

# Mullica Township School District



## Science Curriculum Grade 7

Board approval: 11/28/2018

**MULLICA TOWNSHIP SCHOOL DISTRICT**  
**Science Curriculum**  
**GRADE 7**

**Content Area:** SCIENCE

**Course Title:** Middle School

**Grade Level:** 7

<b>UNIT 1</b> Structure and Properties of Matter	15 days
<b>UNIT 2</b> Interactions of Matter	20 days
<b>UNIT 3</b> Chemical Reactions	20 days
<b>UNIT 4</b> Structure and Function	15 days
<b>UNIT 5</b> Body Systems	15 days
<b>UNIT 6</b> Inheritance and Variation of Traits	20 days
<b>UNIT 7</b> Organization For Matter and Energy Flow in Organisms	20 days
<b>UNIT 8</b> Earth Systems	25 days

**Date Created:** 11/19/2018

**Board Approved:**

**Created By:** Barbara Rheault

## MULLICA TOWNSHIP SCHOOL DISTRICT

### Grade 7 - Unit 1

**Content Area:** Science

**Unit Title:** Structure and Properties of Matter

**Target Course/Grade Level:** 7

#### **Unit Summary**

Students build understandings of what occurs at the atomic and molecular scale. Students apply their understanding that pure substances have characteristic properties and are made from a single type of atom or molecule. They also provide a molecular level accounts to explain states of matter and changes between states. The crosscutting concepts of *cause and effect*, *scale, proportion and quantity*, *structure and function*, *interdependence of science, engineering, and technology*, and *the influence of science, engineering and technology on society and the natural world* provide a framework for understanding the disciplinary core ideas. Students demonstrate grade appropriate proficiency in *developing and using models*, and *obtaining, evaluating, and communicating information*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

This unit is based on MS-PS1-1 and MS-PS1-2.

#### **Primary Interdisciplinary Connections:**

##### **ELA/Literacy**

**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MS-PS1-2)

**RST.6-8.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-1),(MS-PS1-2)

##### **Mathematics**

**MP.2** Reason abstractly and quantitatively. (MS-PS1-1),(MS-PS1-2)

**MP.4** Model with mathematics. (MS-PS1-1)

**6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-1),(MS-PS1-2)

**8.EE.A.3** Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. (MS-PS1-1)

**6.SP.B.4** Display numerical data in plots on a number line, including dot plots, histograms, and box plots. (MS-PS1-2)

**6.SP.B.5** Summarize numerical data sets in relation to their context (MS-PS1-2)

#### **21<sup>st</sup> Century Themes:**

##### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

**CRP4.** Communicate clearly and effectively and with reason.

**CRP5.** Consider the environmental, social and economic impacts of decisions.

**CRP6.** Demonstrate creativity and innovation.

**CRP7.** Employ valid and reliable research strategies.

**CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP9.** Model integrity, ethical leadership and effective management.

**CRP12.** Work productively in teams while using cultural global competence

**9.2.4.A.1** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

**9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

**8.1.8.A.3** Use and/or develop a simulation that provides an environment to solve a real world problem or theory

**8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results

**8.1.8.B.1** Synthesize and publish information about a local or global issue or event

**8.1.8.D.4** Assess the credibility and accuracy of digital content.

**8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### **Learning Targets**

#### **Performance Expectations**

**MS-PS1-1.** Develop models to describe the atomic composition of simple molecules and extended structures

**MS-PS1-2.** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

#### **Essential Questions**

- Why are atomic models necessary?
- How can you identify unknown substances?

#### **Disciplinary Core Ideas**

##### **PS1.A: Structure and Properties of Matter**

- Substances are made from different types of atoms, which combine with one another in various ways. Atoms form molecules that range in size from two to thousands of atoms.  
(MS-PS1-1)
- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-2)
- Solids may be formed from molecules, or they may be extended structures with repeating subunits (e.g., crystals).  
(MS-PS1-1)

**PS1.B: Chemical Reactions**

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-2)

**PS3.A: Definitions of Energy**

- The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system's material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system's total thermal energy.

**Science and Engineering Practices****Developing and Using Models**

Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to predict and/or describe phenomena. (MS-PS1-1)

**Analyzing and Interpreting Data**

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

- Analyze and interpret data to determine similarities and differences in findings. (MS-PS1-2)

**Connections to Nature of Science****Scientific Knowledge is Based on Empirical Evidence**

- Science knowledge is based upon logical and conceptual connections between evidence and explanations. (MS-PS1-2)

**Crosscutting Concepts****Patterns**

- Macroscopic patterns are related to the nature of microscopic and atomic-level structure. (MS-PS1-2)

**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-PS1-1)



## Evidence of Learning

### Formative Assessments

- Activity: Hook
- Activity: Investigate
- Activity w/report: Engineering Design
- Activity w/report: Science/Literacy
- Quiz/STEMScopedia Activity - Vocabulary Quiz
- Quiz/Activity: Concept Review Game
- STEM Talk: View and discuss Content Connections Interactive Video(s):.
- Communicate/Drama Activity: Students use Science Rock “Movement” musical/video software platform where students sing standards-based science songs and dance to the tune.
- Quiz/Activity: Math Connections interactive practice/quiz that uses grade-level appropriate math activities to address the concept.
- STEM Talk: View and discuss Teacher-Guided Read Aloud
- Assessment Review: View and interact with “Science Today - Watch It!” by Associated Press

### Summative Assessments

**Argue: Claim-Evidence-Reasoning:** student writes a scientific explanation to show their understanding of a science in a way that uses evidence.

