

**MOORESTOWN TOWNSHIP PUBLIC SCHOOLS  
MOORESTOWN, NEW JERSEY**

**William Allen Middle School  
*Science Department***

***Grade 7 Science***

**Date: July 2022 (Updated July 2023)**

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## **[Course Description and Fundamental Concepts](#)**

Grade 7 Science is a hands-on inquiry-based course in which students investigate topics related to life science, physics, chemistry, and earth/space science. The course will help students to understand some of the basic principles of life science and acquire useful science and laboratory skills helping them to develop and design models to explain phenomena. A student's ability to understand the discoveries of science rests in their ability to relate those ideas to the real world. Topics of study are to include: inquiry and problem solving, cells, cell processes, cellular organization, genetics and reproduction, diversity of life including evolutionary changes, human body systems, and the impact of humans on our environment.

## New Jersey Student Learning Standards (NJSLS)

### **Subject/Content Standards**

*Include grade appropriate subject/content standards that will be addressed*

<b>Standard #</b>	<b>Standard Description</b>
<b>MS-LS1</b>	<b>From Molecules to Organisms: Structures and Processes</b>
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 arguments supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.
MS-LS1-4	Use arguments 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-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.
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.
<b>MS-PS1</b>	<b>Matter and Its Interactions</b>
MS-PS1-3	Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
<b>MS-LS2</b>	<b>Ecosystems: Interactions, Energy, and Dynamics</b>
MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
<b>MS-LS3</b>	<b>Heredity: Inheritance and Variation of Traits</b>

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 on 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 result in offspring with genetic variation.
MS-LS4	<b>Biological Evolution: Unity and Diversity</b>
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.
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-LS4-5	Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.
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.
MS-ESS3	<b>Earth and Human Activity</b>
MS-ESS3-3	Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment
MS-ESS3-4	Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.
MS-ESS3-5	Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
MS-ETS1	<b>Engineering Design</b>
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.

## English Companion Standards

List grade-level appropriate companion standards for History, Social Studies, Science and Technical Subjects (CTE/Arts) 6-12. English Companion Standards are required in these subject/content areas.

<b>Unit Addressed</b>	<b>Standard #</b>	<b>Standard Description</b>
1, 2, 3, 4, 5, 6, 7, 8	RST.6-8.1	<i>Cite specific textual evidence to support analysis of science and technical texts.</i>
3, 4, 5	RST.6-8.2	<i>Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions</i>
1, 2, 3, 4, 5, 6, 7, 8	RST.6-8.3	<i>Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.</i>
1, 2, 3, 4, 5, 6, 7, 8	RST.6-8.4	<i>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</i>
1, 2, 3, 4, 5, 7	RST.6-8.7	<i>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).</i>
2, 5, 6, 7	RST.6-8.9	<i>Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.</i>
2, 3, 4, 7	WHST.6-8.1	<i>Write arguments focused on discipline content.</i>
2, 3, 7, 8	WHST.6-8.2	<i>Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization and analysis of relevant content.</i>
2, 5, 6, 7, 8	WHST.6-8.7	<i>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.</i>
1, 2, 3, 4, 5, 6, 7, 8	WHST.6-8.8	<i>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.</i>
1, 2, 3, 4, 5, 6, 7, 8	WHST.6-8.9	<i>Draw evidence from informational texts to support analysis, reflection, and research.</i>

1, 2, 3, 4, 5, 6, 7, 8	SL.8.1	<i>Engage effectively in a range of collaborative discussions (one-on-one, in groups, teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly</i>
1, 2, 3, 4, 5, 6, 7, 8	SL.8.4	<i>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.</i>
2, 4, 5, 6, 7, 8	SL.8.5	<i>Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest</i>

**Career Awareness, Exploration, Preparation, and Training ([Standard 9.2](#))**

*List appropriate units below for which standards will be addressed*

<b>By Grade 8</b>		
<b>Unit Addressed</b>	<b>Core Idea</b>	<b>Standard / Description</b>
1, 2, 3, 4, 5, 6, 7, 8	An individual's strengths, lifestyle goals, choices, and interests affect employment and income	<p><b>9.2.8.CAP.1:</b> <i>Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.</i></p> <p><b>9.2.8.CAP.2:</b> <i>Develop a plan that includes information about career areas of interest.</i></p> <p><b>9.2.8.CAP.3:</b> <i>Explain how career choices, educational choices, skills, economic conditions, and personal behavior affect income.</i></p> <p><b>9.2.8.CAP.4:</b> <i>Explain how an individual's online behavior (e.g., social networking, photo exchanges, video postings) may impact opportunities for employment or advancement.</i></p>
1, 8	Developing and implementing an action plan is an essential step for achieving one's personal and professional goals.	<b>9.2.8.CAP.5:</b> <i>Develop a personal plan with the assistance of an adult mentor that includes information about career areas of interest, goals and an educational plan.</i>
	Early planning can provide more options to pay for postsecondary training and employment.	<b>9.2.8.CAP.6:</b> <i>Compare the costs of postsecondary education with the potential increase in income from a career of choice.</i>

		<p><b>9.2.8.CAP.7:</b> Devise a strategy to minimize costs of postsecondary education.</p> <p><b>9.2.8.CAP.8:</b> Compare education and training requirements, income potential, and primary duties of at least two jobs of interest.</p> <p><b>9.2.8.CAP.9:</b> Analyze how a variety of activities related to career preparation (e.g., volunteering, apprenticeships, structured learning experiences, dual enrollment, job search, scholarships) impacts postsecondary options.</p>
1, 2, 3, 4, 5, 6, 7, 8	There are a variety of resources available to help navigate the career planning process.	<p><b>9.2.8.CAP.10:</b> Evaluate how careers have evolved regionally, nationally, and globally.</p> <p><b>9.2.8.CAP.11:</b> Analyze potential career opportunities by considering different types of resources, including occupation databases, and state and national labor market statistics.</p> <p><b>9.2.8.CAP.12:</b> Assess personal strengths, talents, values, and interests to appropriate jobs and careers to maximize career potential.</p>
	Employee benefits can influence your employment choices.	<p><b>9.2.8.CAP.13:</b> Compare employee benefits when evaluating employment interests and explain the possible impact on personal finances.</p> <p><b>9.2.8.CAP.14:</b> Evaluate sources of income and alternative resources to accurately compare employment options.</p>
	Communication skills and responsible behavior in addition to education, experience, certifications, and skills are all factors that affect employment and income	<p><b>9.2.8.CAP.15:</b> Present how the demand for certain skills, the job market, and credentials can determine an individual's earning power.</p> <p><b>9.2.8.CAP.16:</b> Research different ways workers/ employees improve their earning power through education and the acquisition of new knowledge and skills.</p> <p><b>9.2.8.CAP.17:</b> Prepare a sample resume and cover letter as part of an application process.</p> <p><b>9.2.8.CAP.18:</b> Explain how personal behavior, appearance, attitudes, and other choices may impact the job application process.</p> <p><b>9.2.8.CAP.19:</b> Relate academic achievement, as represented by high school diplomas, college degrees, and industry credentials, to employability and to potential level</p>

	There are resources to help an individual create a business plan to start or expand a business.	<b>9.2.8.CAP.20:</b> <i>Identify the items to consider when estimating the cost of funding a business.</i>
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**Life Literacies and Key Skills ([Standard 9.4](#))**  
*List appropriate units below for which standards will be addressed*

<b>By Grade 8</b>		
<b>Unit Addressed</b>	<b>Core Idea</b>	<b>Standard / Description</b>
1,2,3,4,5,6,7,8	<b>Creativity and Innovation:</b> Gathering and evaluating knowledge and information from a variety of sources, including global perspectives, fosters creativity and innovative thinking.	<p><b>9.4.8.CI.1:</b> <i>Assess data gathered on varying perspectives on causes of climate change (e.g., cross cultural, gender-specific, generational), and determine how the data can best be used to design multiple potential solutions (e.g., RI.7.9, 6.SP.B.5, 7.1.NH.IPERS.6, 8.2.8.ETW.4).</i></p> <p><b>9.4.8.CI.2:</b> <i>Repurpose an existing resource in an innovative way (e.g., 8.2.8.NT.3).</i></p> <p><b>9.4.8.CI.3:</b> <i>Examine challenges that may exist in the adoption of new ideas (e.g., 2.1.8.SSH, 6.1.8.CivicsPD.2).</i></p> <p><b>9.4.8.CI.4:</b> <i>Explore the role of creativity and innovation in career pathways and industries</i></p>
1,2,3,4,5,6,7,8	<b>Critical Thinking and Problem-solving:</b> Multiple solutions often exist to solve a problem.	<p><b>9.4.8.CT.1:</b> <i>Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).</i></p> <p><b>9.4.8.CT.2:</b> <i>Develop multiple solutions to a problem and evaluate short- and long-term effects to determine the most plausible option (e.g., MS-ETS1-4, 6.1.8.CivicsDP.1).</i></p>
6,8	<b>Critical Thinking and Problem-solving:</b> An essential aspect of problem solving is being able to self-reflect on why possible solutions for solving problems were or were not successful.	<b>9.4.8.CT.3:</b> <i>Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.</i>

1,2,3,4,5,6,7,8	<b>Digital Citizenship:</b> Detailed examples exist to illustrate crediting others when incorporating their digital artifacts in one’s own work.	<i>9.4.8.DC.1: Analyze the resource citations in online materials for proper use.</i> <i>9.4.8.DC.2: Provide appropriate citation and attribution elements when creating media products (e.g., W.6.8).</i>
1	<b>Digital Citizenship:</b> There are tradeoffs between allowing information to be public and keeping information private and secure.	<i>9.4.8.DC.3: Describe tradeoffs between allowing information to be public (e.g., within online games) versus keeping information private and secure.</i>
1,2,3,4,5,6,7,8	<b>Digital Citizenship:</b> Digital footprints are publicly accessible, even if only shared with a select group. Appropriate measures such as proper interactions can protect online reputations.	<i>9.4.8.DC.4: Explain how information shared digitally is public and can be searched, copied, and potentially seen by public audiences.</i> <i>9.4.8.DC.5: Manage digital identity and practice positive online behavior to avoid inappropriate forms of self-disclosure.</i> <i>9.4.8.DC.6: Analyze online information to distinguish whether it is helpful or harmful to reputation.</i>
	<b>Digital Citizenship:</b> Digital communities are used by individuals to share information, organize, and engage around issues and topics of interest.	<i>9.4.8.DC.7: Collaborate within a digital community to create a digital artifact using strategies such as crowdsourcing or digital surveys.</i>
8	<b>Digital Citizenship:</b> Digital technology and data can be leveraged by communities to address effects of climate change.	<i>9.4.8.DC.8: Explain how communities use data and technology to develop measures to respond to effects of climate change (e.g., smart cities).</i>
1,2,3,4,5,6,7,8	<b>Global and Cultural Awareness:</b> Awareness of and appreciation for cultural differences is critical to avoid barriers to productive and positive interaction.	<i>9.4.8.GCA.1: Model how to navigate cultural differences with sensitivity and respect (e.g., 1.5.8.C1a).</i> <i>9.4.8.GCA.2: Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.</i>
1,2,3,4,5,6,7,8	<b>Information and Media Literacy:</b> Increases in the quantity of information available through electronic means have heightened the need to check sources for possible distortion, exaggeration, or misrepresentation.	<i>9.4.8.IML.1: Critically curate multiple resources to assess the credibility of sources when searching for information.</i> <i>9.4.8.IML.2: Identify specific examples of distortion, exaggeration, or misrepresentation of information.</i>

