Ganado Unified School District
(High School Astronomy – One Semester)

PACING Guide SY 2020-2021

Timeline & Resources	AZ College and Career Readiness Standard	Essential Question (HESS Matrix)	Learning Goal	Vocabulary (Content/ Academic)
In this Course, Students will explore careers in Astronomy, Study Scientists in this field, write a Scientific Research Paper, create a Slide Show Presentation using a Computer, Design and Implement a working Scientific Investigation for the GUSD Science Fair, build a model, and create a diagram, to develop Scientific Skills and Knowledge.				
Big Bang **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Big Bang. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS.E2U1.17 - Construct an explanation of the origin, expansion, and scale of the universe based on astronomical evidence.	How did the Universe form? What information do we have that proves to us this is true?	**During this Unit, Students will be able to:** • Describe the big bang theory of universe formation and how it is supported by observations of distant galaxies receding from our own, first discovered by the Hubble Telescope. • Understand the nebular theory of solar system formation and the evidence supporting this theory, including cosmic background radiation, variance of elements, and redshift relation. • Identify the scientific evidence, such as radioactive decay, for the age of the solar system (4.6 billion years), including Earth. • Examine the age of our Universe by looking at how spontaneous radioactive decay follows a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials.	See Below
History of Cosmology **One Week** **Resources:**	E2:HS.E2U1.17 - Construct an explanation of the origin, expansion, and scale of the universe based on astronomical evidence.	What thoughts might early Astronomers have had regarding	**During this Unit, Students will be able to:** • Describe the big bang theory of universe formation and compare it to past hypothesis of Creation.	See Below

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Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens Power Point Presentation: Cosmology. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.		today's Space Exploration? How might each of the Early Astronomers envisioned Space?	• Understand the nebular theory of solar system formation and the evidence supporting this theory, including cosmic background radiation, variance of elements, and redshift relation. • Explain Empirical Evidence to identify patterns. • Participate in learning about the past views of Cosmology in different cultures and societies.	
Stars **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Stars, Black Holes. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS.E2U1.15 - Construct an explanation based on evidence to illustrate the role of nuclear fusion in the life cycle of a star. E2:HS+E.E2U1.12 - Obtain, evaluate, and communicate scientific information about the way stars, throughout their stellar stages, produce elements and energy	How hot are stars? What happens when stars die? What is on the other side of a Black Hole? Will we ever be able to travel to a star?	**During this Unit, Students will be able to:** • Decipher the results of the observations of newly forming stars, Investigate the life cycle of stars, the different types of stars, black holes, and be able to chart them based on the Hertzsprung-Russell (HR) diagram by the Electromagnetic Radiation in which atoms of each element emit and absorb characteristic frequencies of light. These characteristics allow identification of the presence of an element, even in microscopic quantities. • Explain how heavy elements found on Earth are formed in stars by nucleosynthesis, being produced when certain massive stars achieve a supernova stage and explode. • Explore evidence of nuclear fusion in the sun's core that releases energy that eventually reaches Earth in the form of radiation, focusing on the energy transfer mechanisms and the difference of the masses and lifetimes of other stars, as well as the variation of radiation due to solar flares, the 11-year sunspot cycle, and non-cyclic variations over centuries.	See Below

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Galaxies **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Galaxies. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS+E.E2U1.16 - Obtain, evaluate, and communicate information about patterns of size and scale of our solar system, our galaxy, and the universe.	How do different shapes of galaxies form? What does our galaxy look like if we were outside of it? How do we understand what we are seeing when we look at other galaxies through telescopes?	**During this Unit, Students will be able to:** • Study how galaxies were formed, and what the different classifications of galaxies are, including our Milky Way. • Explain Empirical Evidence to identify patterns.	See Below
Milky Way **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens,** Power Point Presentation: Out Milky Way. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS+E.E2U1.16 - Obtain, evaluate, and communicate information about patterns of size and scale of our solar system, our galaxy, and the universe.	Why are we called the Milky Way? What is it we are looking at when we see the "Milky Way" in the night sky? Can we travel to the edge of our Milky Way?	**Objectives:** **During this Unit, Students will be able to:** • Compare the size of the solar system to the Milky Way galaxy and compare the size and scale of objects within the solar system, itself. • Study how galaxies were formed, and what the different classifications of galaxies are, including our Milky Way. • Explain Empirical Evidence to identify patterns.	See Below
The Sun	E2:HS+E.E2U1.13 - Analyze and interpret data showing	How is our Sun different from other	**Objectives:**	See Below

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One Week **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: The Sun. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	how gravitational forces are influenced by mass, and the distance between objects. E2:6.E2U1.9 - Develop and use models to construct an explanation of how eclipses, moon phases, and tides occur within the Sun-Earth-Moon system. E2:6.E2U1.7 - Use ratios and proportions to analyze and interpret data related to scale, properties, and relationships among objects in our solar system. E2:K.E2U1.5 - Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky. E2:2.E2U1.8 - Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another	stars? Will our Sun die? What will Happen to Earth when our Sun dies? Where do we fit the Sun on the Hertzsprung-Russell diagram? Are solar flares dangerous?	**During this Unit, Students will be able to:** • Relate the composition of objects in the solar system to their distance from the Sun. • Explore evidence of nuclear fusion in the sun's core that releases energy that eventually reaches Earth in the form of radiation, focusing on the energy transfer mechanisms and the difference of the masses and lifetimes of other stars, as well as the variation of radiation due to solar flares, the 11-year sunspot cycle, and non-cyclic variations over centuries. • Evaluate the conditions that currently support life on Earth and compare them to the conditions that exist on other planets and moons in the solar system including atmospheres, hydrosphere, geospheres, the amounts of incoming solar energy, and the habitable zones. • Understand that Energy cannot be created or destroyed only moved between one place and another place, between objects and/or fields, or between systems, and that in nuclear processes, atoms are not conserved, but the total number of protons plus neutrons is conserved.	
Solar Systems **One Week** **Resources:**	E2:HS+E.E2U1.15 - Obtain, evaluate, and communicate information on how the nebular theory explains solar system formation with distinct regions characterized by different types of planetary and other bodies.	What is a solar system? How do we know the lighter planets and materials are on the outside of a solar system? Are there other	**Objectives:** **During this Unit, Students will be able to:** • Understand the nebular theory of solar system formation and the evidence supporting this theory, including cosmic background radiation, variance of elements, and redshift relation.	See Below

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Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens Power Point Presentation: Solar Systems. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.		solar systems like ours?	• Describe the solar system structure due to gravity, motion and temperature and relate the composition of objects in the solar system to their distance from the Sun. • Compare the size of the solar system to the Milky Way galaxy and compare the size and scale of objects within the solar system, itself.	
Our Solar System **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Our Solar System. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS.E2U1.16 - Construct an explanation of how gravitational forces impact the evolution of planetary motion, structure, surfaces, atmospheres, moons, and rings. E2:HS+E.E2U1.13 - Analyze and interpret data showing how gravitational forces are influenced by mass, and the distance between objects. E2:HS+E.E2U1.14 - Use mathematics and computational thinking to explain the movement of planets and objects in the solar system. E2:6.E2U1.7 - Use ratios and proportions to analyze and interpret data related to scale, properties, and relationships among objects in our solar system.	Will we be able to travel through our solar system some day? What do we have left to explore in our solar system? Will our solar system continue to grow? What do we know about the other planets in our Solar System? Can we live on our other Planets?	**Objectives:** **During this Unit, Students will be able to:** • Understand the nebular theory of solar system formation and the evidence supporting this theory, including cosmic background radiation, variance of elements, and redshift relation. • Identify the scientific evidence, such as radioactive decay, for the age of the solar system (4.6 billion years), including Earth. • Describe the solar system structure due to gravity, motion and temperature and relate the composition of objects in the solar system to their distance from the Sun. • Analyze Earth as part of the solar system, which is part of the Milky Way galaxy. • Compare the size of the solar system to the Milky Way galaxy and compare the size and scale of objects within the solar system, itself. • Relate the composition of objects in the solar system to their distance from the Sun. • Evaluate the conditions that currently support life on Earth and compare them to the conditions that exist	See Below

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			on other planets and moons in the solar system including atmospheres, hydrosphere, geospheres, the amounts of incoming solar energy, and the habitable zones.	
Earth **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: The Planet Earth. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:2.E2U1.8 - Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another E2:5.E2U1.7 - Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system. E2:2.E2U1.8 - Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another E2:5.E2U1.7 - Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system. E2:HS+E.E2U1.13 - Analyze and interpret data showing how gravitational forces are influenced by mass, and the distance between objects.	How do we know how old the Earth is? Are there other planets like Earth?	**Objectives:** **During this Unit, Students will be able to:** • Identify the scientific evidence, such as radioactive decay, for the age of the solar system (4.6 billion years), including Earth. • Analyze Earth as part of the solar system, which is part of the Milky Way galaxy. • Evaluate the conditions that currently support life on Earth and compare them to the conditions that exist on other planets and moons in the solar system including atmospheres, hydrosphere, geospheres, the amounts of incoming solar energy, and the habitable zones. • Test how cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, are responsible for altering the intensity and distribution of sunlight falling on the earth. Connect how these phenomena cause a cycle of ice ages and other gradual	See Below

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Meteors, Asteroids, and Comets **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Meteors Asteroids and Comets. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS+E.E2U1.13 - Analyze and interpret data showing how gravitational forces are influenced by mass, and the distance between objects. E2:HS+E.E2U1.14 - Use mathematics and computational thinking to explain the movement of planets and objects in the solar system.	Will an Asteroid or Meteor hit Earth and destroy it? Why do more Asteroids not hit Earth? Are Asteroids, Planets? How are Meteors, Asteroids, and Comets different? How are they alike? How are they different than Planets?	**Objectives:** **During this Unit, Students will be able to:** • Describe the solar system structure due to gravity, motion and temperature and relate the composition of objects in the solar system to their distance from the Sun. • Study the composition and age of meteorites and discover what part asteroids, meteors, and comets play in the Universe. • Examine the age of our Universe by looking at how spontaneous radioactive decay follows a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials. • Explain Empirical Evidence to identify patterns. • Participate in learning about the past views of Cosmology in different cultures and societies. • Explore the Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons, and Kepler's law that describes common features of the motion of orbiting objects, including their elliptical paths around the sun.	See Below
Moons **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Moons.	E2:6.E2U1.7 - Use ratios and proportions to analyze and interpret data related to scale, properties, and relationships among objects in our solar system. E2:HS.E2U1.16 - Construct an explanation of how gravitational forces impact the evolution of planetary motion, structure, surfaces, atmospheres, moons, and rings.	How do moons form? Why do moons not float away into space, but rather stay with a planet? Are there moons in other Galaxies? Can people live on moons?	**Objectives:** **During this Unit, Students will be able to:** • Describe the solar system structure due to gravity, motion and temperature and relate the composition of objects in the solar system to their distance from the Sun. • Relate the composition of objects in the solar system to their distance from the Sun. • Evaluate the conditions that currently support life on Earth and compare them to the conditions that exist on other planets and moons in the solar system	See Below

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Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.			including atmospheres, hydrosphere, geospheres, the amounts of incoming solar energy, and the habitable zones. • Examine the age of our Universe by looking at how spontaneous radioactive decay follows a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials. • Participate in learning about the past views of Cosmology in different cultures and societies. • Review past space explorations, what impacts space exploration has had, and what scientists are looking to discover in the future. • Test how cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, are responsible for altering the intensity and distribution of sunlight falling on the earth. Connect how these phenomena cause a cycle of ice ages and other gradual climate changes in conjunction with plate tectonics. • Explore the Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons, and Kepler's law that describes common features of the motion of orbiting objects, including their elliptical paths around the sun.	
Earth's Moon **One Week** **Resources:**	E2:HS.E2U1.16 - Construct an explanation of how gravitational forces impact the evolution of planetary motion, structure, surfaces, atmospheres, moons, and rings. E2:HS+E.E2U1.13 - Analyze and interpret data showing how gravitational forces are	How does the Moon affect Earth? Why does Earth only have one Moon? Can we live on the Moon?	**Objectives:** **During this Unit, Students will be able to:** • Describe the solar system structure due to gravity, motion and temperature and relate the composition of objects in the solar system to their distance from the Sun.	See Below