**Open-Ended Response:** a short-answer and essay assessment to evaluate student mastery of the concept.

**Multiple-Choice Assessment:** a standards-based assessment designed to gauge students’ understanding of the science concept using their selections of the best possible answers from a list of choices

### Modifications (ELLs, Special Education, Gifted and Talented)

#### ELL

- Learn the backgrounds of LEP students
- Plan lessons that are both culturally and linguistically appropriate.
- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student’s native language or in simplified English, the key concepts learned in content areas.
- Paraphrase information and main ideas.
- Reorganize and reinforce information.
- Provide bilingual classroom resources, such as bilingual dictionaries, picture books and dictionaries, and English language encyclopedias for LEP students.

#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
- Utilize Techniques and Activities to Support Personal-Social Development
- Modify the Presentation of Materials
- Modify the Learning Environment
- Modify Assessments
- Modify Grading
- Facilitate Appropriate Behavior
- Limit/Reduce/Modify/Permit Alternate Class Work Curricular Procedures
- Provide Alternative Homework
- Provide Access to Special Equipment and Instructional Materials

#### Gifted and Talented

- Accelerate or enrich content.
- Reduce regular classroom work
- Providing alternate assignments
- Schedule opportunities to work individually through independent study
- Schedule opportunities to work in homogeneous groupings with peers of similar ability and interests
- Schedule opportunities to participate heterogeneous groupings of mixed-ability students.
- Stimulate higher order thinking skills and give students opportunities to consider and express personal opinions by asking open-ended questions.
- Scaffold investigations and reports to require thinking skills such as comparison, synthesis, insight, judgment, hypothesis, conjecture, and assimilation.
- Curriculum compact to allow student to skip standard assignments in order to acquire time to pursue alternate assignments or independent projects.
- Compact curriculum in areas that represent student strengths
- Create a plan outline and time frame for completion of assignments & alternate activities.
- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- Structure of Matter
- Chemical Properties and Interactions

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**

**Grade 7 - Unit 2**

**Content Area:** Science

**Unit Title:** Interactions of Matter

**Target Course/Grade Level:** 7

**Unit Summary**

Students provide molecular-level accounts of states of matter and changes between states, of how chemical reactions involve regrouping of atoms to form new substances, and of how atoms rearrange during chemical reactions. Students are also able to apply an understanding of optimization design and process in engineering to chemical reaction systems. The crosscutting

concepts of *structure and function, cause and effect, interdependence of science, engineering, and technology, and influence of science, engineering, and technology on society and on the natural world* provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate grade appropriate proficiency in *obtaining, evaluating, and communicating information* and *developing and using models*. Students are also expected to use the scientific and engineering practices to demonstrate understanding of the core ideas.

This unit is based on MS-PS1-3 and MS-PS1-4.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions (MSPS1-3)

**RST.6-8.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-4)

**WHST.6-8.8** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-PS1-3)

#### **Mathematics**

**6.NS.C.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation. (MS-PS1-4)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

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**9.2.4.A.1** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

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**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

#### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

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**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### Learning Targets

#### Performance Expectations

**MS-PS1-3.** Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

**MS-PS1-4.** Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.

#### Essential Questions

- What changes happen to carbon dioxide and water molecules during photosynthesis?
- How can you feel heat without directly touching something?
- Why do temperatures stay the same while a solid is melting?

#### Disciplinary Core Ideas

##### PS1.A: Structure and Properties of Matter

- Each pure substance has characteristic physical and chemical properties (for any bulk quantity under given conditions) that can be used to identify it. (MS-PS1-3)
- Gases and liquids are made of molecules or inert atoms that are moving about relative to each other. (MS-PS1-4)
- In a liquid, the molecules are constantly in contact with others; in a gas, they are widely spaced except when they happen to collide. In a solid, atoms are closely spaced and may vibrate in position but do not change relative locations. (MS-PS1-4)
- The changes of state that occur with variations in temperature or pressure can be described and predicted using these models of matter. (MS-PS1-4)

##### PS1.B: Chemical Reactions

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants. (MS-PS1-3)

**PS3.A: Definitions of Energy**

- The term “heat” as used in everyday language refers both to thermal energy (the motion of atoms or molecules within a substance) and the transfer of that thermal energy from one object to another. In science, heat is used only for this second meaning; it refers to the energy transferred due to the temperature difference between two objects. (secondary to MSPS1-4)
- The temperature of a system is proportional to the average internal kinetic energy and potential energy per atom or molecule (whichever is the appropriate building block for the system’s material). The details of that relationship depend on the type of atom or molecule and the interactions among the atoms in the material. Temperature is not a direct measure of a system’s total thermal energy. The total thermal energy (sometimes called the total internal energy) of a system depends jointly on the temperature, the total number of atoms in the system, and the state of the material. (secondary to MS-PS1-4)

**Science and Engineering Practices**

Developing and Using Models  
Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

Develop a model to predict and/or describe phenomena. (MS-PS1-4)

**Obtaining, Evaluating, and Communicating Information**

Obtaining, evaluating, and communicating information in 6–8 builds on K–5 and progresses to evaluating the merit and validity of ideas and methods.

- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility,

**Crosscutting Concepts****Cause and Effect**

- Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-PS1-4)

**Structure and Function**

- Structures can be designed to serve particular functions by taking into account properties of different materials, and how materials can be shaped and used. (MS-PS1-3)

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

- Engineering advances have led to important discoveries in virtually every field of science, and scientific

accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-PS1-3)

discoveries have led to the development of entire industries and engineered systems. (MS-PS1-3)

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

- The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-PS1-3)

## Evidence of Learning

### Formative Assessments

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### Modifications (ELLs, Special Education, Gifted and Talented)

#### ELL

- Learn the backgrounds of LEP students
- Plan lessons that are both culturally and linguistically appropriate.
- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student’s native language or in simplified English, the key concepts learned in content areas.
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#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
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- Stimulate higher order thinking skills and give students opportunities to consider and express personal opinions by asking open-ended questions.
- Scaffold investigations and reports to require thinking skills such as comparison, synthesis, insight, judgment, hypothesis, conjecture, and assimilation.
- Curriculum compact to allow student to skip standard assignments in order to acquire time to pursue alternate assignments or independent projects.
- Compact curriculum in areas that represent student strengths
- Create a plan outline and time frame for completion of assignments & alternate activities.
- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- Characteristics of Chemical Reactions
- Heat and Matter
- Changes In Energy at a Molecular

