

Student Achievement Committee  
Wednesday, September 1, 2021 6:30 PM

Virtual via Zoom  
129 Church Street  
Bristol, CT 06010

## **Agenda**

- I. Call to Order
- II. Decision: Approval of Minutes from June 16, 2021 meeting
- III. Public Comment
- IV. Information: Extracurricular participation in athletics from 20-21  
**Presenter:** Bristol Central and Bristol Eastern High School Principals
- V. Information: Colleges of Class of 2021  
**Presenter:** Bristol Central and Bristol Eastern High School Principals
- VI. Decision: Biotechnology and Forensics Curriculum Revision First Reading  
**Presenter:** Dr. Rechenberg
- VII. Decision: Physics Academic and Accelerated Curriculum Revision First Reading  
**Presenter:** Dr. Rechenberg
- VIII. Decision: AP Biology Curriculum Revision First Reading  
**Presenter:** Dr. Rechenberg
- IX. Decision: ECE Biology Curriculum Revision First Reading  
**Presenter:** Dr. Rechenberg
- X. Decision: Anatomy and Physiology Curriculum Revision  
**Presenter:** Dr. Rechenberg
- XI. Decision: K-2 Social Studies Curriculum Revision  
**Presenter:** Mrs. Redzic
- XII. Decision: September Student Achievement Committee Date



Student Achievement Committee  
June 16, 2021  
MINUTES - DRAFT

Present: Catherine Carbone, Christopher Carrier, Michael Dietter, Jennifer Dube, Carly Fortin, Mike Higgins, Sara Hale, Shelby Pons, Jaime Rechenberg, Azra Redzic, Jillian Romann, Samantha Sarli, Melanie Vetrano, Allison Wadowski, Leszek Ward, Christopher Wilson

Call to Order:

Commissioner Wilson called the meeting to order at 6:30pm.

Approval of Minutes from May 19, 2021

*On a motion made by Shelby Pons and seconded by Christopher Wilson, it was unanimously;*

**VOTED: To approve the Minutes of May 19, 2021.**

Decision: Revision of Visual Art, K-5:

Dr. Samantha Sarli, Supervisor of Fine Arts presented the revision of the Visual Art, K-5 Curriculum. In 2014 there was a national revision of visual and performing arts standards. The standards cultivate a student's ability to carry out the Four Artistic Processes of Create, Perform, Respond and Connect.

*On a motion made by Shelby Pons and seconded by Allison Wadowski, it was unanimously;*

**VOTED: to approve the Visual Art K-5 curriculum revision and move it forward to the full Board for approval.**

Decision: Revision of Instrumental Music (Band) for Grades 6-8:

Dr. Sarli presented the Instrumental Music (Band) for Grades 6-8 curriculum. Students in 6th through 8th grade have the opportunity to choose to be in band. Some enter middle school with two years of elementary band, while others are entering their first year of playing an instrument. In order to accommodate the various ability levels, all students need to be exposed to the fundamentals of playing an instrument while mastering the techniques.

*On a motion made by Shelby Pons and seconded by Allison Wadowski, it was unanimously;*

**VOTED: to approve the Instrumental Music (Band) for Grades 6-8 curriculum revision and move it forward to the full Board for approval.**

Information: New Course, Health Grade 11:

Carly Fortin clarified that this is a brand new course, so this is a preview of what will come before the full board as a first reading at the July Board of Education meeting.

Sara Hale, Teaching Dean of Physical Education and Health, presented information on the Health Grade 11 curriculum. Students in 11th grade will now receive a semester of health education due to the increased graduation requirements that are now in effect to meet the local and state graduation requirements of one credit of health education. This class is set up as more of a life university class. The goal is to provide students the opportunity to ponder their potential responses to life challenges after they leave high school. The curriculum committee developed scenarios that they felt the students may encounter at some point in their life.

Discussion: Revision of Grade 7 Social Studies:

Leszek Ward, Secondary Humanities Supervisor presented the Grade 7 Social Studies curriculum. This course continues the global study of physical and human geography students began in 6th grade.

*On a motion made by Shelby Pons and seconded by Allison Wadowski, it was unanimously;*

**VOTED: to approve the first reading of the Grade 7 Social Studies curriculum revision and move it forward to the full Board for approval.**



Information: CT Seal of Biliteracy

Carly Fortin introduced Mr. Ward to share the exciting news that we have had several of our students earn the Seal of Biliteracy this year. The Seal of Biliteracy is an award given by a school or district, in recognition of students who have studied and attained proficiency in English and at least one other language. For the first time in Bristol's history, we gave the AAPPL exam this spring and had a number of students from Bristol Central and Bristol Eastern qualify for the seal.

Questions and discussion followed regarding the languages offered on the AAPPL exam, success of the pilot assessment, and recognition of the seal of biliteracy for students.

Information: MBIAMS Programming Update:

Mrs. Fortin provided an update on the Memorial Boulevard Intradistrict Arts Magnet School. Our curriculum development has been progressing. Our committees and teachers have outlined a potential slate of courses to be offered within each pathway.

Question and discussion followed regarding the framework for these courses being developed.

There being no further discussion, Commissioner Wilson adjourned the meeting at 7:15pm.

Respectfully submitted,

***Gabby Nicoletti***

Gabby Nicoletti



**Bristol Public Schools**  
**Office of Teaching & Learning**

<b>Department</b>	Science
<b>Department Philosophy</b>	Bristol Public Schools science programing provides students with knowledge of the science and engineering practices, crosscutting concepts, and the core ideas of science and engineering to engage in public discussions on science related issues, to be critical consumers of scientific information related to their everyday lives, and continue to learn science throughout their lives. To ensure this level of scientific literacy, Bristol Public Schools anchor science units in phenomena, this practice promotes student ownership of learning and supports student application of the science content as it pertains to the real world. In each science unit, students work to explain phenomena through the applications of the three dimensions of the Next Generation Science Standards: (1) science and engineering practices, (2) disciplinary core ideas, and (3) cross cutting concepts. Bristol's use of phenom-based units and the three dimensions ensure that students connect with and build a deep conceptual understanding of science concepts. Throughout the kindergarten through grade 12 experience, this philosophy provides all Bristol students with the skills and concepts to be scientifically literate adults.
<b>Course</b>	Biotechnology & Forensics
<b>Course Description for Program of Studies</b>	Biotechnology and Forensics will expose students to the diverse fields of biotechnology including biomedical engineering, bio-molecular genetics, bioprocess engineering, agricultural and environmental engineering, and forensics. Lessons engage students in engineering design problems that can be accomplished in a high school setting related to biomechanics, cardiovascular engineering, biomedical devices, human interface, bioprocesses, forensics and bioethics.
<b>Grade Level</b>	11-12
<b>Pre-requisites</b>	Must pass Biology
<b>Credit (if applicable)</b>	1.0

[UNIT 1: Biotechnology Safety and Measurement](#)

[UNIT 2: Genomics and Genetic Engineering](#)

[UNIT 3: Biomedical Engineering](#)

[UNIT 4: Forensics](#)