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Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens Power Point Presentation: The Moon. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	influenced by mass, and the distance between objects. E2:6.E2U1.9 - Develop and use models to construct an explanation of how eclipses, moon phases, and tides occur within the Sun-Earth-Moon system. E2:K.E2U1.5 - Observe and ask questions about patterns of the motion of the sun, moon, and stars in the sky. E2:2.E2U1.8 - Observe and explain the Sun's position at different times during a twenty-four-hour period and changes in the apparent shape of the Moon from one night to another E2:5.E2U1.7 - Develop, revise, and use models based on evidence to construct explanations about the movement of the Earth and Moon within our solar system. E2:6.E2U1.7 - Use ratios and proportions to analyze and interpret data related to scale, properties, and relationships among objects in our solar system.	What do different cultures believe about the Moon?	• Relate the composition of objects in the solar system to their distance from the Sun. • Evaluate the conditions that currently support life on Earth and compare them to the conditions that exist on other planets and moons in the solar system including atmospheres, hydrosphere, geospheres, the amounts of incoming solar energy, and the habitable zones. • Examine the age of our Universe by looking at how spontaneous radioactive decay follows a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials. • Participate in learning about the past views of Cosmology in different cultures and societies. • Review past space explorations, what impacts space exploration has had, and what scientists are looking to discover in the future. • Test how cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, are responsible for altering the intensity and distribution of sunlight falling on the earth. Connect how these phenomena cause a cycle of ice ages and other gradual climate changes in conjunction with plate tectonics. • Explore the Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons, and Kepler's law that describes common features of the motion of orbiting objects, including their elliptical paths around the sun.	
Eclipse's (Lunar and Solar) **One Week**	E2:6.E2U1.9 - Develop and use models to construct an explanation of how eclipses, moon phases, and tides occur	Are Eclipse's dangerous? Why can we still	**Objectives:** **During this Unit, Students will be able to:**	See Below

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Resources: **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Eclipses. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	within the Sun-Earth-Moon system.	see light during an eclipse? How are Eclipses formed? Does an eclipse change anything on Earth? Why are Eclipses revered in some cultures and abhorred in others?	• Explain Empirical Evidence to identify patterns. • Participate in learning about the past views of Cosmology in different cultures and societies. • Explore the Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons, and Kepler's law that describes common features of the motion of orbiting objects, including their elliptical paths around the sun.	
Space Exploration **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Space Travel. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS+E.E2U2.17 - Obtain, evaluate, and communicate the impact of technology on human understanding of the formation, scale, and composition of the universe. E2:HS+E.E2U1.16 - Obtain, evaluate, and communicate information about patterns of size and scale of our solar system, our galaxy, and the universe. E2:HS.E2U1.17 - Construct an explanation of the origin, expansion, and scale of the universe based on astronomical evidence.	How far have we travelled through space? Can movies like Star Trek and Star Wars really happen? What is the largest space ship launched into space so far?	**Objectives:** **During this Unit, Students will be able to:** • Describe the solar system structure due to gravity, motion and temperature and relate the composition of objects in the solar system to their distance from the Sun. • Review past space explorations, what impacts space exploration has had, and what scientists are looking to discover in the future.	See Below
Observatories **One Week**	E2:HS+E.E2U2.17 - Obtain, evaluate, and communicate the impact of technology on human understanding of the	What are observatories for? Who owns the	**Objectives:** **During this Unit, Students will be able to:**	See Below

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Resources: **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Observatories. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	formation, scale, and composition of the universe.	observatories? What would have maybe not learned about space if it had not been for observatories? What might observatories look like in the future? How will they be different?	• Explain how Observatories enhanced our knowledge of space and our theories of the Evolution of space. • Understand the nebular theory of solar system formation and the evidence supporting this theory, including cosmic background radiation, variance of elements, and redshift relation. • Explain Empirical Evidence to identify patterns. • Review past space explorations, what impacts space exploration has had, and what scientists are looking to discover in the future.	
Satellites **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: Satellites. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS+E.E2U2.17 - Obtain, evaluate, and communicate the impact of technology on human understanding of the formation, scale, and composition of the universe.	Why do satellites just go around Earth over an over? Who owns the satellites that are in orbit around Earth? What happens if there are problems on a Satellite? How do people live on satellites?	**Objectives:** **During this Unit, Students will be able to:** • Explain Empirical Evidence to identify patterns. • Explore the Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons, and Kepler's law that describes common features of the motion of orbiting objects, including their elliptical paths around the sun.	See Below
Space Travel **One Week** **Resources:**	E2:HS+E.E2U2.17 - Obtain, evaluate, and communicate the impact of technology on human understanding of the formation, scale, and composition of the universe.	What does space travel mean for us in the future? Can we all travel to space some day?	**Objectives:** **During this Unit, Students will be able to:**	See Below

