

MSAD #54 Science Curriculum

Content Area: Science
Unit: Unifying Themes

Grade: Grades 8
MLR Span: 6-8

MLR Content Standard: A: Unifying Themes

Students apply the principles of systems, models, constancy and change, and scale in science and technology.

*Assessment

Unifying Themes:	MLR Performance Indicators	MSAD #54 Objectives	Instructional Resources/Activities
A1 Systems	<p>1.Students describe and apply principles of systems in man-made things, natural things, and processes.</p> <p>a.Explain how individual parts working together in a system (including organisms, Earth systems, solar systems, or man-made structures) can do more than each part individually.</p> <p>b.Explain how the output of one part of a system, including waste products from manufacturing or organisms, can become the input of another part of a system.</p> <p>c.Describe how systems are nested and that systems may be thought of as containing subsystems (as well as being a subsystem of a larger system) and apply the</p>	<p>Students will:</p> <p>a1.explain how individual parts working together in a system (including organisms, Earth systems, solar systems, or man-made structures) can do more than each part individually.</p> <p>b1.explain how the output of one part of a system, including waste products from manufacturing or organisms, can become the input of another part of a system.</p> <p>c1.describe how systems are nested and that systems may be thought of as containing subsystems (as well as being a subsystem of a larger system) and apply the understanding to analyze systems</p>	<p>a1-c1.STC: Micro Macro Organisms, STC Energy and Motion, STC: Earth and Space</p> <p>a1-c1.Aimes: Microworld FAST Program</p>

<p>A2 Models</p>	<p>understanding to analyze systems.</p> <hr/> <p>2.Students use models to examine a variety of real-world phenomena from the physical setting, the living environment, and the technological world and compare advantages and disadvantages of various models.</p> <p>a.Compare different types of models that can be used to represent the same thing (including models of chemical reactions, motion, or cells) in order to match the purpose and complexity of a model to its use.</p> <p>b.Propose changes to models and explain how those changes may better the real thing.</p>	<hr/> <p>Students will:</p> <p>a1.compare different types of models that can be used to represent the same thing (including models of chemical reactions, motion, or cells) in order to match the purpose and complexity of a model to its use.</p>	<hr/> <p>a1. Resources: Physical and Conceptual Models</p>
<p>A3 Constancy and Change</p>	<p>3.Students describe how patterns of change vary in physical, biological, and technological systems.</p> <p>a.Describe systems that are changing including ecosystems, Earth systems, and technologies.</p>	<hr/> <p>Students will:</p> <p>a1.describe systems that are changing including ecosystems, Earth systems, and technologies.</p>	<hr/> <p>a1–b1. STC: Earth and Space Genetics Unit STC: Micro/Macro Organisms</p>

	<p>b. Give examples of systems including ecosystems, Earth systems, and technologies that appear to be unchanging (even though things may be changing within the system) and identify any feedback mechanisms that may be modifying the changes.</p> <p>c. Describe rates of change and cyclic patterns using appropriate grade-level mathematics.</p>	<p>b1. give examples of systems including ecosystems, Earth systems, and technologies that appear to be unchanging (even though things may be changing within the system) and identify any feedback mechanisms that may be modifying the changes.</p>	
<p>A4 Scale</p>	<p>4. Students use scale to describe objects, phenomena, or processes related to Earth, space, matter, and mechanical and living systems.</p> <p>a. Describe how some things change or work differently at different scales.</p> <p>b. Use proportions, averages, and ranges to describe small and large extremes of scale.</p>	<p>Students will:</p> <p>a1. describe how some things change or work differently at different scales.</p> <p>b1. use proportions, averages, and ranges to describe small and large extremes of scale.</p>	<p>a1-b1. STC: Organisms STC: Earth and Space FAST Program Aimes: Machine Shop</p>

MSAD #54 Science Curriculum

Content Area: Science
Unit: Skills & Traits

Grade: Grade 8
MLR Span: 6-8

MLR Content Standard: B. The Skills and Traits of Scientific Inquiry And Technological Design

Students plan, conduct, analyze data from and communicate results of in-depth scientific investigations; and they use a systematic process, tools, equipment, and a variety of materials to create a technological design and produce a solution or product to meet a specified need.