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**

**Grade 7 - Unit 3**

**Content Area:** Science

**Unit Title:** Chemical Reactions

**Target Course/Grade Level:** 7

**Unit Summary**

Students provide molecular-level accounts of states of matters and changes between states, of how chemical reactions involve regrouping of atoms to form new substances, and of how atoms rearrange during chemical reactions. Students also apply their understanding of optimization

design and process in engineering to chemical reaction systems. The crosscutting concept of energy and matter provides a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in developing and using models, analyzing and interpreting data, designing solutions, and obtaining, evaluating, and communicating information. Students are also expected to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-PS1-5, MS-PS1-6, MS-ETS1-2, MS-ETS1-3, and MS-ETS1-4.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. (MS-PS1-6)

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-PS1-5)

WHST.6-8.7 Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-PS1-6)

#### **Mathematics**

**MP.2** Reason abstractly and quantitatively. (MS-PS1-5)

**MP.4** Model with mathematics. (MS-PS1-5)

**6.RP.A.3** Use ratio and rate reasoning to solve real-world and mathematical problems. (MS-PS1-5)

**MP.2** Reason abstractly and quantitatively. (MS-ETS1-2),(MS-ETS1-3),(MS-ETS1-4)

**7.EE.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. (MS-ETS1-2),(MS-ETS1-3)

**7.SP** Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy. (MS-ETS1-4)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

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**9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

### **Technology Integration: 6-8**

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**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### **Learning Targets**

#### **Performance Expectations**

**MS-PS1-5.** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

**MS-PS1-6.** Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

**MS-ETS1-2.** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the 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.

**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

#### **Essential Questions**

- If matter can neither be created nor be destroyed, how are new substances produced during a chemical reaction?
- Why do some chemical reactions become cold and others become hot?

#### **Disciplinary Core Ideas**

##### **PS1.B: Chemical Reactions**

- Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the Reactants. (MS-PS1-5)
- The total number of each type of atom is conserved, and thus the mass does not change. (MS-PS1-5)
- Some chemical reactions release energy, others store energy. (MS-PS1-6)

**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. (secondary to MS-PS1-6)

**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 the characteristics may be incorporated into the new design. (secondary to MS-PS1-6)
- 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. (secondary to MS-PS1-6)

**Science and Engineering Practices****Developing and Using Models**

Modeling in 6–8 builds on K–5 and progresses to developing, using and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to describe unobservable mechanisms. (MS-PS1-5)

**Constructing Explanations and Designing Solutions**

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.

- Undertake a design project, engaging in the design cycle, to construct and/or implement a solution that meets specific design criteria and constraints. (MS-PS1-6)

**Connections to Nature of Science****Crosscutting Concepts****Energy and Matter**

- Matter is conserved because atoms are conserved in physical and chemical processes. (MS-PS1-5)
- The transfer of energy can be tracked as energy flows through a designed or natural system. (MS-PS1-6)

**Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena**

- Laws are regularities or mathematical descriptions of natural phenomena.  
(MS-PS1-5)

## Evidence of Learning

### Formative Assessments

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- Assessment Review: View and interact with "Science Today - Watch It!" by Associated Press

### Summative Assessments

**Argue: Claim-Evidence-Reasoning:** student writes a scientific explanation to show their understanding of a science in a way that uses evidence.

**Open-Ended Response:** a short-answer and essay assessment to evaluate student mastery of the concept.

**Multiple-Choice Assessment:** a standards-based assessment designed to gauge students' understanding of the science concept using their selections of the best possible answers from a list of choices

### Modifications (ELLs, Special Education, Gifted and Talented)

#### ELL

- Learn the backgrounds of LEP students
- Plan lessons that are both culturally and linguistically appropriate.
- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student's native language or in simplified English, the key concepts learned in content areas.
- Paraphrase information and main ideas.
- Reorganize and reinforce information.
- Provide bilingual classroom resources, such as bilingual dictionaries, picture books and dictionaries, and English language encyclopedias for LEP students.

#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
- Utilize Techniques and Activities to Support Personal-Social Development
- Modify the Presentation of Materials
- Modify the Learning Environment
- Modify Assessments
- Modify Grading
- Facilitate Appropriate Behavior
- Limit/Reduce/Modify/Permit Alternate Class Work Curricular Procedures
- Provide Alternative Homework
- Provide Access to Special Equipment and Instructional Materials

#### Gifted and Talented

- Accelerate or enrich content.
- Reduce regular classroom work
- Providing alternate assignments
- Schedule opportunities to work individually through independent study
- Schedule opportunities to work in homogeneous groupings with peers of similar ability and interests
- Schedule opportunities to participate heterogeneous groupings of mixed-ability students.
- Stimulate higher order thinking skills and give students opportunities to consider and express personal opinions by asking open-ended questions.
- Scaffold investigations and reports to require thinking skills such as comparison, synthesis, insight, judgment, hypothesis, conjecture, and assimilation.
- Curriculum compact to allow student to skip standard assignments in order to acquire time to pursue alternate assignments or independent projects.
- Compact curriculum in areas that represent student strengths
- Create a plan outline and time frame for completion of assignments & alternate activities.
- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- Modeling Conservation of Matter
- Energy In Chemical Reactions

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**

**Grade 7 - Unit 4**

**Content Area:** Science

**Unit Title:** Structure and Function

**Target Course/Grade Level:** 7

**Unit Summary**

Students demonstrate age appropriate abilities to plan and carry out investigations to develop evidence that living organisms are made of cells. Students gather information to support explanations of the relationship between structure and function in cells. They are able to communicate an understanding of cell theory and understand that all organisms are made of

cells. Students understand that special structures are responsible for particular functions in organisms. They then are able to use their understanding of cell theory to develop and use physical and conceptual models of cells. The crosscutting concepts of scale, proportion, and quantity and structure and function provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in planning and carrying out investigations, analyzing and interpreting data, and developing and using models. Students are also expected to use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS1-1 and MS-LS1-2.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

**WHST.6-8.7** Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration. (MS-LS1-1)

**SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS1-2)

#### **Mathematics**

**6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-1),(MS-LS1-2)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

**CRP4.** Communicate clearly and effectively and with reason.

**CRP5.** Consider the environmental, social and economic impacts of decisions.

**CRP6.** Demonstrate creativity and innovation.

**CRP7.** Employ valid and reliable research strategies.

**CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP9.** Model integrity, ethical leadership and effective management.

