

Options EHS Astronomy		Scope and Sequence
Unit	Lesson	Objectives
<b>Science and Measurement</b>		
	Accuracy and Precision	
		Differentiate between accuracy and precision.
		Apply rules for using significant figures.
		Identify causes and effects of uncertainty in data.
	Experimental Design Principles	
		Distinguish between accuracy and precision.
		Explain the difference between replication and repetition.
		Write measurements in standard form and in scientific notation.
		Evaluate data to determine accuracy and reproducibility.
	Scientific Measurement	
		Explain the purpose of utilizing the metric system in scientific measurement.
		Identify the basic SI units utilized in scientific measurement.
		Calculate values utilizing the metric conversion process.
		Describe the use of significant figures and rounding in scientific measurement.
	Lab: Measurement	
		Demonstrate how scientific tools can be used to gather accurate measurements.
		Determine how to measure volume, mass, and density of regular and irregular objects.
		Science Practice: Develop a relationship between SI units and standard units.
	Analyzing Data and Drawing Conclusions	
		Analyze data to determine validity.

**Options EHS Astronomy****Scope and Sequence****Unit Lesson****Objectives**

Create charts and graphs to analyze trends in data.

Formulate a conclusion based on observations, data, and inferences.

Science Practice: Describe various ways evidence can be interpreted or explained.

Test

**The Nature of Light**

## Dual Nature of Light

Describe and give evidence for the dual nature of light.

Examine the photoelectric effect.

Calculate the energy of a photon.

## Properties of Light

Describe the wave and particle models of light.

Explain what happens when light interacts with objects.

Recognize what determines the color of an object.

Lab: Absorption and Radiation by  
Land and Water

Examine how the angle of sunlight affects heat absorption in the different climate regions.

Compare and contrast the absorption of heat by land and water surfaces.

## Using Light

Describe how magnifying glasses, microscopes, telescopes, and cameras work.

Differentiate laser light from regular light and identify uses of lasers.

Identify uses of fiber optics.

Test

**Stars and Galaxies and The Universe**

**Unit Lesson****Objectives**

## Stars

Identify the physical properties of stars.

Explain how stars are classified.

Explain how a star forms.

Explain what happens as a star runs out of fuel.

## The Life and Death of Stars

Describe the basic structure and properties of stars.

Explain how the surface temperature of a star is measured.

Recognize that all normal stars are powered by fusion reactions that form elements.

Identify the stages in the evolution of stars.

## Test

## Star Systems and Galaxies

Describe star systems.

Distinguish the major types of galaxies.

## Galaxies and the Universe

Identify the different types of galaxies.

Discuss the organization of the universe.

Summarize the Big Bang Theory and discuss the evidence that supports it.

Science Practice: Describe units used by astronomers to measure the distances to stars and galaxies.

## Origin and Evolution of the Universe

Examine evidence for the big bang theory.

Describe the evolution of the universe.

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		Distinguish between the different types of stars and their life cycles.
		Analyze how stellar spectra are used to identify the composition and motion of a star.
	Space Technology	
		Describe the history and future of space exploration.
		Identify the role of technology in space exploration.
	Test	
<b>Earth, the Moon and Friends</b>		
	Middle and Recent Earth History	
		Compare and contrast characteristic life-forms in the Mesozoic and Cenozoic Eras.
		Explain how changes caused by plate tectonics affected organisms during the Mesozoic Era.
		Identify when humans first appeared on Earth.
	Systems of the Biosphere	
		Describe Earth's systems in terms of energy, matter, time, and space.
		Explain the interactions between Earth's systems.
	Patterns in Systems	
		Describe various patterns found in the Earth system.
		Identify methods of measuring constancy and change in a system.
	The Solar System	
		Compare the Earth-centered and Sun-centered models of the solar system.
		Explain that gravity holds the planets in their orbits around the Sun.
	Formation of the Solar System	
		Contrast ancient models of the solar system with the current model.

## Unit Lesson

## Objectives

Estimate the age of our solar system.

Summarize two points of the nebular model, and describe how it can explain astronomical observations.

Explain how scientists think the moon was formed.

## Gravity and Motion

Identify what determines the strength of the force of gravity between two objects.

Describe two factors that keep the moon and Earth in orbit.

## The Sun

Describe the structure, composition, and physical properties of the Sun.

Explain how the Sun generates energy.

Discuss the different types of solar activity and explain how each activity affects Earth.

Science Practice: Describe units used by astronomers to measure the distance between the Sun and Earth.

## The Dance of the Earth, Moon and Sun

Explain how Earth moves in space.

Explain what causes the phases of the moon.

Describe solar and lunar eclipses.

Explain what causes tides.

## Earth-Moon-Sun System

Describe Kepler's three laws of planetary motion.

Solve problems using Kepler's laws.

Explain the effects of Earth, the moon, and the Sun on each other.

## Planets

Identify characteristics shared by the inner planets.

**Options EHS Astronomy****Scope and Sequence****Unit Lesson****Objectives**

Identify characteristics shared by the outer planets.

Identify each planet in the solar system.

## The Outer Planets

Describe the physical properties, locations, and movements of each of the outer planets.

Compare and contrast the properties of the outer planets to those of the inner planets.

Science Practice: Organize data into tables and charts.

## Other Objects in the Solar System

Distinguish between comets, asteroids, and meteoroids.

Explain the difference between meteoroids, meteors, and meteorites.

Describe the characteristics of dwarf planets.

Science Practice: Examine how life may be affected when cosmic objects impact Earth.

**Motion and Relativity**

## Newton's Laws of Motion

Describe Newton's first law of motion and how it relates to inertia.

Use Newton's second law of motion to calculate force, mass, and acceleration.

Explain Newton's third law of motion and how it relates to action and reaction forces.

Identify applications of Newton's three laws of motion.

## Gravity

Describe Newton's law of universal gravitation.

Identify and describe the factors that affect the gravitational force between two objects.

Explain the concept of free fall.

Describe how gravity affects projectile motion.

Unit	Lesson	Objectives
	Orbital Motion	
		Explain how Newton's universal law of gravitation affects orbital motion.
		Identify the forces acting on an object in orbit.
		Solve problems involving the orbital speed and period of an object in orbit.
	Momentum	
		Define and calculate momentum.
		Explain how momentum is conserved.
		Apply Newton's third law of motion to understand what happens to momentum when two objects collide.
		Use mathematical representations to show that the total momentum of a system of objects is conserved when there is no net force on the system.
	General Relativity	
		Examine Einstein's general theory of relativity.
		Recognize the evidence that supports the general theory of relativity.
		Compare and contrast Newton's universal law of gravitation with Einstein's general theory of relativity.
	Special Relativity	
		Identify Einstein's two postulates of special relativity.
		Analyze the motion of an object using different reference frames.
		Examine how the special theory of relativity leads to time dilation and length contraction.
	Test	