

MONTESSORI CURRICULUM TO STANDARDS ALIGNMENT

ELEMENTARY • 1ST–6TH GRADE

UNIVERSE STUDIES

**Montessori Curriculum to Standards Alignment
Elementary • 1st–6th Grade
Universe Studies**

National Center for Montessori in the Public Sector

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CHAPTER 1

FOUNDATIONS

GREAT STORY: THE STORY OF CREATION

SKILLS INVENTORY

Lower Elementary

Listens to stories about significant historical changes and is inspired to gather additional information to clarify or deepen understanding.

MONTESSORI LESSONS

PURPOSES

INITIAL SERIES

The First Great Story: Story of Creation

- To generate questions about individuals and groups who have shaped a significant historical change.
- To inspire children to ask and answer questions about information that has been presented orally.
- To inspire children to gather additional information to clarify comprehension or deepen understanding.
- To give the children an impression of how the universe began, to allow them to ask questions, and to entice curiosity in the classroom.
- To introduce the child to the fields of physical science: Earth Science, Chemistry, Physics, and Astronomy.
- To present the concept of a lawful universe.

ASSESSMENT VOCABULARY

answer

ask

detail

information

issue

media/medium

question

speaker

text

topic

Cognitive Verbs

answer

ask

clarify

describe

present

recount

ASSESSMENT CONSIDERATIONS

Students will not be assessed on the contents of the Great Stories.

COLLEGE, CAREER AND CIVIC LIFE (C3) FRAMEWORK FOR STATE SOCIAL STUDIES STANDARDS**HISTORY (D2.HIS)****CHANGE, CONTINUITY AND CONTEXT**

His.3.K-2	Generate questions about individuals and groups who have shaped a significant historical change.
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His.3.3-5	Generate questions about individuals and groups who have shaped significant historical changes and continuities.
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COMMON CORE STATE STANDARDS (CCSS.ELA-LITERACY)**LANGUAGE: SPEAKING AND LISTENING (SL)****COMPREHENSION AND COLLABORATION**

SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.
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SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
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SL.2.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.
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SL.2.3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
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NOTES

CHAPTER 2

SUN AND EARTH

EARTH'S SYSTEMS

SKILLS INVENTORY

Lower Elementary

- Identifies the Earth's layers and their relative sizes and describes the functions of the Earth's layers. Understands how tectonic processes impact the Earth and that geologic events can happen very quickly or very slowly.
- Explains ways in which natural disasters may impact people.

Upper Elementary

- Understands how Earth's major systems (geosphere, hydrosphere, biosphere) interact to affect Earth's surface materials and processes. Identifies patterns that occur (rock layers, mountain ranges, ocean floor structures and trenches, earthquakes, volcanos).
- Explains how living things and natural hazards impact land, water, air, and outer-space and the steps that can be taken to reduce these impacts.
- Identifies natural hazards that result from natural processes, how they impact people living in a place, and steps that can be taken to reduce their impacts.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
Layers of Earth	<ul style="list-style-type: none">• To visualize the layers of the Earth; barysphere, lithosphere, hydrosphere, and atmosphere.• Recognize that the Earth is considered to be composed of different layers.
Functions of Earth's Layers	<ul style="list-style-type: none">• To become aware of the characteristics and functions of the different layers of the Earth.
Relative size of Earth's Layers	<ul style="list-style-type: none">• To give the children an image of the thickness of the barysphere when compared to the thinness of the other layers.
Natural Disasters <ul style="list-style-type: none">• Teacher-Created Lessons	<ul style="list-style-type: none">• To understand natural disasters and their impact on the land, communities, and humans.• Identify ways that a catastrophic disaster may affect people living in a place.

continues

MONTESSORI LESSONS		PURPOSES
MIDDLE SERIES		
Further Study of Earth's Layers <ul style="list-style-type: none"> • Plate Tectonics • Continental Drift • Isostatic Balance • Mountain Formation • Hot Spots • Earthquakes • Tsunamis • Geysers 	<ul style="list-style-type: none"> • To explore the idea of the layers of the Earth in more detail. • To explore the action and results of horizontal movements of the Earth's crust. • To explore the action and results of the vertical movements of the Earth's crust. • To explore the ways in which mountain formations have been created by tectonic processes. • To explore the ways in which hotspots and volcanic islands have been created by tectonic processes. • To explore the ways in which earthquakes are generated by tectonic processes. • To explore the ways in which tsunamis are generated by tectonic processes. • To explore the ways in which geysers are generated by tectonic processes. 	
Rock Formations <ul style="list-style-type: none"> • Igneous • Sedimentary • Metamorphic 	<ul style="list-style-type: none"> • To introduce the children to the three major categories of rocks. 	
LATER SERIES		
Natural Disasters <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To understand natural disasters and their impact on the land, communities, and humans. • To explain how natural catastrophic events in one place affect people living in other places. 	
Human Impacts <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To understand humans' impact on the Earth and how they can protect Earth's resources and environments. • To explain how human-made catastrophic events in one place affect people living in other places. 	

