

# MP1-Astronomy and Space

Content Area: **Science**  
Course(s): **Science 6**  
Time Period: **Marking Period 1**  
Length: **MP 1**  
Status: **Published**

## Essential Questions

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- How do the Earth, the moon and the sun interact?
- How does exploring space benefit people on Earth?
- Why are objects in the solar system different from each other?

## Big Ideas

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- Earth is part of a system of objects that orbit the sun.
- Science, technology, and society affect each other.
- The universe is very old, very large constantly changing.

## Cross-Curricular Integration

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### Integration Area: Language Arts

MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.

W.6.2 Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

Activity:

Students will CERs (Claim, Evidence & Reason) on Structures of the Universe and Stars. This shows if students are able to convey their thinking and decision making in writing form

- Students will be answering the question (their claim), “Which of the 5 structures of space is the largest?”.
- Students provide evidence that supports their claim.
- Students will then write a reasoning that explains what their claim is, state knowledge they have on the topic, evidence to prove their topic, and close their reasoning with their claim again.

### Integration Area: Math

MS-ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the

solar system. Students will discover how gravity is not the same on all planets.

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form  $x+p=q$  and  $px=q$  for cases in which  $p$ ,  $q$ , and  $x$  are all nonnegative rational numbers.

Activity:

Students will compare Astronaut Sam's Weight on 8 different planets.

- Students will be provided with the gravity on each of the 8 different planets.
- They will then get what Astronaut Sam's weight on Earth and use equations to figure out how much he will weigh on the other planet.

### **Language Arts Companion Standards:**

WHST 6-8.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

RST 6-8.1 Cite specific textual evidence to support analysis of science and technical texts.

RST 6-8.6 Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.

RST 6-8.8 Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

Activity:

Gravitational Tides: How does gravity impact tides? What effect do the positions of the moon and the sun have during a spring or neap tide? Write an essay that explains the impact of gravity on tides that uses evidence from a variety of credible sources.

### **Diversity Integration**

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Objective: Students will complete a graphic organizer on a chosen Scientist every month.

Activity:

1. Students are to make a copy of the graphic organizer that they are to complete on the scientists.
2. They will then need to complete the organizer by doing research on the person and their field of science that the scientists work in.
3. After finding information about the scientist, they will then need to write a paragraph on the person and explain to us “Why is this scientist famous? What have they done in their lifetime to help out the world?”

## **Science and Engineering Practices**

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### **Developing and Using Models**

- Develop and use a model to describe phenomena. (MS-ESS1-1), (MS-ESS1-2)

### **Analyzing and Interpreting Data**

- Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3)

## **Science and Society**

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### **Aryabhata**

Early Indian astronomer

### **Copernicus**

Made the first models of the solar system

### **Isaac Newton**

3 Laws of motion, Law of universal gravitation

### **Galilei Galileo**

Acceleration due to gravity

## **Technology Integration**

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8.1.8.NI.2 Model the role of protocols in transmitting data across networks and the Internet and how they enable secure and errorless communication.

8.1.8.DA.1 Organize and transform data collected using computational tools to make it usable for a specific purpose.

Activity:

Students will work with their partner to do web-based research on each of the planets of the Solar System on their chromebooks and create a model of the planets' order and distance from the Sun.

## **Enduring Understandings**

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### **Next Generation Standards**

#### **Earth's Place in the Universe**

MS-ESS1-1 Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon and seasons.

MS-ESS1-2 Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

MS-ESS1-3 Analyze and interpret data to determine scale properties of objects in the solar system.

#### **Disciplinary Core Ideas**

##### **ESS1.A: The Universe and Its Stars**

- 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)

##### **ESS1.B: Earth and the Solar System**

- 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)

## **Crosscutting Concepts**

### **Patterns**

Patterns can be used to identify cause- and-effect relationships. (MS-ESS1-1)

### **Scale, Proportion, and Quantity**

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)

### **Systems and System Models**

Models can be used to represent systems and their interactions. (MS-ESS1-2)

## **Focus Areas**

### **The Earth, the moon and the sun**

- On a clear night you may see stars, the moon, planets meteors, and comets in the night sky.
- A constellation is a pattern or group of stars that people imagine to represent a figure, animal, or object.
- The apparent motion of objects in the sky depends on the motions of the Earth.
- The Earth moves in two major ways: rotation and revolution.
- Earth has seasons because its axis is tilted as it revolves around the sun.
- The strength of the force of gravity between two objects depends on two factors: the masses of the objects and the distance between them.
- Newton concluded that inertia and gravity combine to keep Earth in orbit around the sun and the moon in orbit around the Earth.
- The changing relative position, of the moon, Earth, and the sun cause the phases of the moon.
- A solar eclipse occurs when the moon passes directly between Earth and the sun, blocking sunlight from the Earth. During a lunar eclipse, Earth blocks sunlight from reaching the moon. Tides are caused mainly by differences in how much gravity from the moon and the sun pulls on different parts of the Earth.
- Changes in the positions of Earth, moon, and the sun affect heights of the tides during a month.
- The moon is dry and airless and has an irregular surface. Compared to Earth, the moon is small and has large variations in its surface temperature.

### **Exploring Space**

- The space race was the rivalry between the United States and the Soviet Union to explore space, including the Apollo moon missions.
- NASA has used space shuttles to perform many important tasks. These include taking satellites into orbit, repairing damaged satellites, and carrying astronauts and equipment to and from space stations.
- A space station provides a place for experiments in space.
- Space probe collect data about the solar system.

### **Using Space Science on Earth**

- Conditions in space that differ from those on Earth include near vacuum, extreme temperatures, and microgravity. Many types of engineers and scientists have worked together to respond to the challenges of space.
- The space program has led to the development of many thousands of products, among them consumer products, new materials, medical devices, and communication satellites.
- Satellites are used for communications and for collecting weather data and other scientific data.

## **The Solar System**

- The inner planets are small and dense and have rocky surfaces.
- Mercury is the smallest terrestrial planet and the planet closest to the sun. Venus has a thick atmosphere, an unusual pattern of rotation, and the hottest surface of any planet. Earth has liquid water and a suitable temperature range and atmosphere for living things to survive.
- Although Mars is too cold for liquid water, it does have water ice now and has had liquid water in the past.
- The four outer planets are more massive than Earth, and they do not have solid surfaces.
- Jupiter is the largest and most massive planet. Saturn has the most spectacular rings of the planets. Uranus's axis of rotation is tilted at an angle of about 90 degrees from the vertical.
- Neptune is a cold, blue planet. Its atmosphere contains visible clouds.
- Scientists classify these objects based on their sizes, shapes, compositions, and orbits. The major categories include dwarf planets, comets, asteroids, and meteoroids.

## **Resources**

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### **Scientific Inquiry**

MS-ESS1-1 (5.4.8.A.1) *Reasons for the Seasons*, p. 19-22

MS-ESS1-1 (5.4.8.A.2) *Moon Phases and Eclipses*, p. 31-32