

Timeline			
Week	Marking Period 1	Week	Marking Period 3
1	Introduction to 7 <sup>th</sup> Grade Life Science	21	Heredity: Inheritance and Variation of Traits
2	Scientific Practices	22	Heredity: Inheritance and Variation of Traits
3	Scientific Practices	23	Heredity: Inheritance and Variation of Traits
4	Scientific Practices (PBL Project)	24	Heredity: Inheritance and Variation of Traits
5	Scientific Practices (PBL Project)	25	Heredity: Inheritance and Variation of Traits
6	Life Science: Organization and Development <i>Needs and Characteristics of Life</i>	26	Heredity: Inheritance and Variation of Traits
7	Life Science: Organization and Development <i>Needs and Characteristics of Life</i>	27	Heredity: Inheritance and Variation of Traits
8	Life Science: Organization and Development <i>Needs and Characteristics of Life</i>	28	Biological Evolution: Unity and Diversity
9	Chemistry: Atomic Composition of Matter	29	Biological Evolution: Unity and Diversity
10	Chemistry: Atomic Composition of Matter	30	Biological Evolution: Unity and Diversity
Week	Marking Period 2	Week	Marking Period 4
11	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	31	Ecology: Interactions, Energy, and Dynamics
12	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	32	Ecology: Interactions, Energy, and Dynamics
13	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	33	Ecology: Interactions, Energy, and Dynamics
14	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	34	Ecology: The Penguin Predicament PBL STEM Project
15	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	35	Ecology: The Penguin Predicament PBL STEM Project
16	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	36	Science Research Study: Human Influence on the Environment
17	Life Science: From Molecules to Organisms <i>Structures and Processes</i>	37	Science Research Study: Human Influence on the Environment
18	Heredity: Inheritance and Variation of Traits	38	Science Research Study: Human Influence on the Environment
19	Heredity: Inheritance and Variation of Traits	39	STEM – Engineering Design Process
20	Heredity: Inheritance and Variation of Traits	40	STEM – Engineering Design Process

<b>Time Frame</b>	<b>First 5 weeks and last 2 Weeks / Throughout the year: <i>Activities implemented where appropriate throughout the school year</i></b>
<b>Topic</b>	
<b>Science Practices / Engineering Design Process: Understanding Scientific Explanations; Generate Scientific Evidence through Active Investigations; Reflect on Scientific Knowledge; Participate Productively in Science</b>	
<b>Essential Questions</b>	
<ul style="list-style-type: none"> <li>• How do we build and refine models that describe and explain the natural and designed world?</li> <li>• What constitutes useful scientific evidence?</li> <li>• How is scientific knowledge constructed?</li> <li>• How does scientific knowledge benefit, deepen, and broaden from scientists sharing and debating ideas and information with peers?</li> <li>• How does a scientist/engineer satisfy 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?</li> </ul>	
<b>Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>• Measurement and observation tools are used to categorize, represent and interpret the natural world.</li> <li>• Evidence is used for building, refining, and/or critiquing scientific explanations.</li> <li>• Scientific knowledge builds upon itself over time.</li> <li>• Being able to measure accurately is important at school and at home, at work and when pursuing hobbies.</li> <li>• Quality workmanship and accurate measurements with precise instruments are necessary to successfully solve problems.</li> </ul>	
<b>Alignment to NGSS</b>	
<ul style="list-style-type: none"> <li>• SCI.MS-ETS 1</li> <li>• SCI.MS-ETS 2</li> <li>• SCI.MS-ETS 3</li> <li>• SCI.MS-ETS 4</li> </ul>	
<b>Student Outcomes</b>	
<ul style="list-style-type: none"> <li>• Students will apply results of observation and measurement to build conceptual based models, search for core explanations, generate new and productive questions, and revise predictions.</li> <li>• Students will construct and defend arguments based on carefully constructed evidence.</li> <li>• Students will use instruments of measurement to safely gather accurate information for making scientific comparisons of scientific objects and events.</li> <li>• Students will 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.</li> <li>• Students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.</li> <li>• Students will 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.</li> <li>• Students will develop a model to generate data for iterative testing and modification of a</li> </ul>	

proposed object, tool, or process such that an optimal design can be achieved.

### Learning Activities

- Student Safety Contract
- Gummy Bear Lab
- Scientific Cents
- Footprint Evidence Activity
- Simpson's Variables
- Marshmallow Support Challenge
- Cup Structure Challenge
- Brain Safety Helmet Challenge
- Candy Grabber (prosthetic device) Challenge
- Water Filtration Challenge
- Fish water Vs. Tap Water / Plant Controlled Experiment
- Test tube Plants

### Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do now and Wrap-up" participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Performance assessments – "Using Scientific Methods", "Consumer Challenge"

### 21<sup>st</sup> Century Skills

x	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Skills	x	Information Literacy	x	Media Literacy		

### Interdisciplinary Connections

- Social Studies: "A Lifetime of Discoveries" Activity
- Language Arts: Open-Ended Real World Application Questions, Writing Predictions Activity, Lab Report
- Mathematics: Methods of finding averages, metric conversions, graphing results, significant figures
- Fine Arts: Creating scale models

### Technology Integration

- Scientific Inquiry PowerPoint
- Video-Streaming
- ELMO Demonstrations
- SciLinks Activities

<b>Time Frame</b>		<b>5 Weeks</b>					
<b>Topic</b>							
<b>Life Science: Organization and Development</b>							
<b>Essential Questions</b>							
<ul style="list-style-type: none"> <li>• What are the needs and characteristics of all living things?</li> <li>• What methods are used to classify living things into groups?</li> <li>• Why does every species have a scientific name?</li> <li>• How did microscopes change our ideas about living things?</li> <li>• What are the types of microscopes and how do they compare?</li> </ul>							
<b>Enduring Understandings</b>							
<ul style="list-style-type: none"> <li>• All living things share certain characteristics (cellular organization, maintain internal conditions, reproduce, grow and develop, use energy, respond to surroundings) and needs of life (food, water, shelter).</li> <li>• Systematics uses all evidence known about organisms to classify them.</li> <li>• Scientific names allow people all over the world to identify an organism.</li> <li>• The invention of microscopes allowed scientists to view cells which enabled them to further explore and classify life.</li> </ul>							
<b>Alignment to NGSS</b>							
<ul style="list-style-type: none"> <li>• MS-LS1-1</li> <li>• MS-LS1-8</li> </ul>							
<b>Student Outcomes</b>							
<ul style="list-style-type: none"> <li>• Students will conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.</li> <li>• Students will compare and contrast the two main types of microscopes, light and electron.</li> <li>• Students will use scientific classification tools, such as dichotomous keys and cladograms.</li> <li>• Students will gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.</li> </ul>							
<b>Learning Activities</b>							
<ul style="list-style-type: none"> <li>• Response to Stimuli Shoe Box Activity</li> <li>• Heart Rate (Homeostasis) Inquiry Lab</li> <li>• Is it Alive? Station Lab</li> <li>• Please Pass the Bread</li> <li>• Letter “E” Lab</li> </ul>							
<b>Assessments</b>							
<ul style="list-style-type: none"> <li>• Topic Worksheets</li> <li>• Section Quizzes and Tests</li> <li>• Journal Entries: “Do Now and Wrap-Up” Participation.</li> <li>• Observational Assessment/ Lab Participation</li> <li>• Writing Tasks/Lab Reports</li> <li>• Projects/Performance Assessment: “Classification Research Project”</li> </ul>							
<b>21<sup>st</sup> Century Skills</b>							
<b>X</b>	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication	<b>X</b>	Collaboration
<b>X</b>	Skills	<b>X</b>	Information Literacy	<b>X</b>	Media Literacy		
<b>Interdisciplinary Connections</b>							
<ul style="list-style-type: none"> <li>• Social Studies: Historical and Social Perspectives on Cell Theory and The Microscope</li> </ul>							

- Mathematics: “How Small is a Cell”
- Language Arts: Open ended Real World Application Questions
- Fine Arts: Sketches of Microscopic Organisms

### **Technology Integration**

- Video-streaming
- Cells Alive Animations
- ELMO Demonstrations
- SciLinks Activities

<b>Time Frame</b>	<b>7 Weeks</b>
<b>Topic</b>	
<b>Life Science: From Molecules to Organisms - Structures and Processes</b>	
<b>Essential Questions</b>	
<ul style="list-style-type: none"> <li>• What basic substances make up a cell?</li> <li>• What do the structures within a cell do?</li> <li>• How do materials enter and leave the cell?</li> <li>• How do cells obtain energy?</li> <li>• How do cells go through cell division and what occurs if this process is disrupted?</li> </ul>	
<b>Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>• All living things are composed of cells that are composed similar chemical components.</li> <li>• Materials are transported through the cell membrane via passive and active transport.</li> <li>• Cells obtain energy via photosynthesis, respiration, and fermentation.</li> </ul>	
<b>Alignment to NGSS</b>	
<ul style="list-style-type: none"> <li>• MS-LS1-1</li> <li>• MS-LS1-2</li> <li>• MS-LS1-3</li> </ul>	
<b>Student Outcomes</b>	
<ul style="list-style-type: none"> <li>• Students will develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function via cell transport, creation of usable energy, and replication of DNA.</li> <li>• Students will explain the process and importance of DNA replication as well as the negative impact(s) that result if an error occurs during replication.</li> <li>• Students will use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.</li> </ul>	
<b>Learning Activities</b>	
<ul style="list-style-type: none"> <li>• CSI Murder Mystery (Macromolecule) Lab</li> <li>• Onion Cell Microscope Lab</li> <li>• Pond Water Microscope Lab</li> <li>• Plant and Animal Cell Models</li> <li>• Cell-Tastic Adventure Brochure Project</li> <li>• How Much Does Your Nose Know? - Balloon Diffusion Station Lab</li> <li>• Move It! Potato Lab</li> <li>• Egg-Speriment Lab</li> <li>• Diffusion/Osmosis Labs and Demonstrations</li> <li>• Leaf Rubbing and Photosynthesis Diagram</li> <li>• Can You Feel the Burn? Lactic Acid Fermentation Lab</li> <li>• Yeast on the Rise: Cellular Metabolism Lab</li> <li>• Magic Changing Colors (BTB for CO<sub>2</sub>)</li> <li>• Right Brain Vs. Left Brain Activity</li> <li>• Crime Scene DNA Build Lab</li> <li>• My Fruit is Alive...? DNA Extraction Activity</li> <li>• Nitrogen Bases Puzzle</li> <li>• DNA Crime Scene Activity (building DNA strands to identify a guilty suspect)</li> <li>• Cell Cycle and Cancer Virtual Lab</li> <li>• Alien Wrestling</li> </ul>	

- Mitosis vs. Meiosis Order Activity

### Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: “Do Now and Wrap-Up” Participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Projects/Performance Assessment: “Cell City”

### 21<sup>st</sup> Century Skills

<b>X</b>	Creativity	<b>X</b>	Critical Thinking	<b>X</b>	Communication	<b>X</b>	Collaboration
<b>X</b>	Skills	<b>X</b>	Information Literacy	<b>X</b>	Media Literacy		

### Interdisciplinary Connections

- Social Studies: Historical and Social Perspectives on Cell Theory and The Microscope
- Mathematics: “How Small is a Cell”
- Language Arts: Open ended Real World Application Questions
- Fine Arts: Creating a Plant and Animals Cell Model out of Recycled Material

### Technology Integration

- Cell PowerPoint
- Video-streaming
- Cells Alive Animations
- ELMO Demonstrations
- SciLinks Activities

<b>Time Frame</b>	<b>7 Weeks</b>
<b>Topic</b>	
<b>Life Science: Heredity – Inheritance and Variation of Traits</b>	
<b>Essential Questions</b>	
<ul style="list-style-type: none"> <li>• How do organisms change as they go through their life cycle?</li> <li>• How do we model human inheritance of traits?</li> </ul>	
<b>Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>• Organisms reproduce, develop, have predictable life cycles, and pass on some traits to their offspring.</li> <li>• Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.</li> </ul>	
<b>Alignment to NGSS</b>	
<ul style="list-style-type: none"> <li>• MS-LS1-4</li> <li>• MS-LS1-5</li> <li>• MS-LS3-1</li> <li>• MS-LS3-2</li> <li>• MS-LS4-5</li> </ul>	
<b>Student Outcomes</b>	
<ul style="list-style-type: none"> <li>• Students will 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.</li> <li>• Students will construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.</li> <li>• Students will investigate advances that allow scientists to test, screen, diagnose and treat thousands of possible genetic disorders in humans.</li> <li>• Students will gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms and consider multiple viewpoints on modern genetic engineering.</li> </ul>	
<b>Learning Activities</b>	
<ul style="list-style-type: none"> <li>• Probability and Heredity Experiment</li> <li>• Bikini Bottom Genetics</li> <li>• Student Specific Inherited Traits</li> <li>• Doohickey-Bug Activity</li> <li>• Genetically Superior-Hero Project / Monster Genetics</li> <li>• Genetics of Taste Lab</li> <li>• The Mystery of the Baby Blunder Activity</li> <li>• Pedigree Investigator</li> <li>• How are Genes on Sex Chromosomes Inherited Experiment</li> <li>• Karyotype Activity</li> <li>• Genetic Disorder Research</li> </ul>	
<b>Assessments</b>	
<ul style="list-style-type: none"> <li>• Topic Worksheets</li> <li>• Section Quizzes and Tests</li> <li>• Journal Entries: “Do Now and Wrap-Up” participation.</li> <li>• Observational Assessment/ Lab Participation</li> <li>• Writing Tasks/Lab Reports</li> </ul>	



- Performance assessments: “Genetics with a Smile”, “Tracing Traits” and Modern Genetics Classroom Debate / Genetic Disorders Problem Based Learning Project

### **21<sup>st</sup> Century Skills**

<b>x</b>	Creativity	<b>x</b>	Critical Thinking	<b>x</b>	Communication	<b>x</b>	Collaboration
<b>x</b>	Skills	<b>x</b>	Information Literacy	<b>x</b>	Media Literacy		

### **Interdisciplinary Connections**

- Social Studies – historical perspectives of genetics, genetics debate
- Language Arts – Open ended real world application questions, Genetics creative short story
- Mathematics – probability and statistics of inheritance patterns
- Fine Arts – genetics rap, genetics with a smile activity

### **Technology Integration**

- Genetics PowerPoint presentations
- Video-streaming
- Mendel’s peas animation
- ELMO Demonstrations
- “SciLinks” Activities

<b>Time Frame</b>	<b>4 Weeks</b>
<b>Topic</b>	
<b>Biological Evolution: Unity and Diversity</b>	
<b>Essential Questions</b>	
<ul style="list-style-type: none"> <li>• How have living things changed over time?</li> <li>• What scientific evidence exists to support the theory of natural selection?</li> <li>• In what ways are organisms of the same kind different from each other? How does this help them survive and reproduce?</li> </ul>	
<b>Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>• Beneficial variations between organisms of the same species give advantages in obtaining food, avoiding predators and reproducing in different environments.</li> <li>• Organisms who are more likely to survive are able to pass on traits to their offspring.</li> <li>• These naturally selected variations may lead to dramatic changes in characteristics of organisms in populations of extremely long periods of time.</li> </ul>	
<b>Alignment to NGSS</b>	
<ul style="list-style-type: none"> <li>• MS-LS4-1</li> <li>• MS-LS4-2</li> <li>• MS-LS4-3</li> <li>• MS-LS4-4</li> <li>• MS-LS4-6</li> </ul>	
<b>Student Outcomes</b>	
<ul style="list-style-type: none"> <li>• Students will 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.</li> <li>• Students will 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.</li> <li>• Students will 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.</li> <li>• Students will 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.</li> <li>• Students will use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.</li> </ul>	
<b>Learning Activities</b>	
<ul style="list-style-type: none"> <li>• Evolution of Technology Activity</li> <li>• Peppered Moth Historical Data Analysis</li> <li>• Worms Under Attack Pickworm Lab</li> <li>• May the Best Beak Win: Bird Adaptations Lab</li> <li>• The Great Fossil Find Inquiry Lab</li> <li>• Darwin and Evolutionary History Webquest</li> </ul>	
<b>Assessments</b>	
<ul style="list-style-type: none"> <li>• Topic Worksheets</li> <li>• Section Quizzes and Tests</li> </ul>	

- Journal Entries: “Do Now and Wrap-Up” participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Performance Assessment: Examine an “Evolutionary Tree” and Draw Conclusions about how Function and Ancestry Influence the Order and Structure of the Forelimbs of Animals.

### 21<sup>st</sup> Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	X	Media Literacy		

### Interdisciplinary Connections

- Social Studies: Evolution Viewpoints Debate, Historical and Social Perspectives on Evolutionary Change
- Mathematics: Calculating the rates of decay using radioactive dating
- Language Arts: Open ended Real World Application Questions
- Fine Arts: Creating a Branching Tree to Model Evolutionary Relationships and Evolution Songs

### Technology Integration

- Evolution PowerPoint
- Video-streaming
- Fossil Animation
- ELMO Demonstrations
- SciLinks Activities

<b>Time Frame</b>	<b>10 Weeks</b>
<b>Topic</b>	
<b>Ecosystems: Interactions, Energy, and Dynamics</b>	
<b>Essential Questions</b>	
<ul style="list-style-type: none"> <li>• How do living and non-living things interact within the environment?</li> <li>• How does matter and energy move in ecosystems?</li> <li>• What are current threats to components of ecosystems and how can these threats be minimized and/or eliminated?</li> </ul>	
<b>Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>• Living things rely on both biotic and abiotic factors in their environment for survival.</li> <li>• Organisms interact via symbiosis where both benefit (mutualism), one organism benefits and the other is unaffected (commensalism), or one organism benefits and the other is harmed (parasitism).</li> <li>• Matter moves or cycles through ecosystems.</li> <li>• Energy flows through ecosystems from producers to consumers.</li> <li>• The transfer of energy in an ecosystem is modeled with food chains, food webs, and energy pyramids.</li> </ul>	
<b>Alignment to NGSS</b>	
<ul style="list-style-type: none"> <li>• MS-LS1-6</li> <li>• MS-LS1-7</li> <li>• MS-LS2-1</li> <li>• MS-LS2-2</li> <li>• MS-LS2-3</li> <li>• MS-LS2-4</li> <li>• MS-LS2-5</li> </ul>	
<b>Student Outcomes</b>	
<ul style="list-style-type: none"> <li>• Students will analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.</li> <li>• Students will construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems (food chains, food webs, etc.).</li> <li>• Students will develop a model to describe the cycling of matter (water cycle, carbon cycle, nitrogen cycle) and flow of energy (energy pyramids) among living and nonliving parts of an ecosystem.</li> <li>• Students will 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.</li> <li>• Students will 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.</li> <li>• Students will construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.</li> <li>• Students will evaluate competing design solutions for maintaining biodiversity and ecosystem services.</li> </ul>	
<b>Learning Activities</b>	
<ul style="list-style-type: none"> <li>• Backyard Ecology Activity</li> <li>• Nowhere to Hide Interactive</li> <li>• How does soil type effect plant growth? Lab</li> <li>• NJ Animal Ecology Research Project / Create a Food Web</li> </ul>	

- Endangered Species Action Plan
- Studying Populations in an Ecosystem: Snowshoe Hare vs. Lynx
- Virtual Lab (Glencoe): Population Biology
- Oh Deer! (Carrying Capacity and Limiting Factors)
- Nitrogen Cycle Research / Project
- Carbon Cycle Research / Project
- Research and Identification of Symbiosis
- Dinosaur Train: Where have All the Lizards Gone?

### Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: “Do now and Wrap up” participation.
- Observational Assessment/ Lab participation
- Writing Tasks/Lab Reports
- Projects/Performance Assessment: Ecosystem PBL project

### 21<sup>st</sup> Century Skills

X	Creativity	X	Critical Thinking	X	Communication	X	Collaboration
X	Skills	X	Information Literacy	X	Media Literacy		

### Interdisciplinary Connections

- Social Studies: Historical and Social Perspectives on Environmental Concerns
- Mathematics: Graphing Population Trends; Use of Percentages in Calculation of Energy Lost Through the Energy Pyramid
- Language Arts: Open-Ended Real World Application Questions
- Fine Arts: Photosynthesis and Respiration Illustrations

### Technology Integration

- Food Webs, Food Chains, and Energy Pyramids PowerPoint
- Video-Streaming
- ELMO Demonstrations
- SciLinks Activities