1,2,3,4,5,6,7,8	<p><b>Information and Media Literacy:</b> Digital tools make it possible to analyze and interpret data, including text, images, and sound. These tools allow for broad concepts and data to be more effectively communicated.</p>	<p><i>9.4.8.IML.3: Create a digital visualization that effectively communicates a data set using formatting techniques such as form, position, size, color, movement, and spatial grouping (e.g., 6.SP.B.4, 7.SP.B.8b).</i></p> <p><i>9.4.8.IML.4: Ask insightful questions to organize different types of data and create meaningful visualizations.</i></p> <p><i>9.4.8.IML.5: Analyze and interpret local or public data sets to summarize and effectively communicate the data.</i></p>
	<p><b>Information and Media Literacy:</b> The mode of information can convey a message to consumers or an audience.</p>	<p><i>9.4.8.IML.6: Identify subtle and overt messages based on the method of communication.</i></p>
8	<p><b>Information and Media Literacy:</b> Sources of information are evaluated for accuracy and relevance when considering the use of information.</p>	<p><i>9.4.8.IML.7: Use information from a variety of sources, contexts, disciplines, and cultures for a specific purpose (e.g., 1.2.8.C2a, 1.4.8.CR2a, 2.1.8.CHSS/IV.8.AI.1, W.5.8, 6.1.8.GeoSV.3.a, 6.1.8.CivicsDP.4.b, 7.1.NH. IPRET.8).</i></p> <p><i>9.4.8.IML.8: Apply deliberate and thoughtful search strategies to access high-quality information on climate change (e.g., 1.1.8.C1b).</i></p>
	<p><b>Information and Media Literacy:</b> There are ethical and unethical uses of information and media.</p>	<p><i>9.4.8.IML.9: Distinguish between ethical and unethical uses of information and media (e.g., 1.5.8.CR3b, 8.2.8.EC.2).</i></p> <p><i>9.4.8.IML.10: Examine the consequences of the uses of media (e.g., RI.8.7).</i></p> <p><i>9.4.8.IML.11: Predict the personal and community impact of online and social media activities</i></p>
	<p><b>Information and Media Literacy:</b> There is a need to produce and publish media that has information supported with quality evidence and is intended for authentic audiences.</p>	<p><i>9.4.8.IML.12: Use relevant tools to produce, publish, and deliver information supported with evidence for an authentic audience.</i></p> <p><i>9.4.8.IML.13: Identify the impact of the creator on the content, production, and delivery of information (e.g., 8.2.8.ED.1).</i></p> <p><i>9.4.8.IML.14: Analyze the role of media in delivering cultural, political, and other societal messages.</i></p> <p><i>9.4.8.IML.15: Explain ways that individuals may experience the same media message differently.</i></p>

1,2,3,4,5,6,7,8	<b>Technology Literacy:</b> Some digital tools are appropriate for gathering, organizing, analyzing, and presenting information, while other types of digital tools are appropriate for creating text, visualizations, models, and communicating with others.	<p><b>9.4.8.TL.1:</b> Construct a spreadsheet in order to analyze multiple data sets, identify relationships, and facilitate data-based decision-making.</p> <p><b>9.4.8.TL.2:</b> Gather data and digitally represent information to communicate a real-world problem (e.g., MS-ESS3-4, 6.1.8.EconET.1, 6.1.8.CivicsPR.4).</p> <p><b>9.4.8.TL.3:</b> Select appropriate tools to organize and present information digitally.</p> <p><b>9.4.8.TL.4:</b> Synthesize and publish information about a local or global issue or event (e.g., MSLS4-5, 6.1.8.CivicsPI.3).</p>
1,2,3,4,5,6,7,8	<b>Technology Literacy:</b> Digital tools allow for remote collaboration and rapid sharing of ideas unrestricted by geographic location or time.	<p><b>9.4.8.TL.5:</b> Compare the process and effectiveness of synchronous collaboration and asynchronous collaboration.</p> <p><b>9.4.8.TL.6:</b> Collaborate to develop and publish work that provides perspectives on a real-world problem.</p>

### Interdisciplinary Connections ([2020 NJSLs](#))

List any other content standards addressed as well as appropriate units. All arts integration connections may be listed within this chart.

### Visual & Performing Arts Integration ([Standard 1](#))

List appropriate units below for which standards (1.1 through 1.5) may be addressed

Unit Addressed	Artistic Process	Anchor Standard
1,2,3,4,5,6,7,8	<b>Creating</b>	<p>Anchor Standard 1: Generating and conceptualizing ideas.</p> <p>Anchor Standard 2: Organizing and developing ideas.</p> <p>Anchor Standard 3: Refining and completing products.</p>
	<b>Connecting</b>	<p>Anchor Standard 10: Synthesizing and relating knowledge and personal experiences to create products.</p> <p>Anchor Standard 11: Relating artistic ideas and works within societal, cultural, and historical contexts to deepen understanding.</p>
2,3,8	<b>Performing/ Presenting/ Producing</b>	<p>Anchor Standard 4: Selecting, analyzing, and interpreting work.</p> <p>Anchor Standard 5: Developing and refining techniques and models or steps needed to create products.</p> <p>Anchor Standard 6: Conveying meaning through art.</p>

2,3,8	<b>Responding</b>	<i>Anchor Standard 7: Perceiving and analyzing products. Anchor Standard 8: Applying criteria to evaluate products. Anchor Standard 9: Interpreting intent and meaning.</i>
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<b>Unit Addressed</b>	<b>Content / Standard #</b>	<b>Standard Description</b>
1,2,3,6	Math / 6.EE.C.9	<i>Use variables to represent two quantities in a real-world problem that changes 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</i>
2,3,4	Math / 6.SP.A.2	<i>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.</i>
2,3,4	Math / 6.SP.B.4	<i>Summarize numerical data sets in relation to their context.</i>
2,3,8	Math / MP.2	<i>Reason abstractly and quantitatively</i>
2,8	Math / 7.EE.3	<i>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</i>
2,8	Math / 7.SP	<i>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.</i>
3,5,6,8	Math / MP.4	<i>Model with mathematics</i>
3,8	Math / 6.RP.A.3	<i>Use ratio and rate reasoning to solve real-world and mathematical problems</i>

3	Math / 6.NS.C.5	<i>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.</i>
3	Math / 8.EE.A.3	<i>Use numbers expressed in the form of a single digit time and 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</i>
3	Math / 6.SP.B.4	<i>Display numerical data in plots on a number line, including dot plots, histograms, and box plots</i>
3,4,5,6	Math / 6.SP.B.5	<i>Summarize numerical data sets in relation to their context</i>
4,5,6,8	Math / 6.RP.A.1	<i>Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities</i>
5,6,8	Math / 6.EE.B.6	<i>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</i>
4,5,6,8	Math / 7.RP.A.2	<i>Recognize and represent proportional relationships between quantities.</i>
8	Math / 7.EE.B.4	<i>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.</i>

**Pacing Guide** (All Dates are approximate based on the school calendar)

<b>Unit/ Topic</b>	<b>Month</b> (w/Approx number of Teaching Days)
<b>Unit 1 - Introduction to Life Science</b>	<b>September</b> (21 days)
<b>Unit 2 - Cells: Structure and Function</b>	<b>October</b> (15 days)
<b>Unit 3 - Cells and Cell Processes</b>	<b>November</b> (18 days)
<b>Unit 3 - Cells and Cell Processes</b>	<b>December</b> (16 days)
<b>Unit 4 - Genetic Traits and Reproduction</b>	<b>January</b> (20 days)
<b>Unit 4 - Genetic Traits and Reproduction</b>	<b>February</b> (12 days)
<b>Unit 5 - Introduction to the Diversity of Life</b>	<b>February (7 days)</b> <b>March (23 days)</b>
<b>Unit 6 - Diversity of Life - Evolution of Living Things</b>	<b>April (14 days)</b> <b>May (4 days)</b>
<b>Unit 7 - Human Body Systems</b>	<b>May</b> (15 days)
<b>Unit 8 - Environmental Issues and Humans Impact on the Earth</b>	<b>June</b> (12 days)

## Units Scope and Sequence

### **Unit Name: Unit 1 - Introduction to Life Science**

#### **Learning Goals: What do I want my students to learn?**

##### **Standards**

###### *New Jersey Student Learning Standards*

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-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.

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##### **Fundamental Concepts / Big Ideas**

- What is the CER Method?
- Claim, Evidence, and Reasoning framework is a way to scaffold inquiry and problem solving.
- All living things share various key characteristics or functions.

##### **Learning Objectives**

Students will be able to...

- Think and write scientifically using claim, evidence and reasoning.
- Develop a claim to answer a question regarding a phenomena.
- Collect evidence to support the claim.
- Develop Reasoning describing why the evidence supports the claim.
- Understand that a cell is the smallest unit that can be said to be alive.
- Explain how cells function as a whole system including single-cell and multicellular organisms.
- Identify living and nonliving things by the presence or absence of cells.
- Identify tools used for observation at different magnifications and describe why different tools are required to observe cells.