Skills and Traits	MLR Performance Indicators	MSAD #54 Objectives	Instructional Resources/Activities
<p>B1 Skills and Traits of Scientific Inquiry</p>	<p>1.Students plan, conduct, analyze data from, and communicate results of investigations, including simple experiments.</p> <p>a.Identify questions that can be answered through scientific investigations.</p> <p>b.Design and safely conduct scientific investigations including experiments with controlled variables.</p> <p>c.Use appropriate tools, metric units, and techniques to gather, analyze, and interpret data.</p> <p>d.Use mathematics to gather, organize, and present data and structure convincing explanations.</p> <p>e.Use logic, critical</p>	<p>Students will:</p> <p>a1.identify questions that can be answered through scientific investigations.</p> <p>b1.design and safely conduct scientific investigations including experiments with controlled variables.</p> <p>c1.use appropriate tools, metric units, and techniques to gather, analyze, and interpret data.</p> <p>d1.use mathematics to gather, organize, and present data and structure convincing explanations</p>	<p>a1-d1. FAST Program Aimes: Machine Shop Computer Programs to graph data</p>

	<p>reasoning, and evidence to develop descriptions, explanations, predictions, and models.</p> <p>f. Communicate, critique, and analyze their own scientific work and the work of other students.</p>		
<p>B2 Skills and Traits of Technological Design</p>	<p>2. Students use a systematic process, tools, equipment, and a variety of materials to design and produce a solution or product to meet a specified need, using established criteria.</p> <p>a. Identify appropriate problems for technological design.</p> <p>b. Design a solution or product.</p> <p>c. Communicate a proposed design using drawings and simple models.</p> <p>d. Implement a proposed design.</p> <p>e. Evaluate a completed design or product.</p> <p>f. Suggest improvement for their own and others' designs and try out</p>	<p>Students will</p> <p>a1. identify appropriate problems for technological design.</p> <p>b1. design a solution or product.</p> <p>c1. communicate a proposed design using drawings and simple models.</p> <p>d1. implement a proposed design.</p> <p>e1. evaluate a completed design or product.</p> <p>f1. suggest improvement for their own and others' designs and try out proposed modifications.</p>	<p>a1-g1. Teacher Created Activities FAST Program</p>

	<p>proposed modifications.</p> <p>g.Explain the design process including the stages of problem identification, solution design, implementation, and evaluation.</p>	<p>g1.explain the design process including the stages of problem identification, solution design, implementation, and evaluation.</p>	
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MSAD #54 Science Curriculum

Content Area: Science
 Unit: Scientific & Technological Enterprise

Grade: Grade 8
 MLR Span: 6-8

MLR Content Standard: **C. The Scientific and Technological Enterprise**
 Students understand the history and nature of scientific knowledge and technology, the processes of inquiry and technological design, and the impacts science and technology have on society and the environment.

Scientific & Technological Enterprise	MLR Performance Indicators	MSAD #54 Objectives	Instructional Resources/Activities
<p>C1 Understandings of Inquiry</p>	<p>1.Students describe how scientists use varied and systematic approaches to investigations that may lead to further investigations.</p> <p>a.Explain how the type of question informs the type of investigation.</p> <p>b.Explain why it is important to identify and control variables and replicate trials in experiments.</p> <p>c.Describe how scientists’ analyses of findings can lead to new investigations.</p>	<p>Students will</p> <p>a1.explain how the type of question informs the type of investigation.</p> <p>b1.explain why it is important to identify and control variables and replicate trials in experiments.</p> <p>c1.describe how scientists’ analyses of findings can lead to new investigations.</p>	<p>a1-c1.Teacher Created Projects FAST Program STC Programs</p>
<p>C2 Understandings About Science and Technology</p>	<p>2.Students understand and compare the similarities and differences between scientific inquiry and technological design.</p> <p>a.Compare the process of scientific inquiry to the process of technological design.</p>	<p>Students will</p>	

<p>C3 Science, Technology, and Society</p>	<p>b.Explain how constraints and consequences impact scientific inquiry and technological design.</p> <hr/> <p>3.Students identify and describe the role of science and technology in addressing personal and societal challenges.</p> <p>a.Describe how science and technology can help address societal challenges related to population, natural hazards, sustainability, personal health and safety, and environmental quality.</p> <p>b.Identify personal choices that can either positively or negatively impact society including population, ecosystem sustainability, personal health, and environmental quality.</p> <p>c.Identify factors that influence the development and use of science and technology.</p>	<p>Students will</p> <hr/> <p>a1.describe how science and technology can help address societal challenges related to population, natural hazards, sustainability, personal health and safety, and environmental quality.</p> <p>b1.identify personal choices that can either positively or negatively impact society including population, ecosystem sustainability, personal health, and environmental quality.</p> <p>c1.identify factors that influence the development and use of science and technology.</p>	<hr/> <p>a1-c1.STC: Earth and Space STC: Micro/Macro Building Literacy Skills/Current Events</p> <p>a1-c1.National Geographic website</p> <p>a1-c1.60 Minutes website</p>
<p>C4 History and Nature of Science</p>	<p>4.Students describe historical examples that illustrate how science advances knowledge through the scientists involved and through the ways scientists think and about their work and the work of others.</p>	<p>Students will</p>	