## UNIT 1: Biotechnology Safety and Measurement

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard/ISTE		Concepts and Disciplinary-Specific Vocabulary
<b>9-12 Science and Engineering Practices</b> <b>Analyzing and Interpreting Data</b> Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.	SEP	<b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.</li> </ul>	<ul style="list-style-type: none"> <li>Empirical, evidence, logical, reasoning, analysis, valid, effect, limitation, accuracy, precision</li> </ul>
<b>9-12 Nature of Science</b> <b>Scientific Investigations Use a Variety of Methods</b>	NoS	<b>Scientific Investigations Use a Variety of Methods</b> <ul style="list-style-type: none"> <li>Science investigations use diverse methods and do not always use the same set of procedures to obtain data.</li> </ul>	<ul style="list-style-type: none"> <li>Experiment, factor, investigation, method, observable, observation, prediction, test, variable</li> </ul>
<b>Obtaining, Evaluating and Communicating Information</b> Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.	SEP	<b>Obtaining, Evaluating and Communicating Information</b> <ul style="list-style-type: none"> <li>Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>	<ul style="list-style-type: none"> <li>Criteria, decision, digital, feedback, information, knowledge, media, objectivity, peer review, relevant, research, source, value</li> </ul>

## UNIT 1 DETAILS

**Unit Essential Questions:**

1. Why is effective communication necessary in science?
2. What are the basic tools of biotechnology?
3. Why is laboratory safety so important?
4. In the event of an emergency in the laboratory, what steps should you take to keep yourself and your classmates safe?
5. If you were to measure incorrectly, how would you know and what could happen to your experiment results?
6. What is the difference between accuracy and precision?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences/Assessments								
<p style="text-align: center;">(1)</p> <p style="text-align: center;">Science Communication</p> <p style="text-align: center;">Why is effective communication necessary in science? What are the basic tools of biotechnology?</p>	<ul style="list-style-type: none"> <li>• I can communicate ideas for an experiment using various models or other media collected or documented.</li> <li>• I can amend ideas, notes and presentations based on personal view and feedback from others and will document them.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Student Portfolio or Science Communication activities</p> <p>Optional: <a href="#">Math Skills and Basic Tools of the Biotech Lab</a></p>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>• Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p>								
<p style="text-align: center;">(2)</p> <p style="text-align: center;">Laboratory Safety</p> <p style="text-align: center;">Why is laboratory safety so important? In the event of an emergency in the laboratory, what steps should you take to keep yourself and your classmates safe?</p>	<ul style="list-style-type: none"> <li>• I can understand and follow laboratory safety procedures.</li> <li>• I can map the lab to locate and explain the proper usage of key pieces of safety equipment.</li> <li>• I can describe the best mode of action if faced with a laboratory safety issue.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="width: 20px;"></td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<p><a href="#">Zombie College video</a> and <a href="#">corresponding pdfs</a></p>
				Selected Response										
x	Constructed Response													
	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>•</li> </ul>			<p>ELA/Math Connection: N/A</p>								
<p style="text-align: center;">(3)</p> <p style="text-align: center;">Scientific Measurement</p> <p style="text-align: center;">If you were to measure incorrectly, how would you know and what could happen to your experiment results? What is the difference between accuracy and precision?</p>	<ul style="list-style-type: none"> <li>• I can define the difference between precision and accuracy.</li> <li>• I can follow procedures to ensure accurate and precise laboratory measurements using a pipette.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Optional activities: <a href="#">Micropipette color wheel</a> and <a href="#">pptx Instrumentation Calibration lab</a></p>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>• Science investigations use diverse methods and do not always use the same set of procedures to obtain data.</li> <li>• Consider limitations of data analysis (e.g., measurement error, sample selection) when analyzing and interpreting data.</li> </ul>			<p>ELA/Math Connection: CCSS.MATH.CONTENT.HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>								



## UNIT 2: Genomics and Genetic Engineering

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-ETS1-1: Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.	SEP	<b>Asking Questions and Defining Problems</b> <ul style="list-style-type: none"> <li>Analyze complex real-world problems by specifying criteria and constraints for successful solutions.</li> </ul>	<ul style="list-style-type: none"> <li>Consideration, qualitative, quantitative, specification, aspect, critical, mitigation, solution, criteria, constraint, feasible, principle, problem, specific</li> </ul>
	DCI	<b>ETS1.A: Defining and Delimiting Engineering Problems</b> <ul style="list-style-type: none"> <li>Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.</li> <li>Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.</li> </ul>	
	CCC	<b>Influence of Science, Engineering, and Technology on Society and the Natural World</b> <ul style="list-style-type: none"> <li>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>	
HS-ETS1-2: Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.	SEP	<b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.</li> </ul>	<ul style="list-style-type: none"> <li>Iterative, criteria, limitation, systematically, tradeoff. Statistical, quantitative, qualitative, benefit, design, design solution, explanation, merit, reliable, theory</li> </ul>
	DCI	<b>ETS1.C: Optimizing the Design Solution</b> <ul style="list-style-type: none"> <li>Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed.</li> </ul>	
	CCC	<ul style="list-style-type: none"> <li>N/A</li> </ul>	
Hs-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	SEP	<b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models,</li> </ul>	<ul style="list-style-type: none"> <li>Organism, organ, cell, DNA, RNA, mRNA, tRNA, detect, response, external, function, functional, conceptual, precision, specialized, stimulus, structural, derive, mediate,</li> </ul>

		theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.	
	DCI	<b>LS1.A: Structure and Function</b> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</li> </ul>	
	CCC	<b>Structure and Function</b> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul>	
HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	SEP	<b>Asking Questions and Defining Problems</b> <ul style="list-style-type: none"> <li>Ask questions that arise from examining models or a theory to clarify relationships.</li> </ul>	<ul style="list-style-type: none"> <li>Chromosome, formation, gene, genetic, genetic variation, protein, DNA, gene encoding, regulate, regulatory, segment</li> </ul>
	DCI	<b>LS1.A: Structure and Function</b> <ul style="list-style-type: none"> <li>All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (secondary) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)</li> </ul> <b>LS3.A: Inheritance of Traits</b> <ul style="list-style-type: none"> <li>Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>	
HS-ETS1-3: Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental	SEP	<b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff</li> </ul>	<ul style="list-style-type: none"> <li>Consideration, representation, systematic, tradeoff, limitations, constraints, criteria</li> </ul>

impacts.		considerations.	
	DCI	<b>ETS1.B: Developing Possible Solutions</b> <ul style="list-style-type: none"> <li>When evaluating solutions, it is important to take into account a range of constraints, including cost, safety, reliability, and aesthetics, and to consider social, cultural, and environmental impacts.</li> </ul>	
	CCC	<b>Influence of Science, Engineering, and Technology on Society and the Natural World</b> <ul style="list-style-type: none"> <li>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>	

## UNIT 2 DETAILS

Unit Essential Questions:

1. What is biotechnology?
2. What are the basics of the industry and what are some career hot spots?
3. How do world events impact biotechnological advances?
4. What are the 2 main types of cells and how are they distinguished?
5. What is the structure and function of DNA?
6. How can DNA be extracted from cells? What is the difference between DNA and RNA?
7. How are genes expressed from DNA to protein?
8. How can genes be mapped, mutated, and/or analyzed?
9. How should bioethics drive the future of biotechnology?
10. How are GM organisms created?
11. How can genetic engineering benefit humans?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences/Assessments								
			SEP	DCI	CCC									
<p>(1) The Biotechnology Industry</p> <p>The field of biotechnology involves many career subsets. What are the basics of the industry and what are some career hot spots? How do world events impact biotechnological advances?</p>	<ul style="list-style-type: none"> <li>I can explain the field of biotechnology and relate it to specific careers.</li> <li>I can give examples of biotechnology in use</li> <li>I can list some "hot spots" or locations where biotechnology is clustered in the United States</li> <li>I can explain the impacts of world events on the field of biotechnology</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<p><a href="#">Biotech Basics Slides</a> Watch <a href="#">What would happen if you didn't sleep?</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p>
	Selected Response													
x	Constructed Response													
	Performance													
	Observation													
<p>(2) Cells and DNA</p> <p>The understanding of cells is vital in Biotechnology. What are the 2 main types of cells and how are they distinguished? What is the structure and function of</p>	<ul style="list-style-type: none"> <li>I can differentiate between prokaryotic and eukaryotic cells</li> <li>I can differentiate between a bacteria and a virus</li> <li>I can model the structure of DNA</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>X</td><td>Constructed Response</td></tr> <tr><td>X</td><td>Performance</td></tr> </table>		Selected Response	X	Constructed Response	X	Performance	SEP	DCI	CCC	<p>Measuring eukaryotic and prokaryotic cells using a microscope (lab)</p> <p><a href="#">DNA Structure Video</a></p> <p>Article: <a href="#">Twinkling, star-shaped brain cells may hold key to why and how we sleep</a></p> <p>ELA/Math Connection:</p>		
	Selected Response													
X	Constructed Response													
X	Performance													

DNA?		<table border="1"> <tr> <td></td> <td>Observation</td> </tr> </table>		Observation												
	Observation															
<p>(3) DNA Extraction</p> <p>DNA research, extraction, and manipulation is at the forefront of biotechnology. How can DNA be extracted from cells? What is the difference between DNA and RNA?</p>	<ul style="list-style-type: none"> <li>I can describe the structure of DNA and extract DNA from fruits and myself.</li> <li>I can explain the differences between DNA and RNA.</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td></td> <td>Constructed Response</td> </tr> <tr> <td></td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response		Constructed Response		Performance		Observation	<table border="1"> <tr> <td>SEP</td> <td>DCI</td> <td>CCC</td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>(SEP) Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> <li>(DCI) Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>(DCI) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</li> </ul>	<p><a href="#">DNA Extraction lab</a> (strawberry and/or banana) or <a href="#">Virtual DNA Extraction</a></p> <p>Optional article: <a href="#">World's largest DNA sequencing of Viking skeletons reveals they weren't all Scandinavian</a> and <a href="#">video</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p>
	Selected Response															
	Constructed Response															
	Performance															
	Observation															
SEP	DCI	CCC														
<p>(4) The Central Dogma of DNA</p> <p>The function of DNA from code to protein is central to biotechnology. How are genes expressed from DNA to protein?</p>	<ul style="list-style-type: none"> <li>I can explain the Central Dogma of DNA and why DNA is important to living systems.</li> <li>I can demonstrate how DNA is transcribed to form mRNA.</li> <li>I can demonstrate how RNA is translated to form a protein using a codon chart.</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td></td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	<table border="1"> <tr> <td>SEP</td> <td>DCI</td> <td>CCC</td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>(DCI) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (secondary) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)</li> <li>(DCI) Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.</li> <li>(SEP) Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul>	<p>Lab: Protein Synthesis (DNA to protein) Optional: <a href="#">Protein Synthesis Puzzles</a></p> <p>Optional DNA History video: <a href="#">Rosalind Franklin: DNA's unsung hero</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p>
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	Observation															
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<p>(5) Genomics and Gene Expression</p> <p>Biotechnology uses the Central Dogma to research and manipulate DNA. How can genes be mapped, mutated, and/or analyzed?</p>	<ul style="list-style-type: none"> <li>I can explain how genomics is used to study many genes via a DNA microarray</li> <li>I can experiment to differentiate genes using a DNA microarray</li> <li>I can model how a gene is turned “on” or “off” and describe epigenetics</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>(DCI) Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.</li> <li>(DCI) Criteria may need to be broken down into simpler ones that can be approached systematically, and decisions about the priority of certain criteria over others (trade-offs) may be needed.</li> </ul>	SEP	DCI	CCC	<p><a href="#">Microarray lab virtually</a> or DNA Microarray via Edvotek</p> <p>Optional article: <a href="#">Intro to Epigenetics</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<p>(6) Bioethics</p> <p>Some of the uses of biotechnology are controversial in terms of the effects on the environment and ethical issues they raise. How should bioethics drive the future of biotechnology?</p>	<ul style="list-style-type: none"> <li>I can create my own definition of bioethics</li> <li>I can differentiate between morals, values and ethics and relate them to biotechnology.</li> <li>I can elaborate on the central theme of bioethics: “We can, but should we?”</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td></td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response		Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>(SEP) Analyze complex real-world problems by specifying criteria and constraints for successful solutions.</li> <li>(DCI) Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.</li> <li>(DCI) Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.</li> <li>(CCC) New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>	SEP	DCI	CCC	<p><a href="#">Bioethics Case Studies</a> - Socratic Seminar, FlipGrid, or other discussion setup</p> <p>Optional sources: <a href="#">Center for Practical Bioethics</a> and <a href="#">NCBI</a></p>
	Selected Response														
	Constructed Response														
	Performance														
	Observation														
SEP	DCI	CCC													
<p>(7) Genetic Engineering and Restriction Enzymes</p> <p>Scientists can now select specific genes to modify and even insert genes from other organisms. How are GM organisms created? How can genetic engineering benefit humans?</p>	<ul style="list-style-type: none"> <li>I can describe how selective breeding can be accelerated by genetic engineering.</li> <li>I can model the role of restriction enzymes in creating genetically modified organisms.</li> <li>I can explain the benefits of genetic engineering.</li> <li>I can interpret Gel Electrophoresis to solve scientific questions</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td></td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response		Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>(SEP) Analyze complex real-world problems by specifying criteria and constraints for successful solutions.</li> <li>(DCI) Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.</li> <li>(CCC) New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>	SEP	DCI	CCC	<p>Video: <a href="#">The Deadliest Being on Planet Earth And MIT’s Genetic Engineering Video</a></p> <p>Gel Electrophoresis Lab (practical or virtual - one option is <a href="#">here</a>)</p> <p>Optional: Go to <a href="http://biotech.emcp.net/nebecomm">http://biotech.emcp.net/nebecomm</a> to research restriction endonucleases available from New England BioLabs</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.2 Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.</p>
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## UNIT 3: Biomedical Engineering

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	SEP	<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	<ul style="list-style-type: none"> <li>Protein synthesis, protein structure, organic compounds, living system, derive, tissue, structural, specialized, organism, hierarchical, evidence, empirical evidence, quantitative, qualitative</li> </ul>
	DCI	<b>LS1.A: Structure and Function</b> <ul style="list-style-type: none"> <li>Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> </ul>	
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.</li> </ul>	
Connections to Engineering, Technology, and Applications of Science	NoS	<b>Interdependence of Science, Engineering and Technology</b> <ul style="list-style-type: none"> <li>Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.</li> <li>Many R&amp;D projects may involve scientists, engineers, and others with wide ranges of expertise.</li> </ul> <b>Influence of Science, Engineering, and Technology on Society and the World</b> <ul style="list-style-type: none"> <li>Modern civilization depends on major technological systems.</li> <li>Engineers continuously modify these systems to increase benefits while decreasing costs and risks.</li> <li>New technologies can have deep impacts on society and the environment, including some that are not anticipated.</li> <li>Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>	Influence, interaction, natural, natural world, risk, scientist, society, standard, engineer, research and development

## UNIT 3 DETAILS

**Unit Essential Questions:**

1. What are some careers I can pursue in biomedical engineering? What are the various fields under this career umbrella?
2. How can microorganisms be utilized or manipulated to help humans?
3. How can organisms be cloned? What are the benefits and controversy surrounding cloning?
4. What are stem cells? How can they be used to help humans?
5. What is regenerative medicine?
6. What are the five functions of the skeletal system?
7. What two major functions do muscles perform in addition to movement?
8. How does the muscular system assist the skeletal system in body movements?
9. How could an engineer utilize knowledge of the skeletal system and muscular system in designing joint replacements?
10. What are the major types of joints?
11. How does myocardial infarction or heart attack affect the pathway of blood flow and the functions of the heart?
12. How do electrical signals correspond to the cardiac cycle? How can an ECG be interpreted?
13. What are some examples of prosthetic devices that can be used for correcting cardiac defects or monitoring cardiac defects or functions?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences/Assessments								
<p style="text-align: center;">(1) Introduction to Biomedical Engineering</p> <p>What are some careers I can pursue in BME? What are the various fields under this career umbrella?</p>	<ul style="list-style-type: none"> <li>● I can define biomedical engineering.</li> <li>● I can list and explain several careers in biomedical engineering and search for career opportunities in CT.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	Optional: Use <a href="#">EMB Career Guide</a>
				Selected Response										
x	Constructed Response													
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			<p><b>Influence of Science, Engineering, and Technology on Society and the World</b></p> <ul style="list-style-type: none"> <li>● Modern civilization depends on major technological systems.</li> <li>● Engineers continuously modify these systems to increase benefits while decreasing costs and risks.</li> <li>● New technologies can have deep impacts on society and the environment, including some that are not anticipated.</li> <li>● Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.W.11-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</p>								
<p style="text-align: center;">(2) Microbiology in Biotechnology</p> <p>How can microorganisms be utilized or manipulated to help humans?</p>	<ul style="list-style-type: none"> <li>● I can use prior knowledge of restriction enzymes to understand how insulin was first produced.</li> <li>● I can analyze the experiments of Griffith, Avery, and other scientists that led to our understanding of transformation.</li> <li>● I can see and explain the lab process to transform bacteria.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Discussion or activity focused on the <a href="#">history of insulin</a> pGlo Transformation Project or Lab (practical or virtual)
				Selected Response										
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			<p><b>Interdependence of Science, Engineering and Technology</b></p> <ul style="list-style-type: none"> <li>● Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.</li> <li>● Many R&amp;D projects may involve scientists, engineers, and others with wide ranges of</li> </ul>			<p>Optional: <a href="#">DNA discovery notes to supplement transformation</a></p> <p>ELA/Math Connection:</p>								

			expertise.															
(3) Gene Editing and CRISPR  How can CRISPR technology be used for scientific research and to treat and present diseases?	<ul style="list-style-type: none"> <li>I can explain what CRISPR and Cas9 are to explain their function in gene editing</li> <li>I can describe how CRISPR is used to treat genetic disease.</li> <li>I can hypothesize how CRISPR can be used in the future of medicine and biotechnology.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> <tr> <td colspan="3"> <ul style="list-style-type: none"> <li>(NoS) Engineers continuously modify these systems to increase benefits while decreasing costs and risks.</li> <li>(NoS) New technologies can have deep impacts on society and the environment, including some that are not anticipated.</li> <li>(NoS) Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul> </td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>(NoS) Engineers continuously modify these systems to increase benefits while decreasing costs and risks.</li> <li>(NoS) New technologies can have deep impacts on society and the environment, including some that are not anticipated.</li> <li>(NoS) Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>			<p>Discuss how CRISPR is used to treat Sickle Cell Anemia and/or Cancer</p> <p><a href="#">Gene Editing Video (CRISPR)</a> Optional: <a href="#">New Scientist Article</a></p> <p>ELA/Math Connection:</p>
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<ul style="list-style-type: none"> <li>(NoS) Engineers continuously modify these systems to increase benefits while decreasing costs and risks.</li> <li>(NoS) New technologies can have deep impacts on society and the environment, including some that are not anticipated.</li> <li>(NoS) Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>																		
(4) Stem Cells, Cloning, and Regenerative Medicine  How can organisms be cloned? What are the benefits and controversy surrounding cloning? What are stem cells? How can they be used to help humans? What is regenerative medicine?	<ul style="list-style-type: none"> <li>I can describe the process of cloning.</li> <li>I can explain the differences between embryonic and adult stem cells.</li> <li>I can describe how stem cells are used to treat disease.</li> <li>I can predict how stem cells can be engineered to avoid using embryos.</li> <li>I can experiment with Planaria to understand regenerative medicine</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td></td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response		Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> <tr> <td colspan="3"> <ul style="list-style-type: none"> <li>(DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>(NoS) Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.</li> <li>(NoS) Many R&amp;D projects may involve scientists, engineers, and others with wide ranges of expertise.</li> </ul> </td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>(DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>(NoS) Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.</li> <li>(NoS) Many R&amp;D projects may involve scientists, engineers, and others with wide ranges of expertise.</li> </ul>			<p>Bioethics of stem cell research (discussion or Socratic Seminar)</p> <p><a href="#">Go GoStem Cells by Utah Genetics</a> (if Flash version is updated)</p> <p><a href="#">STO Stem Cell Lab Activity</a> or comparable</p> <p>Planaria Regeneration Lab Activity (<a href="#">Ward's</a> or other)</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
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<ul style="list-style-type: none"> <li>(DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>(NoS) Engineering advances have led to important discoveries in virtually every field of science, and scientific discoveries have led to the development of entire industries and engineered systems.</li> <li>(NoS) Many R&amp;D projects may involve scientists, engineers, and others with wide ranges of expertise.</li> </ul>																		
(5) Joint Replacements and Orthopedic Implants  What are the five functions of the skeletal system? What two major functions do muscles perform in addition to movement? How does the muscular system assist the skeletal system in body movements? How could an engineer utilize knowledge of the skeletal system and muscular system in designing joint replacements? What are the major types of joints?	<ul style="list-style-type: none"> <li>I can list the 5 functions of the skeletal system and identify the types of joints found at its articulations.</li> <li>I can explain how muscles aid in movement of the body.</li> <li>I can model a synovial joint and explain the procedures involved in replacement joint surgery.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> <tr> <td colspan="3"> <ul style="list-style-type: none"> <li>(DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>(SEP) Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> </td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>(DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>(SEP) Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>			<p>Joint Replacement Project or <a href="#">Broken Bones Lab</a> from Flinn</p> <p>Optional: <a href="#">Radiology Reference Guide</a>, <a href="#">Board Exam</a> and <a href="#">Practical Lab</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>
	Selected Response																	
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<ul style="list-style-type: none"> <li>(DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>(SEP) Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>																		

<p>(6) Cardiovascular Engineering</p> <p>How does myocardial infarction or heart attack affect the pathway of blood flow and the functions of the heart? How do electrical signals correspond to the cardiac cycle? How can an ECG be interpreted? What are some examples of prosthetic devices that can be used for correcting cardiac defects or monitoring cardiac defects or functions?</p>	<ul style="list-style-type: none"> <li>• I can draw and label the anatomy of the human heart</li> <li>• I can explain the cardiac conduction system and interpret a basic ECG</li> <li>• I can explain the function of a pacemaker and other devices used to monitor and/or correct heart disorders</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	Optional Case Study: <a href="#">A Tiny Heart</a>
				Selected Response										
x	Constructed Response													
	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>• (DCI) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>• (SEP) Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>• (NoS) Engineers continuously modify these systems to increase benefits while decreasing costs and risks.</li> <li>• (NoS) New technologies can have deep impacts on society and the environment, including some that are not anticipated.</li> <li>• (NoS) Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p>								

## UNIT 4: Forensics

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
<p><b>Constructing Explanations and Designing Solutions:</b></p> <ul style="list-style-type: none"> <li>Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</li> </ul>	<b>NoS</b>	<ul style="list-style-type: none"> <li>Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> <li>Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul>	<ul style="list-style-type: none"> <li>Basis, benefit, design, design solution, explanation, idea, merit, reliable, solution, theory, simulation, assumption</li> </ul>
<p><b>Analyzing and Interpreting Data</b></p> <ul style="list-style-type: none"> <li>Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.</li> </ul>	<b>NoS</b>	<ul style="list-style-type: none"> <li>Evaluate the impact of new data on a working explanation and/or model of a proposed process or system.</li> </ul>	<ul style="list-style-type: none"> <li>Statistical analysis, model, evaluate, system, accurate, analysis, assumption, comparison, data, finding, inference, interpretation, technique</li> </ul>
<p><b>Cause and Effect: Mechanism and Prediction:</b></p> <ul style="list-style-type: none"> <li>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.</li> </ul>	<b>CCC</b>	<ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> <li>Systems can be designed to cause a desired effect.</li> <li>Changes in systems may have various causes that may not have equal effects.</li> </ul>	<ul style="list-style-type: none"> <li>Causality, causation, correlation, effect, result, empirical evidence, scale mechanism</li> </ul>

## UNIT 4 DETAILS

**Unit Essential Questions:**

1. How has the field of forensic science evolved from its inception?
2. What impact has forensics had on solving criminal investigations?
3. How is a crime scene processed? What types of evidence must be gathered at a crime scene?
4. How are fingerprints collected at a crime scene? What are the 3 fingerprint principles? What are the 3 classes of fingerprints and how are they analyzed?
5. How is blood identified and collected at a crime scene? What can blood tell us about a crime scene?
6. What techniques are necessary to attain an uncontaminated DNA sequence that can be compared to known data by a forensic scientist or pathologist?
7. How are DNA sequences compared to each other?
8. How can hair and fibers collected at a crime scene be analyzed by forensic scientists?
9. What are the limits of forensics?
10. What is the main goal of the Innocence Project?
11. What possibilities still exist in the field of forensics?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences/Assessments								
<p>(1) History and Development of Forensic Science</p> <p>How has the field of forensic science evolved from its inception? What impact has forensics had on solving criminal investigations?</p>	<ul style="list-style-type: none"> <li>● I can explain what forensics is and the role of a forensic scientist</li> <li>● I can describe the Locard Exchange Principle and list other scientists like Alec Jeffreys who contributed to the field of forensics</li> <li>● I can explain the services provided of a basic crime lab</li> <li>● I can differentiate between CSI myths and facts (CSI Effect)</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Case study in Forensic Science of either Colin Pitchfork, Robert Durst, Robert Crafts, or other historical case.</p> <p>Optional exploration of <a href="#">Chemical &amp; Engineering News</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
				Selected Response										
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x	Performance													
	Observation													
<p>(2) Evidence Collection</p> <p>How is a crime scene processed? What types of evidence must be gathered at a crime scene?</p>	<ul style="list-style-type: none"> <li>● I can identify the seven S's of crime scene investigation</li> <li>● I can differentiate between direct and circumstantial evidence at a crime scene.</li> <li>● I can evaluate the importance of eyewitness testimony</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<p>Forensic File episodes "Body of Evidence" or "The Disappearance of Helle Crafts" or comparable.</p> <p>ELA/Math Connection:</p>
				Selected Response										
x	Constructed Response													
	Performance													
	Observation													
<p>(3) Fingerprinting Basics</p> <p>How are fingerprints collected at a crime scene?</p>	<ul style="list-style-type: none"> <li>● I can explain the 3 fundamental principles of fingerprints?</li> <li>● I can collect latent fingerprints</li> <li>● I can identify which class of fingerprint I have collected and identify ridge</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> </table>		Selected Response	x	Constructed Response	SEP	DCI	CCC	<p>Fingerprinting lab - students create, collect, and analyze latent prints</p> <p>● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own</p>				
	Selected Response													
x	Constructed Response													

<p>What are the 3 fingerprint principles? What are the 3 classes of fingerprints and how are they analyzed?</p>	<p>characteristics and patterns.</p> <ul style="list-style-type: none"> <li>I can explain how AFIS and biometrics can be used to track criminals.</li> </ul>	<table border="1"> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Performance		Observation	<p>investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</p>	<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>										
	Performance																	
	Observation																	
<p>(4) Serology and Blood Spatter</p> <p>How is blood identified and collected at a crime scene? What can blood tell us about a crime scene?</p>	<ul style="list-style-type: none"> <li>I can define forensic serology and classify crime scene blood.</li> <li>I can explain how blood is identified and collected at a crime scene.</li> <li>I can differentiate between the human blood types in a laboratory setting</li> <li>I can explain how blood is characterized by a criminalist at a crime scene</li> <li>I can interpret blood spatter patterns at a simulated crime scene.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> <tr> <td colspan="3"> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> </ul> </td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> </ul>			<p>Simulated Blood Typing Lab or equivalent.</p> <p>Blood Spatter Lab or equivalent</p> <p>Forensic Files “The House that Roared” or comparable</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>
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x	Constructed Response																	
x	Performance																	
	Observation																	
SEP	DCI	CCC																
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<p>(5) DNA Profiling</p> <p>What techniques are necessary to attain an uncontaminated DNA sequence that can be compared to known data by a forensic scientist or pathologist? How are DNA sequences compared to each other?</p>	<ul style="list-style-type: none"> <li>I can explain the processes of Southern blotting and gel electrophoresis</li> <li>I can compare DNA between different individuals as demonstrated by electrophoresis in a laboratory setting</li> <li>I can explain how PCR is used to copy and amplify miniscule traces of DNA.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> <tr> <td colspan="3"> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> <li>Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> </ul> </td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> <li>Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> </ul>			<p>Electrophoresis Lab (actual, simulation, or <a href="#">virtual</a>)</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
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<p>(6) Hair and Fiber Analysis</p> <p>How can hair and fibers collected at a crime scene be analyzed by forensic scientists?</p>	<ul style="list-style-type: none"> <li>I can draw and label the anatomy of human hair</li> <li>I can differentiate human hair from other mammals and identify its structural components.</li> <li>I can differentiate between different fibers like cotton, silk, and synthetics</li> <li>I can understand how hair and fiber may be misconstrued and non-admissible in court.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> <tr> <td colspan="3"> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> <li>Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> </ul> </td> </tr> </table>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> <li>Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> </ul>			<p>Hair and Fiber Analysis Lab (or comparable comparison microscopy virtual lab).</p> <p>Optional Case Study: Atlanta Child Murders</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p>
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<p>(7) The Limits of Forensic Science</p> <p>What are the limits of forensics? What is the main goal of the Innocence Project? What possibilities still exist in the field of forensics?</p>	<ul style="list-style-type: none"> <li>I can explain how forensic technology has advanced and how certain methods of evidence collection have been reevaluated (lie detector, eyewitness testimony, hair analysis, etc).</li> <li>I can describe other forensic science specialties that can be useful in an investigation</li> <li>I can explain the goal and mission of the Innocence Project</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<p>Innocence Project Presentation or Case Studies (ex. Ronald Cotton)</p> <p>Optional: - CSI Wildlife via HHMI - Forensic Specialties Project (research a topic/field that was not covered - Glass Analysis, Forensic Odontology, Forensic Psychology, Forensic Entomology, etc)</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
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**Bristol Public Schools**  
**Office of Teaching & Learning**

<b>Department</b>	Science
<b>Department Philosophy</b>	Bristol Public Schools science programing provides students with knowledge of the science and engineering practices, crosscutting concepts, and the core ideas of science and engineering to engage in public discussions on science related issues, to be critical consumers of scientific information related to their everyday lives, and continue to learn science throughout their lives. To ensure this level of scientific literacy, Bristol Public Schools anchor science units in phenomena, this practice promotes student ownership of learning and supports student application of the science content as it pertains to the real world. In each science unit, students work to explain phenomena through the applications of the three dimensions of the Next Generation Science Standards: (1) science and engineering practices, (2) disciplinary core ideas, and (3) cross cutting concepts. Bristol's use of phenom-based units and the three dimensions ensure that students connect with and build a deep conceptual understanding of science concepts. Throughout the kindergarten through grade 12 experience, this philosophy provides all Bristol students with the skills and concepts to be scientifically literate adults.
<b>Course</b>	Physics
<b>Course Description for Program of Studies</b>	This course is designed for students interested in a career in mathematics, science or engineering as well as those interested in a more extensive physical science background. The academic course provides a survey of physics concepts including: motion, mass, force, circular motion & torque, energy, momentum, simple harmonic motion, gravity, heat, electrostatics, electric circuits, magnets, waves and particle nature of light. The accelerated version of this course provides a deeper mathematical overview of these physics concepts. Rich laboratory activities are woven into student experiences for students enrolled at both the academic and accelerated levels.
<b>Grade Level</b>	11-12
<b>Pre-requisites</b>	Successful completion of Algebra 1 and Geometry
<b>Credit (if applicable)</b>	1.0

[UNIT 1: Motion](#)

[UNIT 2: Mass and Force](#)

[UNIT 3: Circular Motion and Torque](#)

[UNIT 4: Energy](#)

[UNIT 5: Momentum](#)

[UNIT 6: Simple Harmonic Motion](#)

[UNIT 7: Gravitation](#)

[UNIT 8: Heat](#)

[UNIT 9: Electrostatics](#)

[UNIT 10: Electric Circuits](#)

[UNIT 11: Magnetism](#)

[UNIT 12: Waves](#)

[UNIT 13: The Particle Nature of Light](#)

P indicates standard will be a priority for the unit; S indicates a supporting standard

District Learning Expectations and Standards	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9	Unit 10	Unit 11	Unit 12	Unit 13
<b>Next Generation Science Standards</b>													
HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.									X				
Hs-PS2-1: Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	X						X						
HS-PS2-2: Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	X	X			X								
HS-PS2-3: Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*					X								
HS-PS2-4: Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between objects.	X						X		X		X		
HS-PS2-5: Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.										X	X		
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*								X	X		X		
HS-PS3-1: Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.				X									
HS-PS3-2: Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).			X	X				X					

HS-PS4-1: Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.													X	
HS-PS4-3: Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. [													X	
HS-PS4-4: Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.														X
HS-PS4-5: Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*														X
HS-ESS1-4 4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.							X							
<b>College Board AP Physics Enduring Understandings and Learning Objectives</b>														
3.B.3.1: Predict which properties determine the motion of a simple harmonic oscillator and what the dependence of the motion is on those properties.							X							
3.B.3.2: Design a plan and collect data in order to ascertain the characteristics of the motion of a system undergoing oscillatory motion caused by a restoring force.							X							
3.B.3.3: Analyze data to identify qualitative and quantitative relationships between given values and variables (i.e., force, displacement, acceleration, velocity, period of motion, frequency, spring constant, string length, mass) associated with objects in oscillatory motion and use those data to determine the value of an unknown.							X							
3.B.3.4: Construct a qualitative and/or quantitative explanation of oscillatory behavior given evidence of a restoring force.							X							

# UNIT 1: Motion

## UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Academic Vocabulary
HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	SEP	<b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.</li> </ul>	<ul style="list-style-type: none"> <li>Position</li> <li>Displacement</li> <li>Distance</li> <li>Speed</li> <li>Velocity</li> <li>Acceleration</li> <li>Vector</li> <li>Scaler</li> <li>Magnitude</li> <li>Resultant</li> <li>Vector composition</li> <li>Vector resolution</li> <li>Component</li> <li>Projectile</li> <li>Range</li> <li>Trajectory</li> <li>Free fall</li> <li>Air resistance</li> <li>kinematics</li> </ul>
	DCI	<b>PS2.A: Forces and Motion</b> <ul style="list-style-type: none"> <li>Newton's second law accurately predicts changes in the motion of macroscopic objects.</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>	
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	
	DCI	<b>PS2.A: Forces and Motion</b> <ul style="list-style-type: none"> <li>Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object.</li> <li>If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.</li> </ul>	
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>When investigating or describing a system, the boundaries and initial conditions of the system need to be defined.</li> </ul>	
HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul>	
	CCC	<b>Patterns</b> <ul style="list-style-type: none"> <li>Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li> </ul>	

## UNIT 1 DETAILS: Motion

**Unit Narrative:**

This unit introduces students to the methods of determining a quantitative description of our physical world through the analysis of moving particles.

**Unit Essential Questions:**

- What quantities are useful for describing motion, and what are their units or dimensions?
- How can these quantities be measured?
- What are the relationships between these quantities for various motions?
- Is the motion of an object predictable?
- How do models in physics simplify physical situations, and restrict range of applicability?

Learning Sequence	Learning Target(s): I can...	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) The Equations of Kinematics	<ul style="list-style-type: none"> <li>● I can state, define, and differentiate between the quantities useful for the description of motion.</li> <li>● I can, given boundary conditions, use the equations of kinematics to determine, explain, or predict the state of motion of a particle at a different time or position.</li> <li>● I can identify the range of applicability of the equations developed.</li> <li>● I can apply the equations and methods to solve one dimension kinematics word problems.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<a href="#">Reaction time lab</a> <a href="#">Kinematics quiz</a>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
<ul style="list-style-type: none"> <li>● Use mathematical representations of phenomena to describe explanations.</li> <li>● Newton's second law accurately predicts changes in the motion of macroscopic objects.</li> <li>● Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>											
(2) Free Fall	<ul style="list-style-type: none"> <li>● I can state Galileo's Law of Falling Bodies, and recognize the benefits and limitations of models in physics.</li> <li>● I can measure the acceleration of gravity near the Earth's surface.</li> <li>● I can recognize, infer, and apply symmetry in free fall problems.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<a href="#">Accel of gravity lab</a>
				Selected Response										
x	Constructed Response													
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	Observation													
<ul style="list-style-type: none"> <li>● Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> <li>● Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>											
(3) Vectors	<ul style="list-style-type: none"> <li>● I can recognize that some quantities used to describe motion have both direction and magnitude (Vector), while others are completely described by a number (Scalar).</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> </table>		Selected Response	SEP	DCI	CCC	<a href="#">Accel of gravity lab</a>						
	Selected Response													
<ul style="list-style-type: none"> <li>● Newton's second law accurately predicts changes in the motion of macroscopic</li> </ul>														

	<ul style="list-style-type: none"> <li>• I can add/subtract vectors in two dimensions. (ACC)</li> <li>• I can resolve (split) vectors into x and y components. (ACC)</li> </ul>	<table border="1"> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>	x	Constructed Response	x	Performance		Observation	<p>objects.</p> <ul style="list-style-type: none"> <li>• Use mathematical representations of phenomena to describe explanations.</li> </ul>			<p>ELA/Math Connection:          CCSS.MATH.CONTENT.HSN.VM.A.1          (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes          CCSS.MATH.CONTENT.HSN.VM.A.2          (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.          CCSS.MATH.CONTENT.HSN.VM.A.3          (+) Solve problems involving velocity and other quantities that can be represented by vectors.</p>		
x	Constructed Response													
x	Performance													
	Observation													
<p>(4) Projectile Motion</p>	<ul style="list-style-type: none"> <li>• I can synthesize previously studied 1-dimensional motions and vectors to analyse and solve projectile motion problems.</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td></td> <td>Constructed Response</td> </tr> <tr> <td></td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response		Constructed Response		Performance		Observation	<p><b>SEP</b></p>	<p><b>DCI</b></p>		<p><a href="#">W Rocket lab.doc</a></p> <p>ELA/Math Connection:          CCSS.ELA-LITERACY.RST.11-12.9          Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
	Selected Response													
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## UNIT 2: Mass and Force

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	<ul style="list-style-type: none"> <li>Mass</li> <li>Weight</li> <li>Inertia</li> <li>Law of inertia</li> <li>Newton's 2nd Law</li> <li>Force</li> <li>Friction</li> <li>Static</li> <li>Kinetic</li> <li>Coefficient of friction</li> <li>Normal force</li> <li>Tension</li> <li>Equilibrium</li> <li>Non equilibrium</li> <li>Action</li> <li>Reaction</li> <li>Net force</li> </ul>
	DCI	<b>PS2.A: Forces and Motion</b> <ul style="list-style-type: none"> <li>Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object.</li> <li>If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.</li> </ul>	
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>When investigating or describing a system, the boundaries and initial conditions of the system need to be defined.</li> </ul>	

## UNIT 2 DETAILS: Mass and Force

Unit Narrative: Once students can successfully describe motion in 1 and 2 dimensions, our attention is now turned to what causes a particular motion.

Unit Essential Questions:

- What is a force?
- What is the role of force in the motion of a body?
- Where do forces come from?
- How do you model/represent forces using a free body diagram?
- What is the relationship between unbalanced forces, mass, and acceleration?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Newton's Laws	<ul style="list-style-type: none"> <li>● I can recognize that net force changes motion, but is not required for motion.</li> <li>● I can identify mass as the measure of an object's inertia.</li> <li>● I can state the relationship between net force, mass, and acceleration verbally and mathematically.</li> <li>● I can model objects as point particles when using Newton's Second Law.</li> <li>● I can state that forces always occur in pairs, and identify those action/reaction pairs.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p><a href="#">Proving Newton's 2nd Law</a> <a href="#">Apparent weight lab</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) Equilibrium	<ul style="list-style-type: none"> <li>● I can associate equilibrium with zero acceleration and balanced forces.</li> <li>● I can name and quantify the forces of mechanics</li> <li>● I can identify the forces acting on an object.</li> <li>● I can abstract a free body diagram from a given physical situation.</li> <li>● I can use the free body diagram to generate Newton's second law equations.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p><a href="#">Quiz on Newton's Laws</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(3) Non-Equilibrium	<ul style="list-style-type: none"> <li>● I can identify situations in which the forces are not balanced, and the acceleration of a body is not zero.</li> <li>● I can apply the methods above to analyze non-equilibrium situations.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance	SEP	DCI	CCC	<p>Use mathematical representations of phenomena to describe explanations.</p> <p>If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.</p>		
	Selected Response													
x	Constructed Response													
x	Performance													

		<table border="1"><tr><td></td><td>Observation</td></tr></table>		Observation		ELA/Math Connection:
	Observation					

## UNIT 3: Circular Motion and Torque

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).	SEP	<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	<ul style="list-style-type: none"> <li>Radius</li> <li>Circumference</li> <li>Tangential</li> <li>Radial</li> <li>Inward</li> <li>Centripetal</li> <li>Period</li> <li>Frequency</li> <li>Hertz</li> <li>Critical speed</li> <li>Torque</li> <li>Leverage</li> <li>Lever Arm</li> <li>Axis of rotation</li> <li>Center of mass</li> <li>Uniform</li> </ul>
	DCI	<b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> <li>At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.</li> <li>These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.</li> </ul>	
	CCC	<b>Energy and Matter</b> <ul style="list-style-type: none"> <li>Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.</li> </ul>	

## UNIT 3 Circular Motion and Torque

**Unit Phenomenon:**

Storyline: This unit expands on material previously studied. Students expand their definition of acceleration to include a change in velocity direction (not speed) and investigate the effects of a net force acting perpendicular to the instantaneous direction of motion. Students also expand their understanding of equilibrium to include rotational equilibrium and zero net torque.

**Unit Essential Questions:**

- How do you define and mathematically describe circular motion?
- What is the relationship between centripetal acceleration and circular motion?
- What is the relationship between force and torque?
- What condition is required for rotational equilibrium?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Uniform circular motion	<ul style="list-style-type: none"> <li>● I can understand that circular motion is caused by a net inward force.</li> <li>● I can explain how an object can accelerate even if it is moving with constant speed.</li> <li>● I can use Newton's Second Law and the expression for centripetal acceleration to analyze circular motion.</li> <li>● I can use a model to relate speed, period, and frequency for a body in circular motion.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<a href="#">Circular motion lab</a>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>● These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.</li> </ul>			ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.								
(2) Torque and rotational equilibrium	<ul style="list-style-type: none"> <li>● I can explain how a small force can cause a big torque.</li> <li>● I can determine how to achieve rotational equilibrium.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<a href="#">Torque lab</a> <a href="#">Quiz on circular motion</a>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.</li> </ul>			ELA/Math Connection:								

## UNIT 4: Energy

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS3-1 Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>● Create a computational model or simulation of a phenomenon, designed device, process, or system.</li> </ul>	<ul style="list-style-type: none"> <li>● Work</li> <li>● Joule</li> <li>● Power</li> <li>● Watt</li> <li>● Horse Power</li> <li>● Energy</li> <li>● Kinetic Energy</li> <li>● Gravitational Potential Energy</li> <li>● Law of Conservation of Energy</li> <li>● Mechanical energy</li> </ul>
	DCI	<b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>● Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> </ul> <b>PS3.B: Conservation of Energy and Energy Transfer</b> <ul style="list-style-type: none"> <li>● Conservation of energy means that the total change of energy in any system is always equal to the total energy transferred into or out of the system.</li> <li>● Energy cannot be created or destroyed, but it can be transported from one place to another and transferred between systems.</li> <li>● Mathematical expressions, which quantify how the stored energy in a system depends on its configuration (e.g. relative positions of charged particles, compression of a spring) and how kinetic energy depends on mass and speed, allow the concept of conservation of energy to be used to predict and describe system behavior.</li> <li>● The availability of energy limits what can occur in any system.</li> </ul>	
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>● Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.</li> </ul>	
HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).	SEP	<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>● Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	
	DCI	<b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>● Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> <li>● At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.</li> <li>● These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative</li> </ul>	

		<p>position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.</p>	
	CCC	<p><b>Energy and Matter</b></p> <ul style="list-style-type: none"><li>• Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.</li></ul>	

## UNIT 4 Energy

Unit narrative: Newton's Laws are not the only means of analyzing motion. Students are introduced to the concept of the Conservation law. The bridge between Newton's Laws and energy is the concept of work. The Newton's Laws approach is compared to the new conservation of energy approach.