ASSESSMENT VOCABULARY		
INITIAL SERIES	MIDDLE SERIES	LATER SERIES
design (noun) dike Earth earthquake erosion grass land rock shrub time scale tree wind windbreak Cognitive Verbs change compare observe optimize prevent provide test	<i>In addition to previous vocabulary:</i> angle canyon continental boundary cool (verb) cycle deposition Earth feature flow (noun) fossil freeze hazard heat (verb) human ice impact landscape marine mountain movement natural hazard natural process natural resource ocean floor perform plant relative resistant river rock formation rock layer shell slope	<i>In addition to previous vocabulary:</i> agriculture atmosphere biosphere climate cloud Earth's surface ecosystem environment everyday life geosphere hydrosphere industry landform living thing material (noun) molten mountain range ocean organism resource sediment soil space stream weather Cognitive Verbs combine determine develop influence interact obtain protect

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

Composition of the Earth

- Some geologic events happen very quickly. (2-ESS1-1)
- Some geologic events occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)

Natural Disasters

- A catastrophic disaster may affect people living in a place. (D2.Geo.12.K-2)

MIDDLE SERIES

Students will be asked to demonstrate understanding that:

Composition of the Earth

- Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. (4-ESS1-1)
- The presence and location of certain fossil types indicate the order in which rock layers were formed. (4-ESS1-1)
- Gravity breaks rocks, soils, and sediments into smaller particles and moves them around. (4-ESS2-1)
- The locations of mountain ranges occur in patterns. (4-ESS2-2)
- The locations of deep ocean trenches occur in patterns. (4-ESS2-2)
- The locations of ocean floor structures occur in patterns. (4-ESS2-2)
- The locations of earthquakes occur in patterns. (4-ESS2-2)
- The locations of volcanoes occur in patterns. (4-ESS2-2)
- Most earthquakes occur in bands that are often along the boundaries between continents and oceans. (4-ESS2-2)
- Most volcanoes occur in bands that are often along the boundaries between continents and oceans. (4-ESS2-2)
- Major mountain chains form inside continents or near their edges. (4-ESS2-2)
- Maps can help locate the different land and water features of Earth. (4-ESS2-2)

Natural Disasters

- A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). (4-ESS3-2)

Human Impacts

- Living things affect the physical characteristics of their regions. (4-ESS2-1)
- Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (4-ESS3-2)

continues

ASSESSMENT CONSIDERATIONS

LATER SERIES

Students will be asked to demonstrate understanding that:

Composition of the Earth

- Earth's major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). (5-ESS2-1)
- Earth's major systems interact in multiple ways to affect Earth's surface materials and processes. (5-ESS2-1)

Human Impacts

- Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, oceans, air, and even outer space. (5-ESS3-1)
- Individuals and communities are doing things to help protect Earth's resources and environments. (5-ESS3-1)
- Natural catastrophic events in one place affect people living in other places. (D2.Geo.12.3-5)
- Human-made catastrophic events in one place affect people living in other places. (D2.Geo.12.3-5)

COLLEGE, CAREER AND CIVIC LIFE (C3) FRAMEWORK FOR STATE SOCIAL STUDIES STANDARDS

GEOGRAPHY (D2.GEO)

GLOBAL INTERCONNECTIONS: CHANGING SPATIAL PATTERNS

Geo.12.K-2	Identify ways that a catastrophic disaster may affect people living in a place.
Geo.12.3-5	Explain how natural and human-made catastrophic events in one place affect people living in other places.

NEXT GENERATION SCIENCE STANDARDS**EARTH AND SPACE SCIENCE (ESS)****EARTH'S PLACE IN THE UNIVERSE**

2-ESS1-1	Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.