	<p>a. Describe how men and women of various backgrounds, working in teams or alone and communicating about their ideas extensively with others, engage in science, engineering, and related fields.</p> <p>b. Describe a breakthrough from the history of science that contributes to our current understanding of science.</p> <p>c. Describe and provide examples that illustrate that science is a human endeavor that generates explanations based on verifiable evidence that are subject to change when new evidence does not match existing explanations.</p>	<p>b1. describe a breakthrough from the history of science that contributes to our current understanding of science.</p> <p>c1. describe and provide examples that illustrate that science is a human endeavor that generates explanations based on verifiable evidence that are subject to change when new evidence does not match existing explanations.</p>	<p>b1-c1. STC Programs: Examples: cell theory climate change universe natural selection DNA and heredity</p>
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MSAD #54 Science Curriculum

Content Area: Science
Unit: Physical Setting

Grade: Grade 8
MLR Span: 6-8

MLR Content Standard: D. The Physical Setting

Students understand the universal nature of matter, energy, force, and motion and identify how these relationships are exhibited in Earth Systems, in the solar system, and throughout the universe.

Physical Setting	MLR Performance Indicators	MSAD #54 Objectives	Instructional Resources/Activities
D1 Universe and Solar System	<p>1.Students explain the movements, and describe the location, composition, and characteristics of our solar system and universe, including planets, the sun, and galaxies.</p> <p>a.Describe the different kinds of objects in the solar system including planets, sun, moons, asteroids, and comets.</p> <p>b.Explain the motions that cause days, years, phases of the moon, and eclipses.</p> <p>c.Describe the location of our solar system in its galaxy and explain that other galaxies exist and that they include stars and planets.</p>	<p>Students will:</p> <p>a1 .describe the different kinds of objects in the solar system including planets, sun, moons, asteroids, and comets.</p> <p>b1.explain the motions that cause days, years, phases of the moon, and eclipses.</p> <p>c1.describe the location of our solar system in its galaxy and explain that other galaxies exist and that they include stars and planets.</p>	<p>a1-c1.STC: Earth in Space</p> <p>a1-c1.Teacher Created Activities</p> <p>a1-c1.Brainpop website</p> <p>a1-c1.National Geographic website</p>
D2 Earth	<p>2.Students describe the various cycles, physical and biological forces and processes, position in space, energy transformations,</p>	<p>Students will</p>	

