BLUE VALLEY DISTRICT CURRICULUM

Science | Grade 4

ORGANIZING THEME/ TOPIC	FOCUS STANDARDS & SKILLS
Unit 1: Energy & Motion **Bring Science Alive!** Unit 2 Energy Lessons 1-2 Suggested Time Frame: 14 days	**4-PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object.** **Science and Engineering Practice** • **Constructing Explanations and Designing Solutions –** Use evidence (e.g., measurements, observations, patterns) to construct an explanation. **Disciplinary Core Ideas** • **PS3.A: Definitions of Energy -** The faster a given object is moving, the more energy it possesses. **Crosscutting Concept** • **Energy and Matter –** Energy can be transferred in various ways and between objects. **4-PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide.** **Science and Engineering Practice** • **Asking Questions and Defining Problems –** Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships. **Disciplinary Core Ideas** • **PS3.A: Definitions of Energy -** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. • **PS3.B: Conservation of Energy and Energy Transfer -** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. • **PS3.C: Relationship Between Energy and Forces -** When objects collide, the contact forces transfer energy so as to change the objects' motions. **Crosscutting Concept** • **Energy and Matter –** Energy can be transferred in various ways and between objects.

Unit 2: Energy Transfer **Bring Science Alive!** Unit 2 Energy Lessons 3 - 4 Suggested Time Frame: 13 days	**4-PS3.2 Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat and electric currents.** **Science and Engineering Practice** • **Planning and Carrying Out Investigations** – Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. **Disciplinary Core Ideas** • **PS3.A: Definitions of Energy -** Energy can be moved from place to place by moving objects or through sound, light, or electric currents. • **PS3.B: Conservation of Energy and Energy Transfer -** Energy is present whenever there are moving objects, sound, light, or heat. When objects collide, energy can be transferred from one object to another, thereby changing their motion. In such collisions, some energy is typically also transferred to the surrounding air; as a result, the air gets heated and sound is produced. • **PS3.B: Conservation of Energy and Energy Transfer -** Light also transfers energy from place to place. • **PS3.B: Conservation of Energy and Energy Transfer -** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. **Crosscutting Concept** • **Energy and Matter –** Energy can be transferred in various ways and between objects.
Unit 3: Energy Transfer **Bring Science Alive!** Unit 2 Energy Lesson 5 Suggested Time Frame: 7 days	**4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.** **Science and Engineering Practice** • **Constructing Explanations and Designing Solutions** – Apply scientific ideas to solve design problems. **Disciplinary Core Ideas** • **PS3.B: Conservation of Energy and Energy Transfer -** Energy can also be transferred from place to place by electric currents, which can then be used locally to produce motion, sound, heat, or light. The currents may have been produced to begin with by transforming the energy of motion into electrical energy. • **PS3.D: Energy in Chemical Processes and Everyday Life -** The expression "produce energy" typically refers to the conversion of stored energy into a desired form for practical use. • **ETS1.A: Defining 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). 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. **Crosscutting Concept** • **Energy and Matter –** Energy can be transferred in various ways and between objects.

Unit 4: Natural Resources **Bring Science Alive!** Unit 2 Energy Lesson 6 Suggested Time Frame: Suggested Time Frame: 6 days	**4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.** **Science and Engineering Practice** • **Obtaining, Evaluating, and Communicating Information –** Obtain and combine information from books and other reliable media to explain phenomena. **Disciplinary Core Ideas** • **ESS3.A: Natural Resources -** Energy and fuels that humans use are derived from natural sources, and their use affects the environment in multiple ways. Some resources are renewable over time, and others are not. **Crosscutting Concept** • **Cause and Effect** – Cause and effect relationships are routinely identified and used to explain change.
Unit 5: Earth's Changing Surface **Bring Science Alive!** Unit 3 Earth's Changing Surface Lessons 1-5 Suggested Time Frame: 32 days	**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.** **Science and Engineering Practices** • **Constructing Explanations and Designing Solutions –** Identify the evidence that support particular points in an explanation. **Disciplinary Core Idea** • **ESS1.C: The History of Planet Earth -** Local, regional, and global patterns of rock formations reveal changes over time due to earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. **Crosscutting Concept** • **Patterns** – Patterns can be used as evidence to support an explanation. **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.** **Science and Engineering Practices** • **Planning and Carrying Out Investigations** – Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. **Disciplinary Core Idea** • **ESS2.A: Earth Materials and Systems -** Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, living organisms, and gravity break rocks, soils, and sediments into smaller particles and move them around. • **ESS2.E: Biogeology -** Living things affect the physical characteristics of their regions. **Crosscutting Concept** • **Cause and Effect** – Cause and effect relationships are routinely identified, tested, and used to explain change.