## Units

### Unit Name: Unit 2 - Cells: Structure and Function

#### Learning Goals: What do I want my students to learn?

##### Standards

###### *New Jersey Student Learning Standards*

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.

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.

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##### Fundamental Concepts / Big Ideas

- How come a single celled organism can survive just as well as a multi-celled organism like me?

##### Learning Objectives

###### *Students will be able to...*

- Understand that a cell is the smallest unit that make up all living organisms.
- Explain how cells function as a whole system including single-cell and multicellular organisms.
- Collect and record data on the cellular composition of living organisms.
- Discover that cell organelles have specific functions within an organism.
- Develop a model in which they identify the parts and explain the relationship between how they function as a whole organism.

## Units

### Unit Name: Unit 3 - Cells and Cell Processes

#### Learning Goals: What do I want my students to learn?

##### Standards

###### *New Jersey Student Learning Standards*

MS-PS 1-3 Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.

MS-LS 1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS 1-4 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-LS 1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS 1-6 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-LS 1-7 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.

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##### Fundamental Concepts / Big Ideas

- How do the structures and processes of a cell enable it to survive?
- What is the relationship between the structure and function of cells, tissues, organs and organ systems in an organism?

##### Learning Objectives

Students will be able to...

- Explain that simple and complex organisms are composed of cells that perform essential functions.
- Explain how cells get the necessary materials through various cell processes in order to function.
- Differentiate between diffusion/osmosis (passive transport) and active transport.
- Describe photosynthesis and respiration.
- Compare and contrast the processes of photosynthesis and cellular respiration.
- Explain why cellular respiration is critical for survival.
- Explain the importance of energy and how it flows in and out of an organism.
- Differentiate between mitosis as needed for successful growth and repair versus uncontrolled mitosis.

## Units

### Unit Name: Unit 4 - Genetic Traits and Reproduction

#### Learning Goals: What do I want my students to learn?

##### Standards

###### *New Jersey Student Learning Standards*

MS-LS 1-4 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-LS 1-5 Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.

MS-LS 3-1 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-LS 3-2 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.

MS-LS 4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

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##### Fundamental Concepts / Big Ideas

- How do living organisms pass traits from one generation to the next?
- Why do I look like me?

##### Learning Objectives

Students will be able to...

- Explain the structure of DNA
- Explain what is the difference between mitosis and meiosis.
- Explain why meiosis allows diversity of characteristics in offspring and mitosis does not.
- Explain where genes are located.
- Describe what is the purpose of a gene.
- Differentiate between asexual and sexual reproduction.
- Evaluate the advantages and disadvantages of asexual and sexual reproduction.
- Explain that organisms produced asexually are genetically identical to parents
- Explain why sexual reproduction results in genetic diversity.
- Describe the difference between dominant and recessive traits.
- Utilize a Punnett Square to predict the genotype and phenotype of offspring based on those of the parent
- Describe the importance of Mendel's work
- Understand the role of genes and inheritance in the characteristics of humans
- Describe different genetic disorders/diseases that can alter growth and development

## Units

### Unit Name: Unit 5 - Introduction to Diversity of Life

#### Learning Goals: What do I want my students to learn?

##### Standards

###### *New Jersey Student Learning Standards*

MS-LS 4-3 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.

MS-LS 4-4 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-LS 4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

MS-LS 4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time

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##### Fundamental Concepts / Big Ideas

- How have living things evolved from a single celled organism to a multicellular organism both in structure and function?
- What are the similarities and differences between single celled organisms and simple multicellular organisms?

##### Learning Objectives

Students will be able to...

- Explain how organisms are classified and demonstrate how classification helps to understand unique characteristics of various single and multicellular organisms.
- Analyze the effectiveness of bacterial growth and antibacterial products through various experiments, ultimately determining whether or not claims are accurate based on collected evidence
- Explain how viruses attack a cell and use the mechanisms of the cell to create new viruses.
- Compare and contrast bacteria and viruses, both in structure and function
- Apply knowledge of bacteria and viruses to determine their status as living or nonliving
- Describe the structures in single celled organisms that allow them to function as a living thing.
- Observe living microscopic protists and synthesize their success as organisms based on their structure and function.