	<p>and human actions that affect the short-term and long-term changes to the Earth.</p> <p>a.Explain how the tilt of Earth’s rotational axis relative to the plane of its yearly orbit around the sun affects the day length and sunlight intensity to cause seasons.</p> <p>b.Describe Earth Systems-biosphere, atmosphere, hydrosphere, and lithosphere- and cycles and interactions within them (including water moving among and between them, rocks forming and transforming, and weather formation).</p> <p>c.Give several reasons why the climate is different in different regions of the Earth.</p> <p>d.Describe significant Earth resources and how their limited supply affects how they are used.</p> <p>e.Describe the effect of gravity on objects on Earth.</p> <p>f.Give examples of abrupt changes and slow changes in Earth Systems.</p>	<p>a1.explain how the tilt of Earth’s rotational axis relative to the plane of its yearly orbit around the sun affects the day length and sunlight intensity to cause seasons.</p> <p>b1.describe Earth Systems-biosphere, atmosphere, hydrosphere, and lithosphere- and cycles and interactions within them (including water moving among and between them, rocks forming and transforming, and weather formation).</p> <p>c1.give several reasons why the climate is different in different regions of the Earth.</p> <p>d1.describe significant Earth resources and how their limited supply affects how they are used.</p> <p>e1.describe the effect of gravity on objects on Earth.</p> <p>f1.give examples of abrupt changes and slow changes in Earth Systems.</p>	<p>a1-f1.STC: Earth in Space</p> <p>a1-f1. Teacher Created Activities</p> <p>a1-f1. National Geographic Website</p> <p>a1-f1.Brainpop website</p>
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<p>D3 Matter and Energy</p>	<p>3.Students describe physical and chemical properties of matter, interactions and changes in matter, and transfer of energy through matter.</p> <p>a.Describe that all matter is made up of atoms and distinguish between/among elements, atoms, and molecules.</p> <p>b.Describe how physical characteristics of elements and types of reactions they undergo have been used to create the Periodic Table.</p> <p>c.Describe the difference between physical and chemical change.</p> <p>d.Explain the relationship of the motion of atoms and molecules to the states of matter for gases, liquids, and solids.</p> <p>e.Explain how atoms are packed together in arrangements that compose all substances including elements, compounds, mixtures, and solutions.</p> <p>f.Explain and apply the understanding that substances have characteristic</p>	<p>Students will</p> <p>a1.describe that all matter is made up of atoms and distinguish between/among elements, atoms, and molecules.</p> <p>b1.describe how physical characteristics of elements and types of reactions they undergo have been used to create the Periodic Table.</p> <p>c1.describe the difference between physical and chemical change.</p> <p>d1.explain the relationship of the motion of atoms and molecules to the states of matter for gases, liquids, and solids.</p> <p>e1.explain how atoms are packed together in arrangements that compose all substances including elements, compounds, mixtures, and solutions.</p> <p>f1.explain and apply the understanding that substances have characteristic properties, including density, boiling point,</p>	<p>a1-k1.STC: Properties in Matter</p> <p>a1-k1. Teacher Created Activities</p> <p>a1-k1.Brainpop website</p>
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	<p>properties, including density, boiling point, and solubility and these properties are not dependent on the amount of matter present.</p> <p>g. Use the idea of atoms to explain the conservation of matter.</p> <p>h. Describe several different types of energy forms including heat energy, chemical energy, and mechanical energy.</p> <p>i. Use examples of energy transformations from one form to another to explain that energy cannot be created or destroyed.</p> <p>j. Describe how heat is transferred from one object to another by conduction, convection, and/or radiation.</p> <p>k. Describe the properties of solar radiation and its interaction with objects on Earth.</p>	<p>and solubility and these properties are not dependent on the amount of matter present.</p> <p>g1. use the idea of atoms to explain the conservation of matter.</p> <p>h1. describe several different types of energy forms including heat energy, chemical energy, and mechanical energy.</p> <p>i1. use examples of energy transformations from one form to another to explain that energy cannot be created or destroyed.</p> <p>j1. describe how heat is transferred from one object to another by conduction, convection, and/or radiation.</p> <p>k1. describe the properties of solar radiation and its interaction with objects on Earth.</p>	
<p>D4 Force and Motion</p>	<p>4. Students describe the force of gravity, the motion of objects, the properties of waves, and the wavelike property of energy in light waves.</p>	<p>Students will:</p>	

	<p>a. Describe the similarities and differences in the motion of sound vibrations, earthquakes, and light waves.</p> <p>b. Explain the relationship among visible light, the electromagnetic spectrum, and sight.</p> <p>c. Describe and apply an understanding of how the gravitational force between any two objects would change if their mass or the distance between them changed.</p> <p>d. Describe and apply an understanding of how electric currents and magnets can exert force on each other.</p> <p>e. Describe and apply an understanding of the effects of multiple forces on an object, and how unbalanced forces will cause changes in the speed or direction.</p>	<p>e1. describe and apply an understanding of the effects of multiple forces on an object, and how unbalanced forces will cause changes in the speed or direction.</p>	<p>e1. STC: Energy, Machines and Motion</p> <p>e1. Brainpop.com</p> <p>e1. Teacher Created Activities</p>
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MSAD #54 Science Curriculum

Content Area: Science
 Unit: The Living Environment

Grade: Grade 8
 MLR Span: 6-8

MLR Content Standard: E. The Living Environment

Students understand that cells are the basic unit of life, that all life as we know it has evolved through genetic transfer and natural selection to create a great diversity of organisms, and that these organisms create interdependent webs through which matter and energy flow. Students understand similarities and differences between humans and other organisms and the interconnections of these interdependent webs.