Unit 6: Patterns of Earth's Features **Bring Science Alive!** Unit 3 Earth's Changing Surface Lesson 6 Suggested Time Frame: 7 days	**4-ESS2-2 Analyze and interpret data from maps to describe patterns of Earth's features.** **Science and Engineering Practices** • **Analyzing and Interpreting Data – Analyze and interpret data to make sense of phenomena using logical reasoning.** **Disciplinary Core Idea** • **ESS2.B: Plate Tectonics and Large-Scale System Interactions -** The locations of mountain ranges, deep ocean trenches, ocean floor structures, earthquakes, and volcanoes occur in patterns. Most earthquakes and volcanoes occur in bands that are often along the boundaries between continents and oceans. Major mountain chains form inside continents or near their edges. Maps can help locate the different land and water features areas of Earth. **Crosscutting Concept** • **Patterns –** Patterns can be used as evidence to support an explanation.
Unit 7: Natural Hazards: Impacts on Humans **Bring Science Alive!** Unit 3 Earth's Changing Surface Lesson 7 Suggested Time Frame: 7 days	**4-ESS3-2 Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.** **Science and Engineering Practices** • **Constructing Explanations and Designing Solutions –** Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. **Disciplinary Core Idea** • **ESS3.B: Natural Hazards -** A variety of hazards result from natural processes (e.g., earthquakes, tsunamis, volcanic eruptions). Humans cannot eliminate the hazards but can take steps to reduce their impacts. • **ETS1.B: Designing Solutions to Engineering Problems –** testing a solution involves investigating how well it performs under a range of likely conditions. **Crosscutting Concept** • **Cause and Effect** – Cause and effect relationships are routinely identified, tested, and used to explain change.
Unit 8: Earth's Systems: Wave **Bring Science Alive!** Unit 4 Waves and Information Lessons 1 - 4 Time Frame: 26 days	**4-PS4-1 Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.** **Science and Engineering Practices** • **Developing and Using Models –** Develop a model using an analogy, example, or abstract representation to describe a scientific principle. **Disciplinary Core Idea** • **PS4.A: Wave Properties -** Waves, which are regular patterns of motion, can be made in water by disturbing the surface. When waves move across the surface of deep water, the water goes up and down in place; there is no net motion in the direction of the wave except when the water meets a beach. • **PS4.A: Wave Properties** Waves of the same type can differ in amplitude (height of the wave) and wavelength (spacing between wave peaks). **Crosscutting Concept** • **Patterns –** Similarities and differences in patterns can be used to sort, classify, and analyze simple rates of change for natural phenomena.

Unit 9: Digitized Information **Bring Science Alive!** Unit 4 Waves and Information Lessons 5-6 Suggested Time Frame: 14 days	**4-PS4-3 Generate and compare multiple solutions that use patterns to transfer information.** **Science and Engineering Practices** • **Constructing Explanations and Designing Solutions –** Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution. **Disciplinary Core Idea** • **PS4.C: Information Technologies and Instrumentation -** Digitized information can be transmitted over long distances without significant degradation. High-tech devices, such as computers or cell phones, can receive and decode information—convert it from digitized form to voice—and vice versa. • **ETS1.C: 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. **Crosscutting Concept** • **Patterns –** Similarities and differences in patterns can be used to sort and classify designed products.
Unit 10: Plants and Animals: Structure and Function **Bring Science Alive!** Unit 1 Plant and Animal Structures Lessons 1-7 Suggested Time Frame: 44 days	**4-LS1-1 Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** **Science and Engineering Practices** • **Engaging in Argument from Evidence –** Construct an argument with evidence, data and/or a model. **Disciplinary Core Idea** • **LS1.A: Structure and Function -** Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. **Crosscutting Concept** • **Systems and System Models –** A system can be described in terms of its components and their interactions.

Unit 11: Sight and Sense Receptors **Bring Science Alive!** Unit 1 Plant and Animal Structures Lessons 8-9 Suggested Time Frame: 13 days	**4-PS4-2 Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.** **Science and Engineering Practices** • **Developing and Using Models –** Develop a model to describe phenomena**.** **Disciplinary Core Idea** • **PS4.B: Electromagnetic Radiation -** An object can be seen when light reflected from its surface enters the eyes. **Crosscutting Concept** • **Cause and Effect –** Cause and effect relationships are routinely identified. **4-LS1-2 Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.** **Science and Engineering Practices** • **Developing and Using Models –** Use a model to test interactions concerning the functioning of a natural system. **Disciplinary Core Idea** **LS1.D: Information Processing -** Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. **Crosscutting Concept** • **Systems and System Models –** A system can be described in terms of its components and their interactions.