Unit 2: Astronomy

Number of Days: 25

Unit Focus	Essential Questions	Next Generation Standards	Disciplinary Core Ideas(DCI)
This unit is broken down into three sub-ideas: the universe and its stars, Earth and the solar system, and the history of planet Earth. Students examine the Earth's place in relation to the solar system, the Milky Way galaxy, and the universe. There is a strong emphasis on a systems approach and using models of the solar system to explain the cyclical patterns of eclipses, tides, and seasons. There is also a strong connection to engineering through the instruments and technologies that have allowed us to explore the objects in our solar system and obtain the data that support the theories explaining the formation and evolution of the universe. Students examine geosciences data in order to understand the processes and events in Earth's history. The crosscutting concepts of patterns, scale, proportion, and quantity and systems and systems models provide a framework for understanding the disciplinary core	• **What are Celestial bodies?** • **What holds our galaxy and solar system together?** • **How does gravity cause the movements in space and on Earth including the seasons?**	• **MS-ESS1-1** • **MS-ESS1-2** • **MS-ESS1-3**.	• **ESS1.A: The Universe and Its Stars** • **ESS1.B: Earth and the Solar System**

ideas. Students are expected to demonstrate proficiency in developing and using models and analyzing and interpreting data. Students are also expected to use these practices to demonstrate understanding of the core ideas.	**Link to Unit 6: Astronomy** **https://njctl.org/courses/archived-courses-units/6th-grade-science/** ***All teachers must register at** http://www.NJCTL.org		

NGSS Framework		
Science and Engineering Practices	**Disciplinary Core Ideas**	**Crosscutting Concepts**

<u>Developing and Using Models</u> • Develop and use a model to describe phenomena. (MS-ESS1-1),(MS-ESS1-2) **<u>Analyzing and Interpreting Data</u>** • Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3)	**<u>ESS1.A: The Universe and Its Stars</u>** • Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models. (MS-ESS1-1) • Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. (MS-ESS1-2) **<u>ESS1.B: Earth and the Solar System</u>** • The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them. (MS-ESS1-2),(MS-ESS1-3) • This model of the solar system can explain eclipses of the sun and the moon. Earth's spin axis is fixed in direction over the short-term but tilted relative to its orbit around the sun. The seasons are a result of that tilt and are caused by the differential intensity of sunlight on different areas of Earth across the year. (MS-ESS1-1) • The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS-ESS1-2)	**<u>Patterns</u>** • Patterns can be used to identify cause-and-effect relationships. (MS-ESS1-1) **<u>Scale, Proportion, and Quantity</u>** • Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-3) **<u>Systems and System Models</u>** • Models can be used to represent systems and their interactions. (MS-ESS1-2) - ***Connections to Engineering, Technology, and Applications of Science*** **<u>Interdependence of Science, Engineering, and Technology</u>** • Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of entire industries and engineered systems. (MS-ESS1-3) - ***Connections to Nature of Science*** **<u>Scientific Knowledge Assumes an Order and Consistency in Natural Systems</u>** • Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-ESS1-1),(MS-ESS1-2)

English Language Arts	Mathematics

Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3) **RST.6-8.1** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS1-3) **RST.6-8.7** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS1-1),(MS-ESS1-2) **SL.8.5**	Reason abstractly and quantitatively. (MS-ESS1-3) **MP.2** Model with mathematics. (MS-ESS1-1),(MS-ESS1-2) **MP.4** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3) **6.RP.A.1** Recognize and represent proportional relationships between quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3) **7.RP.A.2** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. (MS-ESS1-2) **6.EE.B.6** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. *(MS-ESS1-2)* **7.EE.B.6**

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Standard(s):

- **MS-ESS1-1** Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.
- **MS-ESS1-2** Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe.
- **MS-ESS1-3.** The solar system consists of the sun and a collection of objects, including planets, their moons, and asteroids that are held in orbit around the sun by its gravitational pull on them.

Student Outcomes	Inquiry Based Learning Activities	Materials/Resources

Students will know that: • There are various types of Celestial Bodies within the galaxies • Celestial bodies (planets, stars, moons, etc) are formed and are held in orbit by the force of gravity. • The tides, phases of the moon, eclipses, and the seasons are affected by the relationship between the Earth, Moon, and Sun ***Students will be able to:*** • ***Distinguish*** between the various Celestial Bodies and the galaxies in which they reside • ***Identify*** the factors that determine the strength of gravity and explain gravity's role in our universe • ***Demonstrate*** tides, moon phases, eclipses, and seasonal set ups using student ***Created*** models • ***Apply*** prior gravity knowledge to its relationship with astronomical Celestial bodies • ***Create*** a quick model of the solar system and all its parts	***Gravity Lab*** https://njctl.org/courses/science/6th-grade-science/the-universe-and-its-stars/attachments/gravity-lab/ ***Solar System Revolution Webquest*** https://njctl.org/courses/archived-courses-units/6th-grade-science/earth-and-the-solar-system/attachments/solar-system-revolution-webquest/ ***Eclipse Activity*** https://njctl.org/courses/archived-courses-units/6th-grade-science/earth-and-the-solar-system/attachments/eclipse-activity/	**Materials:** • Two balls of the same volume, but different mass **Materials:** • **http://www.colorado.edu/physics/phet/dev/my-solar-system/2.03.00/my-solar-system_en.html** **Materials:** • Large Styrofoam balls of the same volume, cardboard tubes, flashlight, small Styrofoam ball, stiff wire **Resources:** • **www.NJCTL.org** • **www.nicerc.org** • **http://bpsscience.weebly.com/science-and-literacy-close-reading-cwa--more.html** • **Technology Resources:** 1. ***Explore Learning*** 2. ***United Streaming*** 3. ***YouTube*** 4. ***Phet*** 5. ***Teacher Tube***

Differentiated Instruction: **Modifications / Extensions:** How will I differentiate the curriculum for ESL, gifted, at-risk, etc? • **All Learners:** Guided Notes/ Graphic Organizers/ Study Guides Opportunities to rework and re-submit work • **Assessments**: Extra Time/ Use of notebook or reference cards/ Break into smaller tasks/ Word Banks/ Reduce choices on multiple choice questions	What evidence will I collect that demonstrate that the students have achieved the objective? • ***Teacher Created:*** Tests Quizzes Lab Reports Mid Terms Final Exams • **Alternate Assessments**: Journal Responses OEQ/Short Responses grade using a 0-3 Rubric Lab Reports Oral Assessments Portfolio Projects
Assessments: edConnect DOQ assessments	