

California Middle School Earth and Space Science Tutorials offer targeted instruction, practice, and review designed to help students develop scientific literacy, deepen conceptual understanding, and apply scientific practices. Students engage with the content in an interactive, feedback-rich environment as they progress through standards-aligned modules. By continually honing their ability to apply knowledge in real-world scenarios, students build the depth of knowledge and higher-order skills required to demonstrate their mastery when put to the test.

In each module, the Learn It and Try It make complex ideas accessible to students as they explore the nature of science through focused content, interactive mini investigations, multi-modal representations, and personalized feedback. The Review It offers a high-impact summary of key concepts and relates those concepts to students' lives. The Test It assesses students' mastery of the module's concepts, providing granular performance data to students and teachers after each attempt. To help students focus on the content most relevant to them, unit-level pretests and posttests can quickly identify where students are strong and where they're still learning.

These Tutorials are built to the Next Generation Science Standards for Earth and space science.

Unit 1: Nature of Science

- **WHAT IS SCIENCE?**
- **TYPES OF INVESTIGATIONS**
- **USING MODELS**

Unit 2: Measurement and Data

- **TOOLS AND MEASUREMENT**
- **DISPLAYING AND INTERPRETING DATA**

Unit 3: Planet Earth

- **MODELS OF EARTH**
 - MS-ESS2-2: Earths Systems Construct an explanation based on evidence for how geoscience processes have changed Earths surface at varying time and spatial scales.
- **EARTH'S STRUCTURE AND CYCLES**
 - MS-ESS2-1: Earths Systems Develop a model to describe the cycling of Earths materials and the flow of energy that drives this process.

Unit 4: The Geosphere

- **MINERALS**

- MS-ESS3-1: Earth and Human Activity Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
- MS-ESS2-1: Earth's Systems Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- MS-ESS3-4: Earth and Human Activity Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- **THE ROCK CYCLE**
 - MS-ESS2-1: Earth's Systems Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
- **SOIL**
 - MS-ESS3-1: Earth and Human Activity Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

Unit 5: Our Changing Planet

- **DEFORMING EARTH'S CRUST**
 - MS-ESS3-1: Earth and Human Activity Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
 - MS-ESS2-2: Earth's Systems Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- **WEATHERING AND EROSION**
 - MS-ESS3-1: Earth and Human Activity Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
 - MS-ESS3-2: Earth and Human Activity Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
 - MS-ESS2-2: Earth's Systems Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
- **GEOLOGIC TIME**
 - MS-ESS1-4: Earth's Place in the Universe Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

Unit 6: Earth's Plates

- **PLATE TECTONICS**

- MS-ESS2-2: Earths Systems Construct an explanation based on evidence for how geoscience processes have changed Earths surface at varying time and spatial scales.
- MS-ESS2-3: Earths Systems Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.
- **EARTHQUAKES AND VOLCANOES**
 - MS-ESS3-2: Earth and Human Activity Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
 - MS-ESS2-2: Earths Systems Construct an explanation based on evidence for how geoscience processes have changed Earths surface at varying time and spatial scales.
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Unit 7: The Atmosphere, Hydrosphere, and Cryosphere

- **FRESHWATER AND ICE**
 - MS-ESS3-1: Earth and Human Activity Construct a scientific explanation based on evidence for how the uneven distributions of Earths mineral, energy, and groundwater resources are the result of past and current geoscience processes.
 - MS-ESS2-4: Earths Systems Develop a model to describe the cycling of water through Earths systems driven by energy from the sun and the force of gravity.
- **OCEANS**
 - MS-ESS2-6: Earths Systems Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
- **THE ATMOSPHERE**
 - MS-ESS2-6: Earths Systems Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

Unit 8: Weather and Climate

- **WEATHER**
 - MS-ESS2-5: Earths Systems Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.
- **SEVERE WEATHER**
 - MS-ESS3-2: Earth and Human Activity Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
- **CLIMATE**
 - MS-ESS2-6: Earths Systems Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

- MS-ESS3-5: Earth and Human Activity Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

Unit 9: Humans and Earth's Resources

- **NATURAL RESOURCES**

- MS-ESS3-1: Earth and Human Activity Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.

- **IMPACTS OF HUMANS**

- MS-ESS3-5: Earth and Human Activity Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
- MS-ESS3-4: Earth and Human Activity Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
- MS-ESS3-3: Earth and Human Activity Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Unit 10: The Solar System

- **SUN-EARTH-MOON SYSTEM**

- MS-ESS1-1: Earth's Place in the Universe 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.

- **OUR SOLAR SYSTEM**

- MS-ESS1-2: Earth's Place in the Universe Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
- MS-ESS1-3: Earth's Place in the Universe Analyze and interpret data to determine scale properties of objects in the solar system.
- MS-ESS2-2: Earth's Systems Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

Unit 11: Exploring the Universe

- **THE UNIVERSE**

- MS-ESS1-2: Earth's Place in the Universe Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.

- **SPACE EXPLORATION**

- MS-PS1-3: Matter and Its Interactions Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
- MS-ETS1-1: Engineering Design Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

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- MS-ETS1-2: Engineering Design Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
 - MS-ETS1-3: Engineering Design Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
 - MS-ETS1-4: Engineering Design Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
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