for engineering)

**Asking questions and defining problems in 9–12 builds on K–8 experiences and progress to formulating, refining, and evaluating empirically testable questions and design proble using models and simulations.**

Ask questions that arise from careful observation of phenomena, or unexpected results, to clarify and/or seek additional information.

Ask questions that arise from examining models or a theory, to clarify and/or seek additional information and relationships.

Practice 3. Planning and carrying out investigations

**Planning and carrying out investigations in 9-12 builds on K-8 experiences and progress to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.**

Select appropriate tools to collect, record, analyze, and evaluate data.

Practice 4. Analyzing and interpreting data

**Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.**

Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.

NGSS: Crosscutting Concepts

**NGSS: 9-12**

Crosscutting Statements

**1. Patterns – Observed patterns in nature guide organization and classification and prom questions about relationships and causes underlying them.**

Classifications or explanations used at one scale may fail or need revision when information from smaller or larger scales is introduced; thus requiring improved investigations and experiments.

**2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple sometimes multifaceted. Deciphering causal relationships, and the mechanisms by whic they are mediated, is a major activity of science and engineering.**

Empirical evidence is required to differentiate between cause and correlation and make clai about specific causes and effects.

NGSS: Disciplinary Core Ideas

**NGSS: 9-12**

PS2: Motion and Stability: Forces and Interactions

**PS2.A: Forces and Motion**

If a system interacts with objects outside itself, the total momentum of the system can chang however, any such change is balanced by changes in the momentum of objectsoutside the system. (HS-PS2-2),(HS-PS2-3)

PS4: Waves and Their Applications in Technologies for Information Transfer

**PS4.B: Electromagnetic Radiation**

Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is usef for explaining many features of electromagnetic radiation, and the particle model explains ot features.(HS-PS4-3)

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| SCI.HS-ESS1-3 | Communicate scientific ideas about the way stars, over their life cycle, produce elements. |
| 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 |

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| | of radiation. |
| SCI.HS-ESS1-4 | Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. |