**CRP12.** Work productively in teams while using cultural global competence

**9.2.4.A.1** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

**9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

#### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

**8.1.8.A.3** Use and/or develop a simulation that provides an environment to solve a real world problem or theory

**8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results

**8.1.8.B.1** Synthesize and publish information about a local or global issue or event

**8.1.8.D.4** Assess the credibility and accuracy of digital content.

**8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### Learning Targets

#### Performance Expectations

**MS-LS1-1.** Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.

**MS-LS1-2.** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

#### Essential Questions

- How do unicellular organisms function?
- How are cells like organisms?

#### Disciplinary Core Ideas

##### LS1.A: Structure and Function

- All living things are made up of cells, which is the smallest unit that can be said to be alive. An organism may consist of one single cell (unicellular) or many different numbers and types of cells (multicellular). (MS-LS1-1)
- Within cells, special structures are responsible for particular functions, and the cell membrane forms the boundary that controls what enters and leaves the cell. (MS-LS1-2)

#### Science and Engineering Practices

##### Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design Systems.

- Develop and use a model to describe phenomena. (MS-LS1-2)

##### Planning and Carrying Out Investigations

Planning and carrying out investigations in 6-8 builds on K5 experiences and progresses to include investigations that use multiple variables and provide evidence to support explanations or solutions.

- Conduct an investigation to produce

#### Crosscutting Concepts

##### Scale, Proportion, and Quantity

- Phenomena that can be observed at one scale may not be observable at another scale. (MS-LS1-1)

##### Structure and Function

- Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS1-2)

data to serve as the basis for evidence that meet the goals of an investigation. (MS-LS1-1)

**Interdependence of Science, Engineering, and Technology**

- Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems. (MS-LS1-1)

## Evidence of Learning

### Formative Assessments

- Activity: Hook
- Activity: Investigate
- Activity w/report: Engineering Design
- Activity w/report: Science/Literacy
- Quiz/STEMScopedia Activity - Vocabulary Quiz
- Quiz/Activity: Concept Review Game
- STEM Talk: View and discuss Content Connections Interactive Video(s):.
- Communicate/Drama Activity: Students use Science Rock “Movement” musical/video software platform where students sing standards-based science songs and dance to the tune.
- Quiz/Activity: Math Connections interactive practice/quiz that uses grade-level appropriate math activities to address the concept.
- STEM Talk: View and discuss Teacher-Guided Read Aloud
- Assessment Review: View and interact with “Science Today - Watch It!” by Associated Press

### Summative Assessments

**Argue: Claim-Evidence-Reasoning:** student writes a scientific explanation to show their understanding of a science in a way that uses evidence.

**Open-Ended Response:** a short-answer and essay assessment to evaluate student mastery of the concept.

**Multiple-Choice Assessment:** a standards-based assessment designed to gauge students’ understanding of the science concept using their selections of the best possible answers from a list of choices

### Modifications (ELLs, Special Education, Gifted and Talented)

#### ELL

- Learn the backgrounds of LEP students
- Plan lessons that are both culturally and linguistically appropriate.
- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student’s native language or in simplified English, the key concepts learned in content areas.
- Paraphrase information and main ideas.
- Reorganize and reinforce information.
- Provide bilingual classroom resources, such as bilingual dictionaries, picture books and dictionaries, and English language encyclopedias for LEP students.

#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
- Utilize Techniques and Activities to Support Personal-Social Development
- Modify the Presentation of Materials
- Modify the Learning Environment
- Modify Assessments
- Modify Grading
- Facilitate Appropriate Behavior
- Limit/Reduce/Modify/Permit Alternate Class Work Curricular Procedures
- Provide Alternative Homework
- Provide Access to Special Equipment and Instructional Materials

#### Gifted and Talented

- Accelerate or enrich content.
- Reduce regular classroom work
- Providing alternate assignments
- Schedule opportunities to work individually through independent study
- Schedule opportunities to work in homogeneous groupings with peers of similar ability and interests
- Schedule opportunities to participate heterogeneous groupings of mixed-ability students.
- Stimulate higher order thinking skills and give students opportunities to consider and express personal opinions by asking open-ended questions.
- Scaffold investigations and reports to require thinking skills such as comparison, synthesis, insight, judgment, hypothesis, conjecture, and assimilation.
- Curriculum compact to allow student to skip standard assignments in order to acquire time to pursue alternate assignments or independent projects.
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- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- What Are Cells?
- Anatomy of a Cell

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**

**Grade 7 - Unit 5**

**Content Area:** Science

**Unit Title:** Body Systems

**Target Course/Grade Level:** 7

**Unit Summary**

Students develop a basic understanding of the role of cells in body systems and how those systems work to support the life functions of the organism. Students will construct explanations for the interactions of systems in cells and organisms. Students understand that special structures are responsible for particular functions in organisms, and that for many organisms, the

body is a system of multiple-interaction subsystems that form a hierarchy, from cells to the body. Students construct explanations for the interactions of systems in cells and organisms and for how organisms gather and use information from the environment. The crosscutting concepts of systems and system models and cause and effect provide a framework for understanding the disciplinary core ideas. Students are expected to demonstrate proficiency in engaging in argument from evidence and obtaining, evaluating, and communicating information. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS1-3 and MS-LS1-8.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

**WHST.6-8.8** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation. (MS-LS1-8)

#### **Mathematics –**

**6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-3)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

**CRP4.** Communicate clearly and effectively and with reason.

**CRP5.** Consider the environmental, social and economic impacts of decisions.

**CRP6.** Demonstrate creativity and innovation.

**CRP7.** Employ valid and reliable research strategies.

**CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP9.** Model integrity, ethical leadership and effective management.

