MS-ESS1 Earth’s Place in the Universe

Science and Engineering Practices
Developing and Using Models
Modeling in 6–8 builds on K–5 experiences and progresses to develop, using, and revising models to describe, test, and predict more abstract phenomena and design systems.
- Develop and use a model to describe phenomena. (MS-ESS1-1), (MS-ESS1-2)

Analyzing and Interpreting Data
Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to a variety of data and using drawings to organize and communicate information.
- Analyze and interpret data to determine similarities and differences in findings. (MS-ESS1-3)

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.
- Construct a scientific explanation based on evidence for a phenomenon or design a solution to a problem. (MS-ESS1-4)

Disciplinary Core Ideas

ESS1: 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 parts 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, moons, and asteroids that are held in orbit around the sun by their gravitational pull on them. (MS-ESS1-2)
- 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)

ESS1-C: The History of Planet Earth
- The geologic time scale interpreted from rock strata provides a way to organize Earth’s history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)

Crosscutting Concepts

Patterns
- Patterns are used to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. (MS-ESS1-3)
- Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. (MS-ESS1-4)
- Analyze and interpret data to determine scale properties of objects in the solar system. (MS-ESS1-5)

Interdependence of Science, Engineering, and Technology
- Engineering advances have led to important discoveries in virtually every field of science and scientific discoveries have led to the development of all industries and engineered systems. (MS-ESS1-3)

Connections to Nature of Science
- Scientific knowledge assumes an order and consistency in natural systems. (MS-ESS1-4)

Common Core State Standards Connections

ELA/Literacy
- RST.6–8.1: Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS1-3), (MS-ESS1-5)
- RST.6–8.7: Integrate quantitative or technical information expressed in words in a text with a visual that conveys the information and make this information the point of a larger claim. (MS-ESS1-5)

WHST.6–8.2: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS1-4)

SL.6–8.5: Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS1-5)

Mathematics
- MP.2: Reason abstractly and quantitatively. (MS-ESS1-3)
- MP.4: Model with mathematics. (MS-ESS1-5)
- 6.RP.A.1: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. (MS-ESS1-2), (MS-ESS1-4)

* The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

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<th>Performance Expectation</th>
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<tr>
<td>7.RP.A.2</td>
<td>Recognize and represent proportional relationships between quantities. (MS-ESS1-1),(MS-ESS1-2),(MS-ESS1-3)</td>
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<td>6.EE.B.6</td>
<td>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),(MS-ESS1-4)</td>
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<tr>
<td>7.EE.B.4</td>
<td>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),(MS-ESS1-4)</td>
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