EARTH'S SYSTEMS

4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
4-ESS2-2	Analyze and interpret data from maps to describe patterns of Earth's features.
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

EARTH AND HUMAN ACTIVITY

4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
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NOTES

Additional information on gravity can be found in Physical Science: Matter and Laws

SUN AND EARTH

SKILLS INVENTORY

Lower Elementary

Understands the patterns of rotation and revolution of the sun, moon, Earth, and other planets and how this influences light and darkness as well as temperature.

Upper Elementary

Identifies the observable patterns caused by the orbit of Earth around the sun, the orbit of the moon around Earth, the rotation of the Earth and the different positions of the sun, the moon, and stars at different times of the day, month, and year.

MONTESSORI LESSONS

PURPOSES

INITIAL SERIES

Introductory Concepts

- Relative Proportion of the Sun and the Earth
- Rotation of the Planets and Centrifugal Force
- The Sun's Energy

- To provide context for the child's experiences of day, night, seasons, temperature, etc.
- To invite further research in various fields of science.
- To have a sensorial impression of the relative proportions of the Earth and the sun.
- To help the child recognize that the sun is very far away.
- To become familiar with the terms rotation and revolution as they relate to the movements of the Earth.
- To provide context for day/night and yearly cycles.
- Recognize that the Earth is much smaller than the sun and is very far away from it.
- To understand that radiant energy comes from the sun in all directions, some of which falls on the Earth.
- Recognize that the Earth neither freezes nor burns up because of rotation.

continues

MONTESSORI LESSONS	PURPOSES
<p>Planets of the Solar System</p> <ul style="list-style-type: none"> • Using Nomenclature Materials • Interplanetary Distances • Planetary Disks 	<ul style="list-style-type: none"> • To give the children an image of the solar system. • Recognize that the planets move around the sun and rotate around themselves. • To see the difference in the orbits of the planets of our solar system.
<p>Earth's Movements</p> <ul style="list-style-type: none"> • Parts of the Day • Hottest and Coldest Parts of the Day • Work Chart for Time Zones • Work Chart for Time Zones - Global Sunrise and Sunset • Lines of Latitude and Longitude • The International Date Line (The Story of Ferdinand Magellan) 	<ul style="list-style-type: none"> • To provide context to a child's daily experience. • To draw attention to the greater forces at work on our planet. • Recognize that the sun continues to warm the Earth into the afternoon. • Recognize that the Earth continues to cool into the early morning before the sun begins to rise again. • Recognize the relation between the sun, the Earth's rotation, and clock time on the Earth. • To become familiar with the concept of time zones.
<p>Earth is a Sphere</p> <ul style="list-style-type: none"> • Sun's Rays Strike at Different Angles • Perpendicular Rays are More Concentrated than Non-Perpendicular Rays • Perpendicular Rays Lose Less Energy to the Atmosphere 	<ul style="list-style-type: none"> • To understand that the sun warms the Earth differently in different places. • To understand that the sun warms the Earth differently in different places. • To connect climate with how people live around the world.

continues

MONTESSORI LESSONS	PURPOSES
MIDDLE SERIES	
<p>The Seasons</p> <ul style="list-style-type: none"> • Unequal Day and Night • There is a 24 Hour Day/Night at the Poles • Unequal Day and Night Causes Seasons • Solstices and Equinoxes • Dates of the Solstices and Equinoxes and the Length of the Seasons 	<ul style="list-style-type: none"> • To help the children recognize that when days are long in the northern hemisphere they are short in the southern hemisphere, and vice versa. • To prepare the children for understanding the seasons. • Recognize that the Earth does not move closer to and further away from the sun throughout the year. • To help the children experience the language and meaning of Arctic and Antarctic Circle. • To show the children how the tilt of the Earth's axis and its movement around the sun cause the seasons. • To introduce the nomenclature for solstices, equinoxes, Tropic of Cancer, Tropic of Capricorn, and Equator. • Recognize that the perpendicular rays strike the Earth at different places throughout the year, while staying within the tropical zone. • To understand the connection between unequal warming and cooling and the season. • To relate the concept of temperature zone to that of latitude. • To bring the child's awareness that the temperature within a temperature zone varies throughout the year. • To introduce nomenclature: Tropic of Cancer, Tropic of Capricorn, Equator.
<p>Tilt of the Axis of the Earth</p>	<ul style="list-style-type: none"> • To understand that the path of the sun through the sky year after year led people to calculate that the tilt of the axis of the Earth is 23 degrees off from vertical.
<p>Temperature Zones</p>	<ul style="list-style-type: none"> • To become aware of the range of temperatures on Earth. • To link this awareness to the motions of the sun and the Earth.
<p>Work Charts</p> <ul style="list-style-type: none"> • Temperature Zones • Temperature Variation in Zones • Seasons 	<ul style="list-style-type: none"> • To consolidate the knowledge that temperature varies in different parts of the Earth and at different times of the year. • To give the child the opportunity to practice with the idea of the changing seasons of the year. • To relate seasons to latitude. • To realize that temperature varies across the year, even within a temperature zone. • To give the child the opportunity to practice with the idea of the changing seasons of the year. • To realize that temperature varies across the year, even within a temperature zone.