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Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens Power Point Presentation: Space Travel. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.		Where have we been in space? Where can we go? What do we need to study if we want to be an astronaut?	• Review past space explorations, what impacts space exploration has had, and what scientists are looking to discover in the future.	
The Future in Space **One Week** **Resources:** **Earth Science - by Edward J. Tarbuck & Frederick K. Lutgens** Power Point Presentation: To Infinity and Beyond, and Reach for the Stars. Star Locators, Telescope, Etc. Various Worksheets, Games, and Films.	E2:HS+E.E2U2.17 - Obtain, evaluate, and communicate the impact of technology on human understanding of the formation, scale, and composition of the universe.	What may future Space Exploration bring to the Human Existence?	**Objectives:** **During this Unit, Students will be able to:** • Evaluate the conditions that currently support life on Earth and compare them to the conditions that exist on other planets and moons in the solar system including atmospheres, hydrosphere, geospheres, the amounts of incoming solar energy, and the habitable zones. • Explain Empirical Evidence to identify patterns.	See Below

Absolute Magnitude, Acceleration, Accretion Disk, Antimatter, Apex, Aphelion, Asteroid, Astrology, Atom, Aurora Borealis, Azimuth, Barred Spiral Galaxy, Big Bang, Binary Star System, Black Hole, Brown Dwarf, Celestial, Centripetal Force, Cluster, Coma, Comet, Conduction, Constellation, Convection, Coriolis Effect, Corona, Coronal Mass Ejection, Cosmic Background Radiation, Cosmic Ray, Cosmology, Crater, Crescent Phase, Dark Matter, Dark Nebula, Density, Differentiation, Diurnal, Doppler Effect, Dust Tail, Dwarf, Eclipse, Electromagnetic Wave, Electron, Elliptical Galaxy, Event Horizon, Fireball, Fission, Focus, Force, Frequency, Fusion, Galaxy, Gamma Ray, Gas, Gas-Giant, Geocentric, Giant, Gibbous, Gravity, Greenhouse Effect, Half-life, Heliocentric, Heliopause, Heliosphere, Hertzsprung - Russell Diagram, Horizon, Hubble's Law, Hyperbola, Inclination, Index of Refraction, Inertia, Inferior Planet, Infrared, Interstellar Matter, Ion, Irregular Galaxy, Kepler's Laws of Planetary Motion, Kuiper Belt, Light Year, Luminosity, Lunar Eclipse, Magnitude, Main Sequence, Maria, Mass, Meteor, Meteor Shower, Meteorite, Meteoroid, Milky Way, Molecular Cloud, Neap Tide, Neutron, Neutron Star, Nodes, Nucleosynthesis, Nucleus, Oort Cloud,

Orbit, Ozone, Parabola, Penumbra, Perihelion, Photon, Planet, Planetesimal, Plasma, Polarity, Pressure, Prominence, Proton, Protostar, Quarter Moon, Quasar, Radiant, Radio Galaxy, Radioactivity, Rays, Redshift, Reflection, Refraction, Regolith, Resolution, Rille, Solar Flare, Solar Nebula, Solar Wind, Solstice, Spacetime, Spectrograph, Spectrum, Spicule, Spiral Arm, Spiral Galaxy, Star, Stellar, Summer Solstice, Sunspot, Supergiant, Supernova, T-Tauri Star, Telescope, Terminal Velocity, Terrestrial Planet, Tides, Transverse Velocity, Ultraviolet, Umbra, Universe, Van Allen Belts, Velocity, Vernal Equinox, Waning Crescent, Wavelength, Waxing Crescent, White Dwarf, Zenith, Zodiac