## Units

### Unit Name: Unit 6 - Diversity of Life - Evolution of Living Things

#### Learning Goals: What do I want my students to learn?

#### Standards

##### *New Jersey Student Learning Standards*

MS-LS 4-3 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.

MS-LS 4-4 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-LS 4-5 Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms.

MS-LS 4-6 Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

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#### Fundamental Concepts / Big Ideas

- How have living things evolved from simple multicellular organisms into complex multicellular organisms both in structure and function?
- What physical characteristics support organism survival over time and how have those characteristics played a role in organism success?

#### Learning Objectives

Students will be able to...

- Compare how the embryological development of cell layers helps to increase the complexity of living organisms.
- Describe the similarities and differences between the symmetries of living things and how these symmetries affect the functions of the organism.
- Explain why the structures of living things, such as shells, have evolved.
- Describe what structures needed to evolve for an organism to go from a water animal to a land animal.
- Identify the characteristics that carry from organism to organism, linking them in an evolutionary way
- Explain why insects are the most successful group in the animal kingdom based on evolutionary evidence
- Simulate how a species spreads over a region and how its traits are inherited or may change over long periods of time.

## Units

### Unit Name: Unit 7 - Human Body Systems

#### Learning Goals: What do I want my students to learn?

##### Standards

###### *New Jersey Student Learning Standards*

MS-LS 1-3 Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

MS-LS 1-8 Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

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##### Fundamental Concepts / Big Ideas

- How does our body work and function daily?
- What are humans made of and how do these structures help to sustain human life?

##### Learning Objectives

Students will be able to...

- Describe the structures and functions of the cells, tissues, organs and organ systems of the human body
- Explain how cells, tissue, organs and organ systems interact to form an organism?
- Name and describe the major bones in the skeletal system.
- Explain how bones are linked together to provide maximum movement and protection for the body.
- Using forensic evidence, collect data and solve a bone mystery.
- Describe how the structure of muscle tissue relates to its function.
- Compare voluntary and involuntary muscle in structure, function, and where they are located in the body.
- Describe how blood flows through the heart and reaches all necessary points within the body
- Compare the structure and function of arteries, veins and capillaries.
- Compare the structure and function of red cells, white cells and platelets.
- Explain the interaction between different blood types.
- Explain how oxygen and carbon dioxide enter and leave a cell by diffusion.
- Describe how oxygen gets into the body and how carbon dioxide leaves the body.
- Explain how the diaphragm and the rib muscles work to create a pressure gradient in the lungs.
- Explain how the circulatory and respiratory systems work together.
- Describe the pathway of food as it travels through the digestive system and illustrate how the system rearranges food through chemical reactions for use and distribution throughout the body
- Explain how sensory receptors respond to stimuli by sending messages to the brain for immediate behavioral response or memory storage by analyzing the relationship between various body systems
- Investigate and explain how various environmental factors influence body temperature, blood sugar, and oxygen levels

## Units

### Unit Name: Unit 8 - Environmental Issues/Human Impact on the Earth

#### Learning Goals: What do I want my students to learn?

##### Standards

###### *New Jersey Student Learning Standards*

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment

MS-ESS3-4 Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

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-ETS 1-3 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-ETS 1-4 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.

MS-LS 2-4 Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS 2-5 Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

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##### Fundamental Concepts / Big Ideas

- How do we monitor the health of our environment and ecosystems and how do humans impact that health

##### Learning Objectives

Students will be able to...

- Discuss human activities that have an adverse impact on the systems of the earth.
- Develop plans of action to help lower or even reverse the negative impacts that humans have on the environment and surrounding ecosystems
- Observe environmental issues that show up in fictional situations and apply them to real world scenarios
- Through collaborative work, propose and justify actions to mitigate or reduce the effects of
- rising temperatures in specific environments.
- Discuss the impact that heat islands have on New Jersey residents, the factors that help to create heat islands, and how heat islands are connected to global warming

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