ASSESSMENT VOCABULARY	
INITIAL SERIES	LATER SERIES
daylight fall (autumn) moon relative rise seasonal sky spring (season) star sun sunlight universe visible winter Cognitive Verbs compare describe observe predict relate	<i>In addition to previous vocabulary:</i> age axis brightness display Earth Earth's surface exert gravitational force gravity local North pole orbit planet pole pull rotation shadow South pole spherical stellar support Cognitive Verbs cause display represent support

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

- Patterns of the motion of the sun, moon, and stars in the sky can be observed, described, and predicted. (1-ESS1-1)
- Seasonal patterns of sunrise and sunset can be observed, described, and predicted. (1-ESS1-2)

LATER SERIES

Students will be asked to demonstrate understanding that:

- The gravitational force of Earth acting on an object near Earth's surface pulls that object toward the planet's center. (5-PS2-1)
- The sun is a star that appears larger and brighter than other stars because it is closer. (5-ESS1-1)
- Stars range greatly in their distance from Earth. (5-ESS1-1)
- The orbits of Earth around the sun and of the moon around Earth, together with the rotation of Earth about an axis between its North and South poles, cause observable patterns. (5-ESS1-2)
- The orbit and rotation of the Earth causes day and night. (5-ESS1-2)
- The orbit and rotation of the Earth causes daily changes in the length and direction of shadows. (5-ESS1-2)
- The orbit and rotation of the Earth causes different positions of the sun, moon, and stars at different times of the day, month, and year. (5-ESS1-2)

NEXT GENERATION SCIENCE STANDARDS

EARTH AND SPACE SCIENCE (ESS)

EARTH'S PLACE IN THE UNIVERSE

1-ESS1-1	Use observations of the sun, moon, and stars to describe patterns that can be predicted
1-ESS1-2	Make observations at different times of year to relate the amount of daylight to the time of year.
5-ESS1-1	Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.
5-ESS1-2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

continues

NEXT GENERATION SCIENCE STANDARDS**PHYSICAL SCIENCE (PS)****MATTER AND ITS INTERACTIONS****5-PS2-1**

Support an argument that the gravitational force exerted by Earth on objects is directed down.

NOTES

CHAPTER 3

PHYSICAL GEOGRAPHY

WORK OF AIR

SKILLS INVENTORY

Lower Elementary

- Identifies the properties of air and understands that wind changes the shape of land by breaking apart rocks, soils, and sediments into smaller particles and moving them.
- Understands the concept of climate and how scientists record weather patterns to predict future weather.

Upper Elementary

- Understands how winds and clouds in the atmosphere interact with landforms to determine weather patterns.
- Understands the interrelationship of winds and landforms to determine patterns of weather.
- Understands the concept of climate and how scientists record weather patterns to predict future weather.

MONTESSORI LESSONS	PURPOSES
INITIAL SERIES	
Natural Disasters <ul style="list-style-type: none">• Teacher-Created Lessons	<ul style="list-style-type: none">• Identify ways that natural disasters affect people living in a place.
MIDDLE SERIES	
Weather Conditions <ul style="list-style-type: none">• Teacher-Created Lessons	<ul style="list-style-type: none">• To describe typical weather conditions expected during a particular season.• To understand how winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.
Climates Around the World <ul style="list-style-type: none">• Teacher-Created Lessons	<ul style="list-style-type: none">• To describe climates in different regions of the world.