**CRP12.** Work productively in teams while using cultural global competence

**9.2.4.A.1** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

**9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

**8.1.8.A.3** Use and/or develop a simulation that provides an environment to solve a real world problem or theory

**8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results

**8.1.8.B.1** Synthesize and publish information about a local or global issue or event

**8.1.8.D.4** Assess the credibility and accuracy of digital content.

**8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### Learning Targets

#### Performance Expectations

**MS-LS1-3.** Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells

**MS-LS1-8.** Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories

#### Essential Questions

- What body systems are required to successfully run a mile?
- How does your body know to produce sweat when you are working out?

#### Disciplinary Core Ideas

##### LS1.A: Structure and Function

- In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions. (MS-LS1-3)

##### LS1.D: Information Processing

- Each sense receptor responds to different inputs (electromagnetic, mechanical, chemical), transmitting them as signals that travel along nerve cells to the brain. The signals are then processed in the brain, resulting in immediate behaviors or memories. (MS-LS1-8)

#### Science and Engineering Practices

##### Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.

- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS1-8)

#### Crosscutting Concepts

##### Cause and Effect

- Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS1-8)

##### Systems and System Models

Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. (MS-LS1-3)

##### Connections to Nature of Science

##### Science is a Human Endeavor

- |  |   |
|--|---|
|  | <ul style="list-style-type: none"><li>• Scientists and engineers are guided by habits of mind such as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas. (MS-LS1-3)</li></ul> |
|--|---|

## Evidence of Learning

### Formative Assessments

- Activity: Hook
- Activity: Investigate
- Activity w/report: Engineering Design
- Activity w/report: Science/Literacy
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- STEM Talk: View and discuss Teacher-Guided Read Aloud
- Assessment Review: View and interact with “Science Today - Watch It!” by Associated Press

### Summative Assessments

**Argue: Claim-Evidence-Reasoning:** student writes a scientific explanation to show their understanding of a science in a way that uses evidence.

**Open-Ended Response:** a short-answer and essay assessment to evaluate student mastery of the concept.

**Multiple-Choice Assessment:** a standards-based assessment designed to gauge students’ understanding of the science concept using their selections of the best possible answers from a list of choices

### Modifications (ELLs, Special Education, Gifted and Talented)

#### ELL

- Learn the backgrounds of LEP students
- Plan lessons that are both culturally and linguistically appropriate.
- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student’s native language or in simplified English, the key concepts learned in content areas.
- Paraphrase information and main ideas.
- Reorganize and reinforce information.
- Provide bilingual classroom resources, such as bilingual dictionaries, picture books and dictionaries, and English language encyclopedias for LEP students.

#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
- Utilize Techniques and Activities to Support Personal-Social Development
- Modify the Presentation of Materials
- Modify the Learning Environment
- Modify Assessments
- Modify Grading
- Facilitate Appropriate Behavior
- Limit/Reduce/Modify/Permit Alternate Class Work Curricular Procedures
- Provide Alternative Homework
- Provide Access to Special Equipment and Instructional Materials

#### Gifted and Talented

- Accelerate or enrich content.
- Reduce regular classroom work
- Providing alternate assignments
- Schedule opportunities to work individually through independent study
- Schedule opportunities to work in homogeneous groupings with peers of similar ability and interests
- Schedule opportunities to participate heterogeneous groupings of mixed-ability students.
- Stimulate higher order thinking skills and give students opportunities to consider and express personal opinions by asking open-ended questions.
- Scaffold investigations and reports to require thinking skills such as comparison, synthesis, insight, judgment, hypothesis, conjecture, and assimilation.
- Curriculum compact to allow student to skip standard assignments in order to acquire time to pursue alternate assignments or independent projects.
- Compact curriculum in areas that represent student strengths
- Create a plan outline and time frame for completion of assignments & alternate activities.
- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- Bodies and Systems
- Sensory Receptors

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**

**Grade 7 - Unit 6**

**Content Area:** Science

**Unit Title:** Inheritance and Variation of Traits

**Target Course/Grade Level:** 7

**Unit Summary**

Students develop and use models to describe how gene mutations and sexual reproduction contribute to genetic variation. Students understand how genetic factors determine the growth of an individual organism. They also demonstrate understanding of the genetic implications of sexual and asexual reproduction. The crosscutting concepts of cause and effect and structure

and function provide a framework for understanding how gene structure determines differences in the functioning of organisms. Students are expected to demonstrate proficiency in developing and using models. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS3-1 and MS-LS3-2.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts. (MS-LS3-1),(MS-LS3-2)

**RST.6-8.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics. (MS-LS3-1),(MS-LS3-2)

**RST.6-8.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-LS3-1),(MS-LS3-2)

**SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-LS3-1),(MS-LS3-2)

#### **Mathematics**

**MP.4** Model with mathematics. (MS-LS3-2)

**6.SP.B.5** Summarize numerical data sets in relation to their context. (MS-LS3-2)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

**CRP4.** Communicate clearly and effectively and with reason.

**CRP5.** Consider the environmental, social and economic impacts of decisions.

**CRP6.** Demonstrate creativity and innovation.

**CRP7.** Employ valid and reliable research strategies.

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**9.2.4.A.1** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

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#### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

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**8.1.8.B.1** Synthesize and publish information about a local or global issue or event

**8.1.8.D.4** Assess the credibility and accuracy of digital content.

**8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### Learning Targets

#### Performance Expectations

**MS-LS3-1.** Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.

**MS-LS3-2.** Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation.

#### Essential Questions

- How can you have different hair color than either of your parents?
- If a mutation is not beneficial to an organism, how will that be reflected in the population?
- When would asexual reproduction be more advantageous to the survival of a species than sexual reproduction?
- Why do my brother and I look so different, even though we both have the same parents? Shouldn't we look more alike, since we share the same DNA?
- If I have the same traits as my dad, does that mean I have his exact same genes?

