



Scope & Sequence

Exploring Creation with High School Astronomy

GRADE LEVEL: 9th–12th There are no prerequisites for this course. All of the math is worked out in the text so that the student can follow along.

TEXT SUMMARY: This text covers in-depth concepts of astronomy and uses math to support the content. Students will be awestruck at the vastness of God’s creation and gain a greater appreciation for this complex and magnificent universe.

Module & Major Themes	Summary	Main Themes	Mathematical Concepts
MODULE 1 <i>Mysteries of the Universe</i>	Module 1 introduces the concept of the universe by defining space and explaining electromagnetic energy and high energy particles.	<ul style="list-style-type: none"> • Interstellar Space • The Universe • Matter and Antimatter • Cosmic Rays • Dark Matter and Dark Energy • Black Holes and Worm Holes • Temperature of the Universe 	<ul style="list-style-type: none"> • Mathematical concepts are not introduced in this module.
MODULE 2 <i>The History of Astronomy</i>	Module 2 discusses the beginnings of astronomy, cultural influences, and the significance of progress.	<ul style="list-style-type: none"> • Ancient Stargazers • Renaissance Era of Stargazers • Telescope • Modern Astronomers • Spectroscopy 	<ul style="list-style-type: none"> • Einstein’s Theory of Special Relativity
MODULE 3 <i>Understanding the Basics</i>	Module 3 provides the mathematical framework for astronomy in order to understand terminology and define measurement.	<ul style="list-style-type: none"> • Measurement and Units • Astronomical Unit, Light Year, Parsec • Time • Speed and Velocity • Mass and Weight • Doppler Effect • Rotations and Revolutions • Potential and Kinetic 	<ul style="list-style-type: none"> • Newton’s Universal Law of Gravitation

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MODULE 4 <i>Our Solar System</i>	Module 4 explores the solar system, the history of developing a model and the role of mathematics and The Church.	<ul style="list-style-type: none"> • Models of the Solar System • Geocentric Model • Heliocentric Model • Ptolemy • Copernicus • Galileo • Bode Law 	<ul style="list-style-type: none"> • Kepler's Third Law • The Bode Law
MODULE 5 <i>The Sun</i>	Module 5 delves into complexities of the Sun, how it works, and its relationship to other planets.	<ul style="list-style-type: none"> • Distance from the Sun • Distance between Planets • Size of the Sun • Experiment: Estimating the Diameter of the Sun • Parts of the Sun • How the Sun Works • Electromagnetic Energy • The Electromagnetic Spectrum 	<ul style="list-style-type: none"> • Kepler's Third Law • Parallax • Geometric Relationship for Distance • Volume of a Sphere • Volume of a Segment of a Sphere • Kepler's Law of Planetary Motion • Einstein's Theory of Special Relativity • Speed of Light • Energy of a Photon
MODULE 6 <i>The Inner Planets</i>	Module 6 explores the inner planets of the solar system and uses applied math to determine measurable features.	<ul style="list-style-type: none"> • Mercury, Venus, Earth, Mars • Basic Orbital Mechanics • Size, Volume, and Mass • Layers and Surface Features • Atmosphere and Temperature • Rotation and Revolution • Moons • Missions 	<ul style="list-style-type: none"> • Geometry of an Ellipse • Planet's Speed at the Perihelion Position • Planet's Speed in an Elliptical Orbit • Orbital Period of an Object Orbiting the Sun • Diameter of a Planet • Volume of a Planet

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MODULE 7 <i>The Moon</i>	Module 7 explores the Moon and uses applied math to determine measurable features.	<ul style="list-style-type: none"> • Size and Volume • Layers and Surface Features • Atmosphere and Temperature • Phases • Gravity 	<ul style="list-style-type: none"> • No new mathematical concepts are introduced in this module.
MODULE 8 <i>Telescopes</i>	Module 8 provides an in-depth look at telescopes including technical build, optics, and imaging.	<ul style="list-style-type: none"> • Optical Telescopes • Lenses • Focal Point • Images and Magnification • Optics of the Eye • Radio Telescopes • Infrared Telescopes • X-ray Telescopes 	<ul style="list-style-type: none"> • Focal Point • Distance of an Image from the Center of a Lens • Magnification of a Lens • Magnification Factor (Telescope Power) • Light Gathering Power
MODULE 9 <i>The Outer Planets</i>	Module 9 explores the outer planets of the solar system and uses applied math to determine measurable features.	<ul style="list-style-type: none"> • Jupiter, Saturn, Uranus, Neptune • Basic Orbital Mechanics • Size, Volume, and Mass • Layers and Surface Features • Atmosphere and Temperature • Rotation and Revolution • Moons • Missions 	<ul style="list-style-type: none"> • Distance and Velocity Relationship
MODULE 10 <i>Dwarf Planets & The Asteroid Belt</i>	Module 10 provides a detailed analysis of the dwarf planets and discusses the asteroid belt.	<ul style="list-style-type: none"> • Dwarf Planets • Pluto and Pluto's Moons • Ceres, Eris, Makemake, and Haumea • The Asteroid Belt • Classifying Asteroids 	<ul style="list-style-type: none"> • No new mathematical concepts are introduced in this module.

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MODULE 11 <i>The Universe</i>	<p>Module 11 explains techniques that scientists use to study the universe. This module also includes information on constellations and other visible objects in the universe.</p>	<ul style="list-style-type: none"> • Studying the Universe • Electromagnetic Energy • Cosmic Rays • The Visible Universe • Constellations • Discovering Planets of Distant Stars • Interstellar Medium • Black Holes 	<ul style="list-style-type: none"> • No new mathematical concepts are introduced in this module.
MODULE 12 <i>The Stars</i>	<p>Module 12 investigates the stars, provides a solid background for how they are studied, and explains their classifications.</p>	<ul style="list-style-type: none"> • Nuclear Fusion and Binding Energy • Star Temperatures • Spectroscopy • Brightness of a Star • Determining a Star's Radius and Distance • Classification of Stars • Star Explosions 	<ul style="list-style-type: none"> • Temperature of a Distant Star • The Brightness of a Star • Luminosity of a Distant Star • Comparing Star Brightness • Radius of a Star • Converting Fahrenheit to Kelvin • Calculating the Distance to a Star
MODULE 13 <i>Galaxies</i>	<p>Module 13 reveals the order of the universe. It describes different types of galaxies and how they are clustered together.</p>	<ul style="list-style-type: none"> • Different Galaxy Shapes • Quasars • The Milky Way Galaxy • Galaxies Close to the Milky Way 	<ul style="list-style-type: none"> • No new supporting equations are introduced in this module.
MODULE 14 <i>Celestial Navigation</i>	<p>Module 14 demonstrates different methods of navigation and ways to determine one's current position.</p>	<ul style="list-style-type: none"> • Navigation • Dead Reckoning • Celestial Navigation • Angle Measurements • Longitude and Latitude • The Sextant and the Nautical Almanac 	<ul style="list-style-type: none"> • Estimating the Angle between Earth and Polaris

ADDITIONAL INFORMATION: Additional resources and websites for further exploration of the topics in the text are provided at the Book Extras link for this title.