BLUE VALLEY DISTRICT CURRICULUM

Science | 6th grade

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 1: SPACE SYSTEMS: THE UNIVERSE AND ITS STARS Solar System Galaxies Milky Way Earth's Location in the galaxy Space Exploration	**MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.** Science & Engineering Practice(s): • **Developing and Using Models:** Develop and use a model to describe phenomena. Disciplinary Core Idea(s): • **ESS1.A: The Universe and Its Stars:** Earth and its solar system are part of the Milky Way galaxy, which is one of many galaxies in the universe. • **ESS1.B: Earth and the Solar System:** The solar system appears to have formed from a disk of dust and gas, drawn together by gravity. Crosscutting Concept(s): • **Systems and System Models:** Models can be used to represent systems and their interactions. **MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system.** . Science & Engineering Practice(s): • **Analyzing and Interpreting Data:** Analyze and interpret data to determine similarities and differences in findings. Disciplinary Core Idea(s): • **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. Crosscutting Concept(s): • **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.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 2: SPACE SYSTEMS: EARTH AND THE SOLAR SYSTEM Lunar Phases Eclipses Seasons	**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.** Science & Engineering Practice(s): • **Developing and Using Models:** Develop and use a model to describe phenomena. Disciplinary Core Idea(s): • **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. • **ESS1.B: Earth and the Solar System:** 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. Crosscutting Concept(s): • **Patterns:** Patterns can be used to identify cause and effect relationships.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 3: HISTORY OF EARTH Rock Strata Fossil Records Geologic Age Change over Time Plate Tectonics Earthquakes Volcanoes	**MS-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.** Science & Engineering Practice(s): • **Constructing Explanations and Designing Solutions:** 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. Disciplinary Core Idea(s): • **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. Crosscutting Concept(s): • **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-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.** Science & Engineering Practice(s): • **Constructing Explanations and Designing Solutions:** 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. Disciplinary Core Idea(s): • **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. • **ESS2.C: The Roles of Water in Earth's Surface Processes:** Water's movements—both on the land and underground—cause weathering and erosion, which change the land's surface features and create underground formations. Crosscutting Concept(s): • **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.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 3: HISTORY OF EARTH (continued) Rock Strata Fossil Records Geologic Age Change over Time Plate Tectonics Earthquakes Volcanoes	**MS-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.** Science & Engineering Practice(s): • **Analyzing and Interpreting Data:** Analyze and interpret data to provide evidence for phenomena. Disciplinary Core Idea(s): • **ESS1.C: The History of Planet Earth:** Tectonic processes continually generate new ocean sea floor at ridges and destroy old sea floor at trenches. • **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. Crosscutting Concept(s): • **Patterns:** Patterns in rates of change and other numerical relationships can provide information about natural systems.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 4: EARTH PROCESSES Energy and Matter Weathering and Erosion Rock Cycling	**MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.** Science & Engineering Practice(s): • **Developing and Using Models:** Develop and use a model to describe phenomena. Disciplinary Core Idea(s): • **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. Crosscutting Concept(s): • **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.

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UNIT 5: THE CHANGING EARTH Water Resources and Resource Distribution	**MS-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.** Science & Engineering Practice(s): • **Developing and Using Models:** Develop a model to describe unobservable mechanisms. Disciplinary Core Idea(s): • **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. • **ESS2.C: The Roles of Water in Earth's Surface Processes:** Global movements of water and its changes in form are propelled by sunlight and gravity. Crosscutting Concept(s): • **Energy and Matter:** Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. **MS-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.** Science & Engineering Practice(s): • **Constructing Explanations and Designing Solutions:** 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. Disciplinary Core Idea(s): • **ESS3.A: Natural Resources:** Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources. 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. Crosscutting Concept(s): • **Cause and Effect:** Cause and effect relationships may be used to predict phenomena in natural or designed systems.