#### Disciplinary Core Ideas

##### LS1.B: Growth and Development of Organisms

- Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MSLS3-2)

##### LS3.A: Inheritance of Traits

- Genes are located in the chromosomes of cells, with each chromosome pair containing two variants of each of many distinct genes. Each distinct gene chiefly controls the production of specific proteins, which in turn affects the traits of the individual. Changes (mutations) to genes can result in changes to proteins, which can affect the structures and functions of the organism and thereby change traits. (MS-LS3-1)
- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited. (MS-LS3-2)

##### LS3.B: Variation of Traits

- In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These

	<p>versions may be identical or may differ from each other. (MS-LS3-2)</p> <ul style="list-style-type: none"> <li>• In addition to variations that arise from sexual reproduction, genetic information can be altered because of mutations. Though rare, mutations may result in changes to the structure and function of proteins. Some changes are beneficial, others harmful, and some neutral to the organism. (MS-LS3-1)</li> </ul>
<p style="text-align: center;"><b>Science and Engineering Practices</b></p> <p><b>Developing and Using Models</b> Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.</p> <ul style="list-style-type: none"> <li>• Develop and use a model to describe phenomena. (MS-LS3-1),(MS-LS3-2)</li> </ul>	<p style="text-align: center;"><b>Crosscutting Concepts</b></p> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>• Cause and effect relationships may be used to predict phenomena in natural systems. (MS-LS3-2)</li> </ul> <p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>• Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the shapes, composition, and relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function. (MS-LS3-1)</li> </ul>

## Evidence of Learning

### Formative Assessments

- Activity: Hook
- Activity: Investigate
- Activity w/report: Engineering Design
- Activity w/report: Science/Literacy
- Quiz/STEMScopedia Activity - Vocabulary Quiz
- Quiz/Activity: Concept Review Game
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### Modifications (ELLs, Special Education, Gifted and Talented)

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- Learn the backgrounds of LEP students
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- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student’s native language or in simplified English, the key concepts learned in content areas.
- Paraphrase information and main ideas.
- Reorganize and reinforce information.
- Provide bilingual classroom resources, such as bilingual dictionaries, picture books and dictionaries, and English language encyclopedias for LEP students.

#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
- Utilize Techniques and Activities to Support Personal-Social Development
- Modify the Presentation of Materials
- Modify the Learning Environment
- Modify Assessments
- Modify Grading
- Facilitate Appropriate Behavior
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#### Gifted and Talented

- Accelerate or enrich content.
- Reduce regular classroom work
- Providing alternate assignments
- Schedule opportunities to work individually through independent study
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- Schedule opportunities to participate heterogeneous groupings of mixed-ability students.
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- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- Genes and Gene Mutations
- Mutations
- Reproduction and Variation
- Inheritance
- Genetic Variation

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**  
**Grade 7 - Unit 7**

**Content Area:** Science

**Unit Title:** Organization For Matter and Energy Flow in an Ecosystem

**Target Course/Grade Level:** 7

**Unit Summary**

Students provide a mechanistic account for how cells provide a structure for the plant process of photosynthesis in the movement of matter and energy needed for the cell. Students use conceptual and physical models to explain the transfer of energy and cycling of matter as they construct explanations for the role of photosynthesis in cycling matter in ecosystems. They construct scientific explanations for the cycling of matter in organisms and the interactions of organisms to obtain matter and energy from an ecosystem to survive and grow. They understand that sustaining life requires substantial energy and matter inputs, and that the structure and functions of organisms contribute to the capture, transformation, transport, release, and elimination of matter and energy. The crosscutting concepts of matter and energy and structure and function provide a framework for understanding of the cycling of matter and energy flow into and out of organisms. Students are also expected to demonstrate proficiency in developing and using models. Students use these science and engineering practices to demonstrate understanding of the disciplinary core ideas.

This unit is based on MS-LS1-6 and MS-LS1-7.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts.

(MS-LS1-6)

**RST.6-8.2** Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions. (MS-LS1-6)

**WHST.6-8.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS1-6)

**WHST.6-8.9** Draw evidence from informational texts to support analysis, reflection, and research.(MS-LS1-6)

#### **Mathematics**

**6.EE.C.9** Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. (MS-LS1-6)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

**CRP4.** Communicate clearly and effectively and with reason.

**CRP5.** Consider the environmental, social and economic impacts of decisions.

**CRP6.** Demonstrate creativity and innovation.

**CRP7.** Employ valid and reliable research strategies.

**CRP8.** Utilize critical thinking to make sense of problems and persevere in solving them.

**CRP9.** Model integrity, ethical leadership and effective management.

**CRP12.** Work productively in teams while using cultural global competence

**9.2.4.A.1** Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

**9.2.4.A.4** Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.

**9.2.8.B.3** Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

**8.1.8.A.3** Use and/or develop a simulation that provides an environment to solve a real world problem or theory

**8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results

**8.1.8.B.1** Synthesize and publish information about a local or global issue or event

**8.1.8.D.4** Assess the credibility and accuracy of digital content.

**8.1.8.E.1** Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### **Learning Targets**

#### **Performance Expectations**

**MS-LS1-6.** Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

**MS-LS1-7.** Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

#### **Essential Questions**

- How do plants receive the energy they need to grow and live without eating food?
- How interconnected are organisms?

#### **Disciplinary Core Ideas**

##### **LS1.C: Organization for Matter and Energy Flow in Organisms**

- Plants, algae (including phytoplankton), and many microorganisms use the energy from light to make sugars (food) from carbon dioxide from the atmosphere and water through the process of photosynthesis, which also releases oxygen. These sugars can be used immediately or stored for growth or later use. (MS-LS1-6)
- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy. (MS-LS1-7)

##### **PS3.D: Energy in Chemical Processes and Everyday Life**

- The chemical reaction by which plants produce complex food molecules (sugars) requires an energy input (i.e., from sunlight) to occur. In this reaction, carbon dioxide and water combine to form carbon-based organic molecules

	<p>and release oxygen. (secondary to MS-LS1-6)</p> <ul style="list-style-type: none"> <li>Cellular respiration in plants and animals involve chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary to MS-LS1-7)</li> </ul>
<p align="center"><b>Science and Engineering Practices</b></p> <p><b>Developing and Using Models</b> Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.</p> <ul style="list-style-type: none"> <li>Develop a model to describe unobservable mechanisms. (MS-LS1-7)</li> </ul> <p><b>Constructing Explanations and Designing Solutions</b> Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific knowledge, principles, and theories.</p> <ul style="list-style-type: none"> <li>Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-LS1-6)</li> </ul> <p align="center"><b>Connections to Nature of Science</b></p> <p><b>Scientific Knowledge is Based on Empirical Evidence</b></p> <ul style="list-style-type: none"> <li>Science knowledge is based upon logical connections between evidence and explanations. (MS-LS1-6)</li> </ul>	<p align="center"><b>Crosscutting Concepts</b></p> <p><b>Energy and Matter</b></p> <ul style="list-style-type: none"> <li>Matter is conserved because atoms are conserved in physical and chemical processes. (MS-LS1-7)</li> <li>Within a natural system, the transfer of energy drives the motion and/or cycling of matter. (MS-LS1-6)</li> </ul>

## Evidence of Learning

### Formative Assessments

- Activity: Hook
- Activity: Investigate
- Activity w/report: Engineering Design
- Activity w/report: Science/Literacy
- Quiz/STEMScopedia Activity - Vocabulary Quiz
- Quiz/Activity: Concept Review Game
- STEM Talk: View and discuss Content Connections Interactive Video(s):.
- Communicate/Drama Activity: Students use Science Rock “Movement” musical/video software platform where students sing standards-based science songs and dance to the tune.
- Quiz/Activity: Math Connections interactive practice/quiz that uses grade-level appropriate math activities to address the concept.
- STEM Talk: View and discuss Teacher-Guided Read Aloud
- Assessment Review: View and interact with “Science Today - Watch It!” by Associated Press

### Summative Assessments

**Argue: Claim-Evidence-Reasoning:** student writes a scientific explanation to show their understanding of a science in a way that uses evidence.

**Open-Ended Response:** a short-answer and essay assessment to evaluate student mastery of the concept.

**Multiple-Choice Assessment:** a standards-based assessment designed to gauge students’ understanding of the science concept using their selections of the best possible answers from a list of choices

### Modifications (ELLs, Special Education, Gifted and Talented)

#### ELL

- Learn the backgrounds of LEP students
- Plan lessons that are both culturally and linguistically appropriate.
- Group students flexibly, in small groups based on individual or group interests as well as instructional need or ability.
- Give clear, simple directions
- Ask them to retell or restate, in their own words, the task.
- Reiterate, in the student’s native language or in simplified English, the key concepts learned in content areas.
- Paraphrase information and main ideas.
- Reorganize and reinforce information.
- Provide bilingual classroom resources, such as bilingual dictionaries, picture books and dictionaries, and English language encyclopedias for LEP students.

#### Special Education

- Provide Instructional Strategies and Techniques that Address Learning Style
- Utilize Techniques and Activities to Support Personal-Social Development
- Modify the Presentation of Materials
- Modify the Learning Environment
- Modify Assessments
- Modify Grading
- Facilitate Appropriate Behavior
- Limit/Reduce/Modify/Permit Alternate Class Work Curricular Procedures
- Provide Alternative Homework
- Provide Access to Special Equipment and Instructional Materials

#### Gifted and Talented

- Accelerate or enrich content.
- Reduce regular classroom work
- Providing alternate assignments
- Schedule opportunities to work individually through independent study
- Schedule opportunities to work in homogeneous groupings with peers of similar ability and interests
- Schedule opportunities to participate heterogeneous groupings of mixed-ability students.
- Stimulate higher order thinking skills and give students opportunities to consider and express personal opinions by asking open-ended questions.
- Scaffold investigations and reports to require thinking skills such as comparison, synthesis, insight, judgment, hypothesis, conjecture, and assimilation.
- Curriculum compact to allow student to skip standard assignments in order to acquire time to pursue alternate assignments or independent projects.
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- Incorporate written independent study contracts to research topics of interest to become “resident experts.”
- Develop descriptions and the criteria for evaluating each project.
- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

**Curriculum Development Resources/Instructional Materials/Equipment Resources:**

**STEMScopes**

- Introduction to Photosynthesis
- Energy Flow In Organisms

**Materials**

**Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab

**MULLICA TOWNSHIP SCHOOL DISTRICT**

**Grade 7 - Unit 8**

**Content Area:** Science

**Unit Title:** Earth Systems

**Target Course/Grade Level:** 7

**Unit Summary**

Students examine geoscience data in order to understand processes and events in Earth's history. Important crosscutting concepts in this unit are scale, proportion, and quantity, stability and change, and patterns in relation to the different ways geologic processes operate over geologic time. An important aspect of the history of Earth is that geologic events and conditions

have affected the evolution of life, but different life forms have also played important roles in altering Earth's systems. Students understand how Earth's geosystems operate by modeling the flow of energy and cycling of matter within and among different systems. Students investigate the controlling properties of important materials and construct explanations based on the analysis of real geoscience data. Students are expected to demonstrate proficiency in analyzing and interpreting data and constructing explanations. They are also expected to use these practices to demonstrate understanding of the core ideas.

This unit is based on MS-ESS1-4, MS-ESS2-1, MS-ESS2-2, and MS-ESS2-3.

### **Primary Interdisciplinary Connections:**

#### **ELA/Literacy**

**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts.

(MS-ESS1-4)

**WHST.6-8.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS1-4)

**RST.6-8.1** Cite specific textual evidence to support analysis of science and technical texts.

(MS-ESS2-2),(MS-ESS2-3)

**RST.6-8.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). (MS-ESS2-3)

**RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

(MS-ESS2-3)

**WHST.6-8.2** Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-ESS2-2)

**WHST.6-8.8** Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

**SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-1),(MS-ESS2-2)

#### **Mathematics**

**MP.2** Reason abstractly and quantitatively. (MS-ESS2-2),(MS-ESS2-3)

**6.EE.B.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

(MS-ESS2-2),(MS-ESS2-3)

**7.EE.B.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. (MS-ESS2-2),(MS-ESS2-3)

### **21<sup>st</sup> Century Themes:**

#### **Career Ready Practices and Financial Literacy**

**CRP1.** Act as a responsible and contributing citizen and employee.

**CRP2.** Apply appropriate academic and technical skills.

**CRP3.** Attend to personal health and financial well-being.

**CRP4.** Communicate clearly and effectively and with reason.

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### **Technology Integration: 6-8**

**8.1.8.A.1** Demonstrate knowledge of a real world problem using digital tools.

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**8.1.8.A.4** Graph and calculate data within a spreadsheet and present a summary of the results

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**8.1.8.F.1** Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.

### **Learning Targets**

#### **Performance Expectations**

**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.

**MS-ESS2-1.** Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.

**MS-ESS2-2.** Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

**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

#### **Essential Questions**

- Are all fossils about the same age?
- When you drive on a road carved through a mountain, why do the walls of the mountain look striped?
- How does an oxbow lake form?
- How can the same species of fossil be found on different continents?
- Where would you find the newest

#### **Disciplinary Core Ideas**

##### **ESS1.C: The History of Planet Earth**

- The geologic time scale interpreted from rock strata provides a way to organize Earth's history. Analyses of rock strata and the fossil record provide only relative dates, not an absolute scale. (MS-ESS1-4)

##### **ESS1.C: The History of Planet Earth**

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

<p>rocks on Earth?</p> <ul style="list-style-type: none"> <li>• How can mountains get shorter?</li> </ul>	<p>MS-ESS2-3)</p> <p><b>ESS2.A: Earth’s Materials and Systems</b></p> <ul style="list-style-type: none"> <li>• All Earth processes are the result of energy flowing and matter cycling within and among the planet’s systems. This energy is derived from the sun and Earth’s hot interior. The energy that flows and matter that cycles produce chemical and physical changes in Earth’s materials and living organisms. (MS-ESS2-1)</li> <li>• The planet’s systems interact over scales that range from microscopic to global in size, and they operate over fractions of a second to billions of years. These interactions have shaped Earth’s history and will determine its future. (MS-ESS2-2)</li> </ul> <p><b>ESS2.B: Plate Tectonics and Large-Scale System Interactions</b></p> <ul style="list-style-type: none"> <li>• Maps of ancient land and water patterns, based on investigations of rocks and fossils, make clear how Earth’s plates have moved great distances, collided, and spread apart. (MS-ESS2-3)</li> </ul> <p><b>ESS2.C: The Roles of Water in Earth’s Surface Processes</b></p> <ul style="list-style-type: none"> <li>• Water’s movements—both on the land and underground—cause weathering and erosion, which change the land’s surface features and create underground formations. (MS-ESS2-2)</li> </ul>
<p><b>Science and Engineering Practices</b></p> <p><b>Constructing Explanations and Designing Solutions</b></p> <p>Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.</p> <ul style="list-style-type: none"> <li>• Construct a scientific explanation based on valid and reliable evidence</li> </ul>	<p><b>Crosscutting Concepts</b></p> <p><b>Scale, Proportion, and Quantity</b></p> <ul style="list-style-type: none"> <li>• Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS1-4)</li> </ul> <p><b>Patterns</b></p> <ul style="list-style-type: none"> <li>• Patterns in rates of change and other</li> </ul>

obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (MS-ESS1-4)

### **Analyzing and Interpreting Data**

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

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

### **Constructing Explanations and Designing Solutions**

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

- Construct a scientific explanation based on valid and reliable evidence obtained from sources (including the students' own experiments) and the assumption that theories and laws that describe nature operate today as they did in the past and will continue to do so in the future. (MS-ESS2-2)

### **Connections to Nature of Science**

#### **Scientific Knowledge is Open to Revision in Light of New Evidence**

- Science findings are frequently revised and/or reinterpreted based on new evidence. (MS-ESS2-3)

numerical relationships can provide information about natural systems. (MS-ESS2-3)

### **Scale Proportion and Quantity**

- Time, space, and energy phenomena can be observed at various scales using models to study systems that are too large or too small. (MS-ESS2-2)

### **Stability and Change**

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

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- Determine (jointly) deadline dates and work schedule.
- Provide complex, critical thinking tasks.

### **Curriculum Development Resources/Instructional Materials/Equipment Resources:**

#### **STEMScopes**

- Geologic History of Earth
- Earth Materials
- Weathering and Erosion
- Maps of Ancient Lands
- Seafloor Spreading
- Geoscience Processes

#### **Materials**

#### **Equipment**

- Smartboard and Projector
- Chromebooks
- Science Lab