MONTESSORI LESSONS		PURPOSES
INITIAL SERIES		
Natural Disasters <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • Identify ways that natural disasters affect people living in a place. 	
MIDDLE SERIES		
Prelude to the Winds <ul style="list-style-type: none"> • Air Occupies Space • Warmer Air Moves Upward • Heated Air Rises and Cool Air Takes its Place • Winds • Air Insulates • Wind is Moving Air Which Circulates in a Pattern • Global Winds • Deflections and Names of Some Planetary Winds • Interactions of Heated Land/Water and Wind (Sea/Land breeze) 	<ul style="list-style-type: none"> • To become familiar with the properties of air. <ul style="list-style-type: none"> • Air takes up space. • Warm air rises. • When warm air rises, cooler air takes its place. • To understand how the sun heats the air on Earth. • To connect this to how wind is created. • To understand that the atmosphere thins as elevation increases. • To understand that air in motion is called wind. • To see that air circulates in a pattern. • To help the child understand that there are global patterns of winds which are predictable and historically important. • To build awareness that the rotation of the Earth affects the direction of the wind. • To learn the names and historic importance of major global wind patterns. • Recognize that the variability in heating of land and water causes wind to change direction throughout the day and night. 	
Interaction of Heated Land/Water and Wind <ul style="list-style-type: none"> • Changing Seasons and Winds • Work Chart of the Winds 	<ul style="list-style-type: none"> • To understand that wind patterns depend on the time of year. • To bring together previous explorations of the seasons and the winds. • To consolidate the children's understanding of the relationship between the seasons and major wind patterns. 	

continues

MONTESSORI LESSONS	PURPOSES
<p>Rain</p> <ul style="list-style-type: none"> • Water Vapors • Water Condenses • Seasonal Rain • Local Conditions for Rain <ul style="list-style-type: none"> • Coastal Rain • Tropical Rain • Orographic Rain 	<ul style="list-style-type: none"> • To help the children understand how temperature changes lead to condensation and evaporation and thus to rain. • To build awareness of vaporization and condensation. • To explore the relationship between seasons, air movement, and rain. • For the children to recognize small-scale rain patterns. • To understand how small-scale rain patterns work. • To understand that when there are high cliffs to drive the air up, rain falls on the coast. • To apply their knowledge of the characteristics of air and water. • To understand why rain may fall on one side of a mountain range, but not the other.
<p>Ocean Currents</p> <ul style="list-style-type: none"> • Air Can Make Water Surface Move • Land Causes the Currents to Turn • Water Rises as it is Heated • Ocean Currents 	<ul style="list-style-type: none"> • To understand how the winds influence ocean currents. • To provide avenues for exploration into how ocean currents impact the weather. • To spark curiosity about the complex interplay of global systems on our planet. • For children to recognize the power of wind to move surface water. • To provide an impression of the interactions between oceans, wind, and land. • To become familiar with the world’s major oceans. • To see the interconnected nature of Earth’s oceans.
<p>Wind Erosion</p>	<ul style="list-style-type: none"> • To build awareness that wind carves stone.
<p>Weather Conditions</p> <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To describe typical weather conditions expected during a particular season. • To understand how winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.
<p>Climates Around the World</p> <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To describe climates in different regions of the world.

ASSESSMENT VOCABULARY		
INITIAL SERIES	MIDDLE SERIES	LATER SERIES
design (noun) dike grass land shrub tree wind windbreak Cognitive Verbs change compare optimize prevent test	<i>In addition to previous vocabulary:</i> angle area average (adjective) barrier biogeology characteristic climate cool (verb) cycle deposition design solution display erosion extent flood flow (noun) freeze gravity hazard heat (verb) human ice impact lightning rod living organism living thing movement natural hazard organism particle physical characteristic precipitation rainfall	<i>In addition to previous vocabulary:</i> atmosphere biosphere climate cloud cloud Earth's surface ecosystem geosphere human hydrosphere ice landform living thing material (noun) molten mountain range ocean organism rock sediment soil support variety weather Cognitive Verbs affect describe determine develop influence interact support

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

- Wind can change the shape of the land. (2-ESS2-1)

MIDDLE SERIES

Students will be asked to demonstrate understanding that:

- Wind breaks rocks, soils, and sediments into smaller particles and moves them around. (4-ESS2-1)
- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)
- Climate describes a range of an area’s typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)
- A variety of natural hazards result from natural processes. (3-ESS3-1)
- Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1)

Students will be asked to:

- Identify ways that a catastrophic disaster may affect people living in a place. (D2.Geo.12.K-2)

LATER SERIES

Students will be asked to demonstrate understanding that:

- Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather. (5-ESS2-1)

COLLEGE, CAREER AND CIVIC LIFE (C3) FRAMEWORK FOR STATE SOCIAL STUDIES STANDARDS

GEOGRAPHY (D2.GEO)

GLOBAL INTERCONNECTIONS: CHANGING SPATIAL PATTERNS

Geo.12.K-2	Identify ways that a catastrophic disaster may affect people living in a place.
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NEXT GENERATION SCIENCE STANDARDS**EARTH AND SPACE SCIENCE (ESS)****EARTH'S SYSTEMS**

2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid
3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
EARTH AND HUMAN ACTIVITY	
3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

NOTES

WORK OF WATER

SKILLS INVENTORY

Lower Elementary

- Identifies bodies of water and understands that water exists as a solid (ice) and liquid form. Understands that water can change the shape of land.

Upper Elementary

- Understands where fresh and salt water are found and identifies different types of water erosion and how water shapes landforms.
- Understands how water impacts ecosystems and organisms found in different regions and how the oceans influence the climate.

MONTESSORI LESSONS

PURPOSES

MIDDLE SERIES

The River

- River Model
- Parts of a River
- Sedimentation
- River Flows from Highlands to Lowlands
- Rivers of the Child’s Own Continent and Main Rivers of the Earth

- To introduce the children to the work of rivers: carving, carrying, and depositing.
- To introduce children to nomenclature for the parts of a river.
- To give the children a sensorial experience of a river in order to inspire further work.
- To become familiar with the parts of the river.
- To help the children see how rivers deposit sediment in layers.
- To understand the role of gravity in a river’s flow.
- To give the child a chance to become familiar with rivers of the world and to inspire further research.
- To spark curiosity about rivers which flow in unlikely directions, such as the Nile River.

continues

MONTESSORI LESSONS	PURPOSES
<p>Erosion</p> <ul style="list-style-type: none"> • By Water • By Rain • By Waves • By Ice 	<ul style="list-style-type: none"> • To understand how water shapes the world. • To become familiar with the types of erosion and the formations they may result in. • To invite interest in further study of erosion and land formations. • To understand the forces which created the valleys and canyons on Earth. • To connect the work of water to the real places it has affected. • To see how land can be washed away by rain. • To see how softer stone can be eroded away to reveal harder stone. • To see how erosion influences a coastline. • To understand the forces at work on Earth. • To become familiar with erosion by ice.
<p>The Water Cycle</p>	<ul style="list-style-type: none"> • To help the child develop awareness of the water cycle. • To apply the knowledge they have gained about the Work of Water.
LATER SERIES	
<p>Saltwater and Freshwater</p> <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To understand that nearly all of Earth's available water is in the ocean. • To understand that most freshwater is in glaciers or underground. • To understand that only a tiny fraction of freshwater is in streams, lakes, wetlands, and the atmosphere.
<p>Impact on Living Things</p> <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To understand how water affects the types of living things found in a region. • To understand how the ocean supports a variety of ecosystems and organisms.
<p>Climate</p> <ul style="list-style-type: none"> • Teacher-Created Lessons 	<ul style="list-style-type: none"> • To understand the oceans' influences on the climate.

ASSESSMENT VOCABULARY		
INITIAL SERIES	MIDDLE SERIES	LATER SERIES
design (noun) dike Earth exist form (noun) grass ice lake land liquid ocean pond river shrub solid tree wind windbreak Cognitive Verbs change compare identify obtain optimize prevent test	<i>In addition to previous vocabulary:</i> angle biogeology characteristic cool (verb) cycle deposition erosion flow (noun) freeze gravity heat (verb) living organism living thing movement organism particle physical characteristic rainfall region relative rock sediment slope soil speed thaw vegetation volume weathering Cognitive Verbs affect provide	<i>In addition to previous vocabulary:</i> atmosphere available biosphere climate cloud distribution Earth's surface ecosystem fresh water geosphere glacier groundwater human hydrosphere landform material (noun) molten mountain range percentage physical properties polar ice caps reservoir stream support underground variety weather wetland Cognitive Verbs describe determine develop graph influence interact support

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

- Water can change the shape of the land. (2-ESS2-1)
- Water is found in the ocean, rivers, lakes, and ponds. (2-ESS2-3)
- Water exists as solid ice and in liquid form. (2-ESS2-3)