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UNIT 6: WEATHER Atmospheric and Oceanic Circulation Salinity Landforms	**MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.** Science & Engineering Practice(s): • **Planning and Carrying Out Investigations:** Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. Disciplinary Core Idea(s): • **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. • **ESS2.D: Weather and Climate:** Because these patterns are so complex, weather can only be predicted probabilistically. Crosscutting Concept(s): • **Cause and Effect:** Cause and effect relationships may be used to predict phenomena in natural or designed systems. **MS-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.** Science & Engineering Practice(s): • **Developing and Using Models:** Develop and use a model to describe phenomena. Disciplinary Core Idea(s): • **ESS2.C: The Roles of Water in Earth's Surface Processes:** Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. • **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. • **ESS2.D: Weather and Climate:** The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. Crosscutting Concept(s): • **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.

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UNIT 7: CLIMATE Global Climate Change	**MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.** Science & Engineering Practice(s): • **Asking Questions and Defining Problems:** Ask questions to identify and clarify evidence of an argument. Disciplinary Core Idea(s): • **ESS3.D: Global Climate Change:** 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. Crosscutting Concept(s): • **Stability and Change:** Stability might be disturbed either by sudden events or gradual changes that accumulate over time.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 8: HUMAN & NATURAL HAZARD IMPACTS ON OUR WORLD Engineering Design Project reflecting problems and solutions for human and natural hazard impacts on our world	**MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.** Science & Engineering Practice(s): • **Analyzing and Interpreting Data:** Analyze and interpret data to determine similarities and differences in findings. Disciplinary Core Idea(s): • **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. Crosscutting Concept(s): • **Patterns:** Graphs, charts, and images can be used to identify patterns in data. **MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*** Science & Engineering Practice(s): • **Constructing Explanations and Designing Solutions:** Apply scientific principles to design an object, tool, process or system. Disciplinary Core Idea(s): • **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. • **ESS3.C: Human Impacts on Earth Systems:** 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. Crosscutting Concept(s): • **Cause and Effect:** Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 8: HUMAN & NATURAL HAZARD IMPACTS ON OUR WORLD (continued)	**MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.** Science & Engineering Practice(s): • **Engaging in Argument from Evidence:** 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. Disciplinary Core Idea(s): • **ESS3.C: Human Impacts on Earth Systems:** 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. Crosscutting Concept(s): • **Cause and Effect:** Cause and effect relationships may be used to predict phenomena in natural or designed systems. **MS-ETS1-1. 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.** Science & Engineering Practice(s): • **Asking Questions and Defining Problems:** Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions. Disciplinary Core Idea(s): • **ETS1.A: Defining and Delimiting Engineering Problems:** The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. Crosscutting Concept(s): • **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 environment. • **Influence of Science, Engineering, and Technology on Society and the Natural World:** The uses of technologies and 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.

ORGANIZING THEME/TOPIC	FOCUS STANDARDS & SKILLS
UNIT 8: HUMAN & NATURAL HAZARD IMPACTS ON OUR WORLD (continued)	**MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.** Science & Engineering Practice(s): • **Engaging in Argument from Evidence:** Evaluate competing design solutions based on jointly developed and agreed-upon design criteria. Disciplinary Core Idea(s): • **ETS1.B: Developing Possible Solutions:** There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. **MS-ETS1-3. 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.** Science & Engineering Practice(s): • **Analyzing and Interpreting Data:** Analyze and interpret data to determine similarities and differences in findings. Disciplinary Core Idea(s): • **ETS1.B: Developing Possible Solutions:** Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. • **ETS1.C: Optimizing the Design Solution:** Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design. **MS-ETS1-4. 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.** Science & Engineering Practice(s): • **Developing and Using Models:** Develop a model to generate data to test ideas about designed systems, including those representing inputs and outputs. Disciplinary Core Idea(s): • **ETS1.B: Developing Possible Solutions:** A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. • **ETS1.B: Developing Possible Solutions:** Models of all kinds are important for testing solutions. • **ETS1.C: Optimizing the Design Solution:** The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution.