Diocese of Greensburg Curriculum
Science Grade 7

Unit	Standards	Content	Skills

Cells to Organisms: Relationships in Structure/Function	**CCSS: English Language Arts 6-12**
	CCSS: Grade 7
	Reading: Informational Text
	8. Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.
	RI.7.8. Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims.
	
	CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12
	CCSS: Grades 6-8
	Reading: Science & Technical Subjects
	Key Ideas and Details
	1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
	RST.6-8.1. Cite specific textual evidence to support analysis of science and technical texts.
	
	2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.
	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.
	
	Writing
	2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through
		• That all living things are made up of cells that have structures responsible for specialized functions that work as a group and operate as subsystems and systems within the body.
		• Cells are the smallest unit of life
		• Basic structures and functions of a cell
		• Cell structure and the relationship among its parts
		• Cells have specialized functions
		• Body as a system of multiple interacting subsystems.
		• Scientific Terminology for this unit:
		  ○ nucleus
		  ○ chloroplasts
		  ○ mitochondria
		  ○ cell membrane
		  ○ cell wall
		  ○ cells
		  ○ tissue
		  ○ organs
		  ○ organ systems
			The students will be able to:
			
			• Believe and recognize the diversity in all of God's creations.
			• Observe cells with a microscope.
			• Develop and use a model to describe a cell and the relationships among its parts.
			• Use evidence to support how the body is a system of interacting subsystems.
			• Conduct investigations to explore cell structure and function.
			• Explore osmosis and diffusion through experimentation.
			• Complete virtual labs
			• Relate the Cell Theory to modern biology.
			• Demonstrate knowledge of the parts and functions of a compound light microscope.

Unit	Standards	Content	Skills
	the effective selection, organization, and analysis of content. WHST.6-8.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **Research to Build and Present Knowledge** **7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.** 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. **NGSS: Science Performance Expectations (2013)** **NGSS: MS Life Science** **MS.Structure, Function, and Information Processing** **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. MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. **NGSS: Science and Engineering Practices** **NGSS: 6-8**		

Unit	Standards	Content	Skills
	Practice 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 determine similarities and differences in findings. **Practice 5. Using mathematics and computational thinking** **Mathematical and computational thinking in 6–8 builds on K–5 experiences and progresses to identifying patterns in large data sets and using mathematical concepts to support explanations and arguments.** Apply mathematical concepts and/or processes (e.g., ratio, rate, percent, basic operations, simple algebra) to scientific and engineering questions and problems**.** **NGSS: Crosscutting Concepts** **NGSS: 6-8** **Crosscutting Statements** **4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.** Systems may interact with other systems; they may have sub-systems and be a part of larger complex systems. Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. Models are limited in that they only represent certain aspects of the system under study.		

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	6. Structure and Function – The way an object is shaped or structured determines many of its properties and functions. 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 and designed structures/systems can be analyzed to determine how they 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. 		

Cell Processes and Reproduction	**CCSS: English Language Arts 6-12**
	CCSS: Grade 8
	Speaking & Listening
	Comprehension and Collaboration
	1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
	SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
	
	5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
		• How energy moves through and is used by cells to support the growth and development of an organism.
		• Sexual or asexual reproduction to transfer genetic information
		• The processes of photosynthesis and cellular respiration
		• Energy moves through a series of chemical reactions
		• Scientific Terminology used for this unit:
		  ○ sexual reproduction
		  ○ asexual reproduction
		  ○ photosynthesis
		  ○ cellular respiration
		  ○ DNA-deoxyribonucleic acid
		  ○ RNA-ribonucleic acid
		  ○ mitosis
			The students will be able to:
			
			• Believe and recognize in God's design in the creation of new life.
			• Observe cell processes with microscopes, viewers, or digital imaging.
			• Construct a model of cell processes and reproduction.
			• Investigate reproduction and cell processes through experimentation.
			• Conduct a fermentation lab.

Unit	Standards	Content	Skills
	SL.8.5. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. **CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12** **CCSS: Grades 6-8** **Reading: Science & Technical Subjects** **2. Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.** 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. **Integration of Knowledge and Ideas** **7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.** 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). **Writing** **Text Types and Purposes** **1. Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.** WHST.6-8.1. Write arguments focused on discipline-specific content. **8. Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.** WHST.6-8.8. Gather relevant information from multiple print and digital sources, using search	○ meiosis	• Utilize graphic organizers to visualize active and passive transport. • Compare mitosis in plant and animal cells. • Identify the parts in a DNA molecule and its structure. • Model how DNA copies itself. • Conduct experiments to test active and passive transport.

Unit	Standards	Content	Skills
	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. **9. Draw evidence from literary or informational texts to support analysis, reflection, and research.** WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research. **CCSS: Mathematics** **CCSS: Grade 6** **Statistics & Probability** **6.SP.A. Develop understanding of statistical variability.** **6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.** **Mathematical Practice** MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. MP.4. Model with mathematics. **NGSS: Science Performance Expectations (2013)** **NGSS: MS Physical Science** **MS.Chemical Reactions** **Performance Expectations** 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. **NGSS: MS Life Science**		

Unit	Standards	Content	Skills
	MS.Structure, Function, and Information Processing **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.Matter and Energy in Organisms and Ecosystems** **Performance Expectations** 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. MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. **MS.Growth, Development, and Reproduction of Organisms** **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. 		

Unit	Standards	Content	Skills

Heredity: Inheritance and Variation of Traits	**CCSS: English Language Arts 6-12**
	CCSS: Grade 8
	Speaking & Listening
	5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.
	SL.8.5. Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.
	
	CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12
	CCSS: Grades 6-8
	Reading: Science & Technical Subjects
	Craft and Structure
	4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
	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**.**
	
	Integration of Knowledge and Ideas
	7. Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.
	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).
	
	NGSS: Science Performance Expectations (2013)
	NGSS: MS Life Science
	MS.Growth, Development, and Reproduction of Organisms
		• The transfer of genetic information through sexual and asexual reproduction
		• Changes and variations in inherited traits.
		• Sexual or asexual reproduction to transfer genetic information
		• Gene mutations and changes in genetic information
		• Variations in inherited traits
		• Parents contribute half of the genes to the offspring
		• Scientific Terminology for this unit:
		  ○ heredity
		  ○ genetics
		  ○ alleles
		  ○ dominant
		  ○ recessive
		  ○ Punnett squares
		  ○ genotype
		  ○ phenotype
		  ○ heterozygous
		  ○ homozygous
			The students will be able to:
			
			• Believe and recognize God's role in the transfer of genetic material.
			• Use diagrams, simulations, and Punnett squares to model the inheritance of traits.
			• Examine case studies to identify and explore variations that arise as a result of mutations.
			• Conceptualize inheritance of dominant and recessive traits through simulations.
			• Develop and use a model to describe and predict phenomena and design systems.
			• Identify Mendel's role in the history of genetics.
			• Compare and contrast genotype and phenotype.
			• Explain how sex linked traits are passed to offspring.
			• Sequence the steps in making genetically engineered organisms.

Unit	Standards	Content	Skills
	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. **NGSS: Disciplinary Core Ideas** **NGSS: 6-8** **LS3: Heredity: Inheritance and Variation of Traits** 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) 		

Unit	Standards	Content	Skills

Interactions within Ecosystems	**CCSS: English Language Arts 6-12**
	CCSS: Grade 8
	Speaking & Listening
	Presentation of Knowledge and Ideas
	4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
	
	SL.8.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation**.**
	
	CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12
	CCSS: Grades 6-8
	Writing
	9. Draw evidence from literary or informational texts to support analysis, reflection, and research.
	WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research.
	
	NGSS: Science Performance Expectations (2013)
	NGSS: MS Life Science
	MS.Matter and Energy in Organisms and Ecosystems
	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-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
		• Flow, transfer, and cycling of energy and matter throughout an ecosystem.
		• The dynamic nature of ecosystems
		• Dependence on abiotic and biotic features
		• Resources in an ecosystem
		• Producers, consumers, and decomposers
		• Effects of biodiversity within an ecosystem
		• Scientific terminology in this unit:
		  ○ ecosystem
		  ○ abiotic
		  ○ biotic
		  ○ population
		  ○ environment
		  ○ food chain
		  ○ consumer
		  ○ producer
		  ○ decomposer
		  ○ carbon cycle
		  ○ nitrogen cycle
		  ○ water cycle
		  ○ biodiversity
		  ○ niche
			The students will be able to:
			
			• Believe and recognize the wonder and diversity in all of God's creations.
			• Conduct simulations.
			• Identify why variations in organisms are important.
			• Explain how relate and radiometric dating are used to estimate fossil age.
			• Evaluate competitions within an ecosystem.
			• Manipulate different environments and species through investigation.
			• Define boundaries of an ecosystem and design solutions for maintaining biodiversity within a system.
			• Develop and use models.
			• Analyze and interpret data.
			• Construct explanations.
			• Design solutions.

Unit	Standards	Content	Skills
	MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. **MS.Interdependent Relationships in Ecosystems** **Performance Expectations** MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.* MS.Growth, Development, and Reproduction of Organisms **Performance Expectations** MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. 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		

Unit	Standards	Content	Skills
	effects to the structure and function of the organism. **NGSS: Disciplinary Core Ideas** **NGSS: 6-8** **LS1: From Molecules to Organisms: Structures and Processes** LS1.A: Structure and Function Organisms reproduce, either sexually or asexually, and transfer their genetic information to their offspring. (secondary to MSLS3-2) LS1.B: Growth and Development of Organisms Animals engage in characteristic behaviors that increase the odds of reproduction. (MS-LS1-4) Plants reproduce in a variety of ways, sometimes depending on animal behavior and specialized features for reproduction. (MS-LS1-4) Genetic factors as well as local conditions affect the growth of the adult plant. (MS-LS1-5) LS2: Ecosystems: Interactions, Energy, and Dynamics LS2.A: Interdependent Relationships in Ecosystems Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1) In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1) Growth of organisms and population increases are limited by access to resources. (MS-LS2-1) Similarly, predatory interactions may reduce the number of organisms or eliminate whole		

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	populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2) LS2.B: **Cycles of Matter and Energy Transfer in Ecosystems** Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5) **LS3: Heredity: Inheritance and Variation of Traits**		

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	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 versions may be identical or may differ from each other. (MS-LS3-2) 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) **LS4: Biological Evolution: Unity and Diversity** LS4.A: Evidence of Common Ancestry and Diversity Anatomical similarities and differences between various organisms living today and between them and organisms in the fossil record, enable the reconstruction of evolutionary history and the inference of lines of evolutionary descent. (MS-LS4-2) LS4.B: Natural Selection Natural selection leads to the predominance of certain traits in a population, and the suppression of others. (MS-LS4-4) In artificial selection, humans have the capacity to influence certain characteristics of organisms by selective breeding. One can choose desired parental traits determined by genes, which are then passed on to offspring. (MS-LS4-5) **LS4.C: Adaptation** Adaptation by natural selection acting over generations is one important process by which species change over time in response to changes in environmental conditions. Traits that		

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	support successful survival and reproduction in the new environment become more common; those that do not become less common. Thus, the distribution of traits in a population changes. (MS-LS4-6) 		

Biological Evolution: Unity and Diversity	**CCSS: English Language Arts 6-12**
	CCSS: Grade 8
	Speaking & Listening
	Comprehension and Collaboration
	1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
	SL.8.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.
	
	CCSS: Literacy in History/Social Studies, Science, & Technical Subjects 6-12
	CCSS: Grades 6-8
	Reading: Science & Technical Subjects
	9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.
	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.
		• Analyzing patterns to construct an explanation for variations in a population over time.
		• Fossil records provide evolutionary evidence for existence, extinction, and variations of life on Earth
		• Human influence on natural selection
		• Scientific Terminology for this unit:
		  ○ evolution
		  ○ mutations
		  ○ adaptations
		  ○ natural selection
		  ○ species
		  ○ variation
			The students will be able to:
			
			• Believe and recognize that the hand of God is involved in creation and evolution.
			• Observe and classify using a dichotomous keys.
			• Model to sequence the chronological appearance of fossils.
			• Integrate knowledge of adaptation presented in a video series.
			• Graph and analyze evolutionary trends.
			• Analyze and interpret data.
			• Use mathematics and computational thinking.
			• Construct explanations and design solutions.

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	Writing **9. Draw evidence from literary or informational texts to support analysis, reflection, and research.** WHST.6-8.9. Draw evidence from informational texts to support analysis reflection, and research. **CCSS: Mathematics** **CCSS: Grade 7** **Ratios & Proportional Relationships** 7.RP.A. Analyze proportional relationships and use them to solve real-world and mathematical problems. 7.RP.A.2. Recognize and represent proportional relationships between quantities. **NGSS: Science Performance Expectations (2013)** **NGSS: MS Life Science** **MS.Natural Selection and Adaptations** **Performance Expectations** MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.		

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	MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. **NGSS: Crosscutting Concepts** **NGSS: 6-8** **Crosscutting Statements** **1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.** Patterns in rates of change and other numerical relationships can provide information about natural and human designed systems. Patterns can be used to identify cause and effect relationships. Graphs, charts, and images can be used to identify patterns in data. **2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.** Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. Cause and effect relationships may be used to predict phenomena in natural or designed systems.		

