# Grade 6 Science Standards

| Domain: Earth & Space Science - Space Systems | | | |
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| **Code:** | **Strand:** | **Rating** | **Completed** |
| DMS.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. | Priority | |
| DMS.ESS1.2 | Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. | Supporting | |
| DMS.ESS1.3 | Analyze and interpret data to determine scale properties of objects in the solar system. | Supporting | |
| DMS ESS1.3.1 | Research how 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. | Priority | |

## Catholic Identity

- Relate the liturgical calendar to the natural patterns of God's universe.
- Appreciate the precision of the universal design which supports life on our planet, e.g. the 23 degree tilt of the Earth, distance from the moon, placement of the Earth to the sun.
- Discuss physical laws as supported by the Old Testament, e.g. Genesis, Job.

## Science and Engineering Practices

**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.

- Develop and use a model to describe phenomena. (MS.ESS1.1),(MS.ES S1.2)

**Analyzing and Interpreting Data**
Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to determine

## Disciplinary 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 t hem. (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

## Crosscutting Concepts

**Patterns**
Patterns can be used to identify cause and affect 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)

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***Connections to Engineering, Technology, and Applications of Science Interdependence of Science, Engineering, and***

**Technology**

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| Similarities and differences in findings. (MS.ESS1.3) | 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)<br>• The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. (MS.ESS1.2) | • 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)<br>---<br>***Connections to Nature of Science***<br>**Scientific Knowledge Assumes an Order and Consistency in Natural Systems**<br>• 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) |

| Domain: Earth & Space Science - History of Earth | | | |
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| **Code:** | **Strand:** | **Rating** | **Completed** |
| DMS.ESS1.4 | 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. | Supporting | |
| DMS.ESS2.2 | Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. | Supporting | |
| DMS.ESS2.3 | Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. | Priority | |

## Catholic Identity

- Awareness of Catholic services that provide aid to people in need from natural disasters and supporting their work, e.g. Caritas Internationales, Catholic Relief Services, Catholic Charities.

## Science and Engineering Practices

**Analyzing and Interpreting Data**
Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to provide evidence for phenomena. (MS.ESS2.3)

**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 valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS.

## Disciplinary Ideas

**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)
- Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. (HS.ESS1.C GBE) (secondary to MS-ESS2-3)

**ESS2.A: Earth's Materials and Systems**

- The planet's systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth's history and will determine its future. (MS-ESS2-2)

**ESS2.B: Plate Tectonics and Large-Scale System Interactions**

- Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth's plates have moved great distances, collided, and spread apart. (MS-ESS2-3)

**ESS2.C: The Roles of Water in Earth's Surface Processes**

- Waters movements—both on the

## Crosscutting Concepts

**Patterns**

- Patterns in rates of change and other numerical relationships can provide information about natural systems. (MS.ESS2.3)

**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.ESS1.4),(MS.ESS2.2)

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| ESS1.4),(MS.ESS2.2)<br><br>----------<br><br>***Connections to Nature of Science***<br><br>**Scientific Knowledge is Open to Revision in Light of New Evidence**<br>Science findings are frequently revised and/or reinterpreted based on new evidence. (MS.ESS2.3) | land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. (MS-ESS2-2) | |

| Domain: Earth & Space Science - Earth's Systems | | | |
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| **Code:** | **Strand:** | **Rating** | **Completed** |
| DMS.ESS2.1 | Students should understand how materials move through Earth's systems and how energy is involved in these processes. They should be able to create a model to explain the carbon cycle. | Priority | |
| DMS.ESS2.4 | Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. | Priority | |
| DMS.ESS3.1 | 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. | Supporting | |
| DMS.ESS3.2 | Distinguish the components and characteristics of the rock cycle for the following types of rocks, igneous, metamorphic, sedimentary. | Priority | |
| DMS.ESS3.3 | Identify the different spheres: Troposphere, stratosphere, mesosphere, thermosphere, ionosphere, exosphere. | Priority | |

## Catholic Identity

- Discuss the sense of order and balance of the Earth's systems in God's creation.

## Science and Engineering Practices

**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.

- Develop and use a model to describe phenomena. (MS. ESS2. 1)
- Develop a model to describe unobservable mechanisms. (MS.ESS2.4)

**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 valid and reliable evidence

## Disciplinary Ideas

**ESS2.A: Earth's Materials and Systems**

- All Earth processes are the result of energy flowing and matter cycling within and among the planet's systems. This energy is derived from the sun and Earth's hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth's materials and living organisms. (MS.ESS2.1)

**ESS2.C: The Roles of Water in Earth's Surface Processes**

- Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS.ESS2.4)
- Global movements of water and its changes in form are propelled by sunlight and gravity. (MS.ESS2.4)

**ESS3.A: Natural Resources**

- Humans depend on Earths land, ocean, atmosphere, and biosphere for many different resources.