MIDDLE SERIES

Students will be asked to demonstrate understanding that:

- Rainfall helps to shape the land and affects the types of living things found in a region. (4-ESS2-1)
- Water and ice break rocks, soils, and sediments into smaller particles and move them around. (4-ESS2-1)

LATER SERIES

Students will be asked to demonstrate understanding that:

- The ocean supports a variety of ecosystems and organisms. (5-ESS2-1)
- The ocean shapes landforms. (5-ESS2-1)
- The ocean influences climate. (5-ESS2-1)
- Nearly all of Earth's available water is in the ocean. (5-ESS2-2)
- Most fresh water is in glaciers or underground. (5-ESS2-2)
- Only a tiny fraction of fresh water is in streams, lakes, wetlands, and the atmosphere. (5-ESS2-2)

NEXT GENERATION SCIENCE STANDARDS

EARTH AND SPACE SCIENCE (ESS)

EARTH'S SYSTEMS

2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid.
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
5-ESS2-2	Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.

NOTES

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APPENDIX

ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE

SKILLS INVENTORY

Engages in scientific inquiry to build, deepen, and apply knowledge of science including understanding what scientists do to investigate the natural world and what engineers do to design and build systems.

MONTESSORI LESSONS PURPOSES

These purposes are integrated into Montessori lessons across the science curriculum.

MONTESSORI LESSONS	PURPOSES
Life Science	<ul style="list-style-type: none">• To use a model to represent relationships in the natural world.• To use observations to describe patterns in the natural world in order to answer scientific questions.• To construct an argument with evidence to support a claim.• To communicate solutions with others in oral and/or written forms.• To use models and/or drawings that provide detail about scientific ideas.
Physical Science	<ul style="list-style-type: none">• To plan and conduct an investigation in collaboration with peers.• To analyze data from tests of an object or tool to determine if it works as intended.
Earth Science	<ul style="list-style-type: none">• To use observations to describe patterns in the natural world in order to answer scientific questions.• To construct an argument with evidence to support a claim.

ASSESSMENT VOCABULARY	
INITIAL SERIES	MIDDLE & LATER SERIES
analyze communicate compare convey design (noun) develop engineering illustrate optimize physical model representation situation sketch solve test Cognitive Verbs approach ask change create define design engineer gather solve understand	<i>In addition to previous vocabulary:</i> account aspect available best control (variable) controlled cost criteria design problem design process difficulty element failure point feature improved limited material (noun) peers perform proposal prototype resource success Cognitive Verbs carry out communicate compare consider control determine develop generate identify improve investigate involve lead limit optimize plan propose share suggest test

ASSESSMENT CONSIDERATIONS

INITIAL SERIES

Students will be asked to demonstrate understanding that:

Defining and Delimiting Engineering Problems

- A situation that people want to change or create can be approached as a problem to be solved through engineering. (K-2-ETS1-1)
- Asking questions, making observations, and gathering information are helpful in thinking about problems. (K-2-ETS1-1)
- Before beginning to design a solution, it is important to clearly understand the problem. (K-2-ETS1-1)

Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. (K-2-ETS1-2)

Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (K-2-ETS1-3)

Students will be asked to:

Asking Questions and Defining Problems

- Ask questions based on observations to find more information about the natural and/or designed world. (K-2-ETS1-1)
- Define a simple problem that can be solved through the development of a new or improved object or tool. (K-2-ETS1-1)

Developing and Using Models

- Develop a simple model based on evidence to represent a proposed object or tool. (K-2-ETS1-2)

Analyzing and Interpreting Data

- Analyze data from tests of an object or tool to determine if it works as intended. (K-2-ETS1-3)

MIDDLE AND LATER SERIES

Students will be asked to demonstrate understanding that:

Defining and Delimiting Engineering Problems

- Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). (3-5-ETS1-1)
- Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

Developing Possible Solutions

- Research on a problem should be carried out before beginning to design a solution. (3-5-ETS1-2)
- Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)
- At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)
- Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

Optimizing the Design Solution

- Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

NEXT GENERATION SCIENCE STANDARDS**ENGINEERING, TECHNOLOGY AND APPLICATIONS OF SCIENCE (ETS)****ENGINEERING DESIGN**

K-2-ETS1-1	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
3-5-ETS1-1	Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
K-2-ETS1-2	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
3-5-ETS1-2	Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
K-2-ETS1-3	Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.
3-5-ETS1-3	Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

NOTES

INDEXES

STANDARDS TO MONTESSORI INDEX

COLLEGE, CAREER AND CIVIC LIFE (C3) FRAMEWORK FOR STATE SOCIAL STUDIES STANDARDS		
HISTORY (D2.HIS)		
CHANGE, CONTINUITY AND CONTEXT		
His.3.K-2	Generate questions about individuals and groups who have shaped a significant historical change.	Foundations <ul style="list-style-type: none"> • The Story of Creation
His.3.3-5	Generate questions about individuals and groups who have shaped significant historical changes and continuities.	