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	Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. 		
Science Project (optional)	**CCSS: English Language Arts 6-12** **CCSS: Grade 7** **Capacities of the Literate Individual** **Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language** They build strong content knowledge. They comprehend as well as critique. They use technology and digital media strategically and capably. **Reading: Literature** **Key Ideas and Details** **1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.** RL.7.1. Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. **Writing** **Text Types and Purposes** **1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.**	• The engineering design process • Inquiry based approach to the scientific method. • Scientific method • Hypothesis • Procedure • Background information • Procedures • Bibliography • Results • Graphs • Dependent and independent variables • Purpose • Vocabulary • Materials • x-axis • y-axis	The students will be able to: • Follow the scientific method to conduct an experiment. • Define the criteria and constraints of a scientific problem. • Research scientific principles. • Evaluate solutions to determine how well the objectives were met during the scientific process. • Analyze and interpret data to determine similarities and differences in findings. • Develop and use models. • Ask and define questions to specify relationships between variables. • Manage a project and meet deadlines. • Communicate project findings through written results, creating a

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	W.7.1d. Establish and maintain a formal style. W.7.1e. Provide a concluding statement or section that follows from and supports the argument presented. **2. Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.** W.7.2. Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. W.7.2d. Use precise language and domain-specific vocabulary to inform about or explain the topic. **Production and Distribution of Writing** **4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.** W.7.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.) **6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.** W.7.6. Use technology, including the Internet, to produce and publish writing and link to and cite sources as well as to interact and collaborate with others, including linking to and citing sources. **Research to Build and Present Knowledge** **7. Conduct short as well as more**		presentation board, and speeches.

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	sustained research projects based on focused questions, demonstrating understanding of the subject under investigation. W.7.7. Conduct short research projects to answer a question, drawing on several sources and generating additional related, focused questions for further research and investigation. **9. Draw evidence from literary or informational texts to support analysis, reflection, and research.** W.7.9. Draw evidence from literary or informational texts to support analysis, reflection, and research. **Speaking & Listening** **Comprehension and Collaboration** **1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.** SL.7.1a. Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. **Presentation of Knowledge and Ideas** **4. Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.** SL.7.4. Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate		

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	eye contact, adequate volume, and clear pronunciation. **5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.** SL.7.5. Include multimedia components and visual displays in presentations to clarify claims and findings and emphasize salient points. **Language** **Conventions of Standard English** **1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.** L.7.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking. **2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.** L.7.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. L.7.2b. Spell correctly. **Knowledge of Language** **3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.** L.7.3. Use knowledge of language and its conventions when writing, speaking, reading, or listening.		

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	L.7.3a. Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.* **CCSS: Mathematics** **CCSS: Grade 7** **The Number System** **7.NS.A. Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.** 7.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers. **Statistics & Probability** **7.SP.B. Draw informal comparative inferences about two populations.** 7.SP.B.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. **7.SP.C. Investigate chance processes and develop, use, and evaluate probability models.** 7.SP.C.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. **Mathematical Practice** **MP.The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.** MP.6. Attend to precision.		

Unit	Standards	Content	Skills
	NGSS: Science Performance Expectations (2013) **NGSS: MS Engineering Design** **MS.Engineering Design** **Performance Expectations** MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. 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.. **NGSS: Crosscutting Concepts** **NGSS: 6-8** **Crosscutting Statements** **1. Patterns – Observed patterns in nature guide organization and classification and prompt questions about relationships and causes underlying them.** Graphs, charts, and images can be used to identify patterns in data.		

Unit	Standards	Content	Skills
	2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering. Cause and effect relationships may be used to predict phenomena in natural or designed systems. Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability. **3. Scale, Proportion, and Quantity – In considering phenomena, it is critical to recognize what is relevant at different size, time, and energy scales, and to recognize proportional relationships between different quantities as scales change.** Scientific relationships can be represented through the use of algebraic expressions and equations. **7. Stability and Change – For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.** Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales, including the atomic scale. **Connections to the Nature of Science: Most Closely Associated with Crosscutting Concepts** **Science is a Way of Knowing**		

Unit	Standards	Content	Skills
	Science is both a body of knowledge and the processes and practices used to add to that body of knowledge. **Science Addresses Questions About the Natural and Material World.** Science limits its explanations to systems that lend themselves to observation and empirical evidence. **NGSS: Disciplinary Core Ideas** **NGSS: 6-8** **ETS1: Engineering Design** **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. (MS-ETS1-3 (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. (MSETS1-4) (secondary to MS-PS1-6) 		