

Standard 6.1.2

Strand 6.1: Structure and Motion within the Solar System	<p>The solar system consists of the Sun, planets, and other objects within Sun’s gravitational influence. Gravity is the force of attraction between masses. The Sun-Earth-Moon system provides an opportunity to study interactions between objects in the solar system that influence phenomena observed from Earth. Scientists use data from many sources to determine the scale and properties of objects in our solar system.</p>	
Standard: 6.1.2 MS-ESS1-2	<p>Develop and use a model to describe the role of gravity and inertia in orbital motions of objects in our solar <u>system</u>.</p>	
	<p>Developing and Using Models Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.</p> <ul style="list-style-type: none"> Develop and use a model to describe phenomena. 	<p>Systems and System Models</p> <ul style="list-style-type: none"> Models can be used to represent systems and their interactions.
DCI	<p>ESS1.A: The Universe and Its Stars</p> <ul style="list-style-type: none"> Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. <p>ESS1.B: Earth and the Solar System</p> <ul style="list-style-type: none"> 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. The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. 	
Student Friendly Objectives	<p>I can use my model to describe how gravity and inertia play a role in the orbital motions of object in our solar system.</p>	
Anchor Phenomena	<p>Planets stay in an orbital pattern around the sun.</p>	
Possible Scenarios	<p>planets stay in orbit as they revolve around the sun many planets have orbiting moons Asteroid Belt</p>	
Vertical Learning Progression Alignment	<p>Previous Science Content (Discussed in K-5 Standards)</p> <ul style="list-style-type: none"> Patterns of movement of the sun, moon, and stars as seen from Earth can be observed, described, and predicted. The Earth’s orbit and rotation, and the orbit of the moon around the Earth cause observable patterns. 	<p>Future Science Content (Discussed in 9-12 Standards)</p> <ul style="list-style-type: none"> Solar activity creates the elements through nuclear fusion. The development of technologies has provided the astronomical data that provide the empirical evidence for the Big Bang theory. Kepler’s laws describe common features of the motions of orbiting objects. Observations from astronomy and space probes provide

		evidence for explanations of solar system formation. <ul style="list-style-type: none">• Changes in Earth's tilt and orbit cause climate changes such as Ice Ages
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What students should be doing:

1. Components of the model
 - a. To make sense of a given phenomenon, students develop a model in which they identify the relevant components of the system, including:
 - i. Gravity.
 - ii. The solar system as a collection of bodies, including the sun, planets, moons, and asteroids.
2. Relationships
 - a. Students describe the relationships and interactions between components of the solar and galaxy systems, including:
 1. Increases with the mass of the interacting objects increases.
 2. Decreases as the distances between objects increases.
 - ii. The orbital motion of objects in our solar system (e.g., moon's orbit around planets, all objects within the solar system orbit the sun).
3. Connections
 - a. Students use the model to describe that gravity is a predominantly inward-pulling force that can keep smaller/less massive objects in orbit around larger/more massive objects.
 - b. Students use the model to describe that gravity causes a pattern of smaller/less massive objects orbiting around larger/more massive objects at all system scales in the universe, including that:
 - i. Gravitational forces from planets cause smaller objects (e.g., moons) to orbit around planets.
 - ii. The gravitational force of the sun causes the planets and other bodies to orbit around it, holding the solar system together.
 - iii. Students use the model to describe that objects too far away from the sun do not orbit it because the sun's gravitational force on those objects is too weak to pull them into orbit.
 - c. Students use the model to describe what a given phenomenon might look like without gravity (e.g., smaller planets would move in straight paths through space, rather than orbiting a more massive body).