Living Environment	MLR Performance Indicators	MSAD #54 Objectives	Instructional Resources/Activities
E1 Biodiversity	<p>1.Students differentiate among organisms based on biological characteristics and identify patterns of similarity.</p> <p>a.Compare physical characteristics that differentiate organisms into groups (including plants that use sunlight to make their own food, animals that consume energy-rich food, and organisms that cannot easily be classified as either).</p> <p>b.Explain how biologists use internal and external features to determine relatedness among organisms and to form the basis for classification systems.</p> <p>c.Explain ways to determine whether organisms are the same species.</p> <p>d.Describe how external and internal structures of</p>	Students will	

	<p>animals and plants contribute to the variety of ways organisms are able to find food and reproduce.</p>		
<p>E2 Ecosystems</p>	<p>2. Students examine how the characteristics of the physical, non-living (abiotic) environment, the types and behaviors of living (biotic) organisms, and the flow of matter and energy affect organisms and the ecosystem of which they are part.</p> <p>a. List various kinds of resources within different biomes for which organisms compete.</p> <p>b. Describe ways in which two types of organisms may interact (including competition, predator/prey, producer/consumer/decomposer, parasitism, and mutualism) and describe the positive and negative consequences of such interactions.</p> <p>c. Describe the source and flow of energy in the two major food webs, terrestrial and marine.</p> <p>d. Describe how matter and energy change from one form to another in living things and in the physical environment.</p> <p>e. Explain that the total amount of matter in the environment stays the same</p>	<p>Students will</p>	

<p>E3 Cells</p>	<p>even as its form and location change.</p> <p>3.Students describe the hierarchy of organization and function in organisms, and the similarities and differences in structure, function, and needs among and within organisms.</p> <p>a.Describe the basic functions of organisms carried out within cells including the extracting of energy from food and the elimination of wastes.</p> <p>b.Explain the relationship among cells, tissues, organs, and organ systems, including how tissues and organs serve the needs of cells and organisms.</p> <p>c.Compare the structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals, including humans, to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement.</p> <p>d.Explain that all living things are composed of cells numbering from just one to millions.</p>	<p>Students will</p> <p>a1.describe the basic functions of organisms carried out within cells including the extracting of energy from food and the elimination of wastes.</p> <p>b1.explain the relationship among cells, tissues, organs, and organ systems, including how tissues and organs serve the needs of cells and organisms.</p> <p>c1.compare the structures, systems, and interactions that allow single-celled organisms and multi-celled plants and animals, including humans, to defend themselves, acquire and use energy, self-regulate, reproduce, and coordinate movement.</p> <p>d1.explain that all living things are composed of cells numbering from just one to millions.</p>	<p>a1-d1.STC: Organisms</p> <p>a1-d1.Brainpop.com</p> <p>a1-d1.Teacher Created Activities</p>
<p>E4 Heredity and Reproduction</p>	<p>4.Students describe the general characteristics and mechanisms of reproduction and heredity in organisms, including</p>	<p>Students will</p>	

	<p>humans, and ways in which organisms are affected by their genetic traits.</p> <p>a.Explain that sexual reproduction includes fertilization that results in the inclusion of genetic information from each parent and determines the inherited traits that are a part of every cell.</p> <p>b.Identify some of the risks to the healthy development of an embryo including mother’s diet, lifestyle, and hygiene.</p> <p>c.Describe asexual reproduction as a process by which all genetic information comes from one parent and determines the inherited traits that are a part of every cell.</p>	<p>a1.explain that sexual reproduction includes fertilization that results in the inclusion of genetic information from each parent and determines the inherited traits that are a part of every cell.</p> <p>b1.identify some of the risks to the healthy development of an embryo including mother’s diet, lifestyle, and hygiene.</p> <p>c1.describe asexual reproduction as a process by which all genetic information comes from one parent and determines the inherited traits that are a part of every cell.</p>	<p>a1-c1.STC Program: Organisms</p>
<p>E5 Evolution</p>	<p>5.Students describe the evidence that evolution occurs over many generations, allowing species to acquire many of their unique characteristics or adaptations.</p> <p>a.Explain how the layers of sedimentary rock and their contained fossils provide evidence for the long history of changing life.</p> <p>b.Describe how small differences between parents and offspring can lead to descendants who are very different from their ancestors.</p>	<p>Students will</p> <p>a1.explain how the layers of sedimentary rock and their contained fossils provide evidence for the long history of changing life.</p> <p>b1.describe how small differences between parents and offspring can lead to descendants who are very different from their ancestors.</p>	<p>a1. Earth Study</p> <p>b1-d1. STC: Organisms</p>

	<p>c. Describe how variations in the behavior and traits of an offspring may permit some of them to survive a changing environment.</p> <p>d. Explain that new varieties of cultivated plants and domestic animals can be developed through genetic modification and describe the impacts of the new varieties of plants and animals.</p>	<p>c1. describe how variations in the behavior and traits of an offspring may permit some of them to survive a changing environment.</p> <p>d1. explain that new varieties of cultivated plants and domestic animals can be developed through genetic modification and describe the impacts of the new varieties of plants and animals.</p>	
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