## Crosscutting Concepts

**Cause and Effect**

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS.ESS3.1)

**Energy and Matter**

- Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS.ESS2.4)

**Stability and Change**

- Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and processes at different scales, including the atomic scale. (MS. ESS2.1)

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***Connections to Engineering, Technology, and Applications of Science***

**Influence of Science, Engineering, and Technology on Society and the Natural World**

- All human activity draws on

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| obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS.ESS3.1) | Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS.ESS3.1) | natural resources and has short and long- term consequences, positive as well as negative, for the health of people and the natural environment. (MS.ESS3.1) |

| Domain: Earth & Space Science - Weather and Climate | | | |
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| **Code:** | **Strand:** | **Rating** | **Completed** |
| DMS.ESS2.5 | Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. | Priority | |
| DMS.ESS2.6 | 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. | Priority | |
| DMS.ESS3.5 | Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. | Supporting | |

## Catholic Identity

- Accept God's creation with gratitude by moderating usage of resources.
- Define environmental stewardship in terms of resources and recognize it as part of Catholic social teaching.

## Science and Engineering Practices

**Asking Questions and Defining Problems**
Asking questions and defining problems in 6–8 builds on K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and models.

- Ask questions to identify and clarify evidence of an argument. (MS.SS3.5)

**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.

- Develop and use a model to describe phenomena. (MS.ESS2.6)

**Planning and Carrying Out Investigations**
Planning and carrying out investigations in 6-8 builds on K-5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.

- Collect data to produce data to serve as the basis for evidence

## Disciplinary Ideas

**ESS2.C: The Roles of Water in Earth's Surface Processes**

- The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS.ESS2.5)
- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS.ESS2. 6)

**ESS2.D: Weather and Climate**

- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS.ESS2.6) Because these patterns are so complex, weather can only be predicted probabilistically. (MS.ESS2.5)
- The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and

## Crosscutting Concepts

**Cause and Effect**

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS.ESS2.5) Systems and System Models
- Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS.ESS2.6)

**Stability and Change**

- Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS.ESS3.5)

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| to answer scientific questions or test design solutions under a range of conditions. (MS.ESS2.5) | globally redistributing it through ocean currents. (MS.ESS2.6)<br>ESS3.D: Global Climate Change<br>• Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in Earth's mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS.ESS3.5) | |

| Domain: Earth & Space Science - Human Impact | | | |
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| **Code:** | **Strand:** | **Rating** | **Completed** |
| DMS.ESS3.2 | Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. | Priority | |
| DMS.ESS3.3 | Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.* | Supporting | |
| DMS.ESS3.3.1 | Students will demonstrate ways that they can have a positive impact on climate change by reducing their carbon footprint and being good stewards of the gifts that God gave us. | Supporting | |
| DMS.ESS.2.1 | Describe how people plan for, and respond to the following natural disasters: draught, flooding, tornadoes and hurricanes with an emphasis on our moral obligation to provide aid. | Supporting | |

## Catholic Identity

- Students will demonstrate ways that they can have a positive impact on climate change by reducing their carbon footprint and being good stewards of the gifts that God gave us.
- Students will recognize the need to help other countries during natural disasters through prayer and material donations.
- Students will consider the Corporal and Spiritual Works of Mercy in providing responsible stewardship to those in need.

## Science and Engineering Practices

**Analyzing and Interpreting Data**
Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to determine similarities and differences in findings. (MS. ESS3.2)

**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.

- Apply scientific principles to design an object, tool, process

## Disciplinary Ideas

**ESS3.B: Natural Hazards**

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS.ESS3.2)

**ESS3.C: Human Impacts on Earth Systems**

- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS.ESS3.3)
- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS.ESS3.3),(MS.ESS3.4)

## Crosscutting Concepts

**Patterns**

- Graphs, charts, and images can be used to identify patterns in data. (MS.ESS3.2)

**Cause and Effect**

- Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS.ESS3.3)
- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS.ESS3.4)

***Connections to Engineering, Technology, and Applications of Science***

**Influence of Science, Engineering, and Technology on Society and the Natural World**

- All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural

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| or system. (MS.ESS3.3)<br>**Engaging in Argument from Evidence**<br>Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).<br>• Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS.ESS3.4) | | environment. (MS.ESS3.4)<br>• The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS.ESS3.2),(MS.ESS3.3)<br>---<br>***Connections to Nature of Science***<br>**Science Addresses Questions About the Natural and Material World**<br>Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes. (MS- ESS3-4) |