COMMON CORE STATE STANDARDS STRANDS, DIVISIONS, AND STANDARDS CCSS.ELA.LITERACY		MONTESSORI CHAPTERS AND SECTIONS
SPEAKING AND LISTENING (SL)		
COMPREHENSION AND COLLABORATION		
SL.1.2	Ask and answer questions about key details in a text read aloud or information presented orally or through other media.	Foundations <ul style="list-style-type: none"> • The Story of Creation
SL.2.2	Recount or describe key ideas or details from a text read aloud or information presented orally or through other media.	
SL.1.3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.	
SL.2.3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.	

NEXT GENERATION SCIENCE STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
EARTH AND SPACE SCIENCE (ESS)		
EARTH AND HUMAN ACTIVITY		
1-ESS1-1	Use observations of the sun, moon, and stars to describe patterns that can be predicted	Earth Science <ul style="list-style-type: none"> • Sun and Earth
1-ESS1-2	Make observations at different times of year to relate the amount of daylight to the time of year.	
2-ESS1-1	Use information from several sources to provide evidence that Earth events can occur quickly or slowly.	
4-ESS1-1	Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time.	
5-ESS1-1	Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth.	
5-ESS1-2	Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.	
EARTH'S SYSTEMS		
2-ESS2-1	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.	Physical Geography <ul style="list-style-type: none"> • Work of Air • Work of Water
2-ESS2-3	Obtain information to identify where water is found on Earth and that it can be solid or liquid	Physical Geography <ul style="list-style-type: none"> • Work of Water
3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	Physical Geography <ul style="list-style-type: none"> • Weather and Climate
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world	

continues

NEXT GENERATION SCIENCE STANDARDS		MONTESSORI CHAPTERS AND SECTIONS
4-ESS2-1	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.	Earth Science <ul style="list-style-type: none"> • Earth's Systems Physical Geography <ul style="list-style-type: none"> • Work of Air • Work of Water
4-ESS2-2	Analyze and interpret data from maps to describe patterns of Earth's features.	Earth Science <ul style="list-style-type: none"> • Earth's Systems
5-ESS2-1	Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.	Earth Science <ul style="list-style-type: none"> • Earth's Systems Physical Geography <ul style="list-style-type: none"> • Work of Air • Work of Water • Weather and Climate
5-ESS2-2	Describe and graph the amounts of salt water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.	Physical Geography <ul style="list-style-type: none"> • Work of Water
EARTH AND HUMAN ACTIVITY		
4-ESS3-2	Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.	Earth Science <ul style="list-style-type: none"> • Earth's Systems
5-ESS3-1	Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.	
3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	Physical Geography <ul style="list-style-type: none"> • Weather and Climate
PHYSICAL SCIENCE (PS)		
MOTION AND STABILITY: FORCES AND INTERACTIONS		
5-PS2-1	Support an argument that the gravitational force exerted by Earth on objects is directed down.	Earth Science <ul style="list-style-type: none"> • Sun and Earth

MONTESSORI TO STANDARDS INDEX

MONTESSORI CHAPTER AND SECTION	NEXT GENERATION SCIENCE STANDARDS ALIGNED	
FOUNDATIONS		
Great Story: The Story of Creation	D2.His	History* <ul style="list-style-type: none"> • Change, Continuity and Context * C3 Framework
	SL	Speaking and Listening* <ul style="list-style-type: none"> • Comprehension and Collaboration * CCSS.ELA-Literacy
EARTH SCIENCE		
Earth's Systems Sun and Earth	ESS	Earth and Space Science <ul style="list-style-type: none"> • Earth and Human Activity • Earth's Place in the Universe • Earth's Systems
PHYSICAL GEOGRAPHY		
Work of Air Work of Water	ESS	Earth and Space Science <ul style="list-style-type: none"> • Earth's Systems