Unit Essential Questions:

- What is energy?
- What is work?
- What is the relationship between work and force?
- What is the relationship between net work and the change in kinetic energy of a body?
- What is power?
- What does it mean to conserve energy?
- How can you determine if energy has been conserved in a system?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Work	<ul style="list-style-type: none"> <li>● I can model how work is done when a force acts through a displacement.</li> <li>● I can recognize and explain the work done by a force is a scalar, whose value can be (+), (-), or zero.</li> <li>● I can calculate the net work done on an object.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Work Model
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Create a computational model or simulation of a phenomenon, designed device, process, or system.</li> <li>● Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>								
(2) Energy	<ul style="list-style-type: none"> <li>● I can calculate the net work changes on the energy of a body.</li> <li>● I can calculate the kinetic energy of an object.</li> <li>● I can calculate gravitational potential energy.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Energy calculations
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Create a computational model or simulation of a phenomenon, designed device, process, or system.</li> <li>● These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>								

<p>(3) Power</p>	<ul style="list-style-type: none"> <li>I can associate power with the rate at which work is done.</li> <li>I can calculate power.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	<p>SEP</p>	<p>DCI</p>	<p>CCC</p>	<p>Power calculations</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>
	Selected Response													
x	Constructed Response													
	Performance													
	Observation													
<p>(4) Conservation of mechanical energy</p>	<ul style="list-style-type: none"> <li>I can identify situations in which total mechanical energy is conserved.</li> <li>I can use the conservation of mechanical energy to analyze problems.</li> <li>I can model/represent the ideas that the conservation laws depend only on initial and final conditions and are independent of the details of the in-between processes.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<p>SEP</p>	<p>DCI</p>	<p>CCC</p>	<p><a href="#">Conservation of energy lab</a> <a href="#">Razor blade lab</a> <a href="#">Energy quiz</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													

## UNIT 5: Momentum

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-2 Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	<ul style="list-style-type: none"> <li>Momentum</li> <li>Collision</li> <li>Impulse</li> <li>Inelastic collision</li> <li>Elastic collision</li> <li>Velocity</li> <li>Vector</li> <li>Law of Conservation of Momentum</li> <li>Perfectly inelastic collision</li> <li>Total momentum</li> <li>Action force</li> <li>Reaction force</li> </ul>
	DCI	<b>PS2.A: Forces and Motion</b> <ul style="list-style-type: none"> <li>Momentum is defined for a particular frame of reference; it is the mass times the velocity of the object.</li> <li>If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.</li> </ul>	
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>When investigating or describing a system, the boundaries and initial conditions of the system need to be defined.</li> </ul>	
HS-PS2-3 Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.*	SEP	<b>Constructing Explanations and Designing Solutions</b> <ul style="list-style-type: none"> <li>Apply scientific ideas to solve a design problem, taking into account possible unanticipated effects.</li> </ul>	
	DCI	<b>PS2.A: Forces and Motion</b> <ul style="list-style-type: none"> <li>If a system interacts with objects outside itself, the total momentum of the system can change; however, any such change is balanced by changes in the momentum of objects outside the system.</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Systems can be designed to cause a desired effect.</li> </ul>	

## UNIT 5 Momentum

Unit Narrative: Some situations, such as collisions, involve interactions, the details of which are very complicated, making Newton’s Laws analysis intractable. In addition, mechanical energy is not conserved during most collisions. A new conservation law is introduced to handle collisions.

Unit Essential Questions:

- What is momentum?
- How does the law of conservation of momentum help us analyze collisions?
- What is the difference between energy and momentum?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Impulse/Momentum	<ul style="list-style-type: none"> <li>● I can calculate the momentum of an object of mass <math>m</math> moving with velocity <math>v</math> as <math>mv</math>.</li> <li>● I can identify the momentum of a body as a vector.</li> <li>● I can explain the relationship between impulse and the change in momentum.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p><a href="#">Quiz on collisions</a></p> <p>ELA/Math Connection:            CCSS.MATH.CONTENT.HSN.VM.A.1            (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., <math>v</math>, <math> v </math>, <math>  v  </math>, <math>v</math>).            CCSS.MATH.CONTENT.HSN.VM.A.2            (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.            CCSS.MATH.CONTENT.HSN.VM.A.3            (+) Solve problems involving velocity and other quantities that can be represented by vectors.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) Conservation of Momentum/Collisions	<ul style="list-style-type: none"> <li>● I can apply the conservation of momentum to solve collision problems.</li> <li>● I can differentiate between energy and momentum, and calculate the loss of kinetic energy in an inelastic collision.</li> <li>● I can make a claim about what happens to the lost kinetic energy.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Collision problems</p> <p>ELA/Math Connection:            CCSS.MATH.CONTENT.HSN.VM.A.1            (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., <math>v</math>,</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													

			problem, taking into account possible unanticipated effects.	$ v $ , $\ v\ $ , $v$ ). CCSS.MATH.CONTENT.HSN.VM.A.2 (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. CCSS.MATH.CONTENT.HSN.VM.A.3 (+) Solve problems involving velocity and other quantities that can be represented by vectors.
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## UNIT 6: Simple Harmonic Motion

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
<p><b>College Board Enduring Understandings</b></p> <p>3. B Classically the acceleration of an object interacting with other objects can be predicted.</p> <p>5.B The energy of a system is conserved</p>	<p><b>CB</b></p>	<p><b>Learning Objectives</b></p> <ul style="list-style-type: none"> <li>● 3.B.3.1: Predict which properties determine the motion of a simple harmonic oscillator and what the dependence of the motion is on those properties.</li> <li>● 3.B.3.2: Design a plan and collect data in order to ascertain the characteristics of the motion of a system undergoing oscillatory motion caused by a restoring force.</li> <li>● 3.B.3.3: Analyze data to identify qualitative and quantitative relationships between given values and variables (i.e., force, displacement, acceleration, velocity, period of motion, frequency, spring constant, string length, mass) associated with objects in oscillatory motion and use those data to determine the value of an unknown.</li> <li>● 3.B.3.4: Construct a qualitative and/or quantitative explanation of oscillatory behavior given evidence of a restoring force.</li> </ul>	<ul style="list-style-type: none"> <li>● Elongation</li> <li>● Displacement from Equilibrium</li> <li>● Hooke's Law</li> <li>● Spring Constant</li> <li>● Restoring Force</li> <li>● Simple Harmonic Motion</li> <li>● Amplitude</li> <li>● Cycle</li> <li>● Oscillation</li> <li>● Elastic Potential Energy</li> <li>● Simple Pendulum</li> </ul>

## UNIT 6 Simple Harmonic Motion

Unit Phenomenon:

Storyline: Having finished our basic survey of fundamental mechanics principles, our attention turns to the application of those principles.

Unit Essential Questions:

- What new terms describe harmonic motion?
- What is a simple harmonic oscillator?
- What is the link between simple harmonic motion and waves?
- How do springs store energy?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Springs	<ul style="list-style-type: none"> <li>● I can graph the elongation of a spring to the applied force.</li> <li>● I can experimentally determine a spring's spring constant from the graph.</li> <li>● I can determine a spring's elastic limit from a graph.</li> </ul>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px;"></td> <td>Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Spring constant calculations
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● 3.B.3.1: Predict which properties determine the motion of a simple harmonic oscillator and what the dependence of the motion is on those properties.</li> </ul>			ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.								
(2) Simple Harmonic Motion	<ul style="list-style-type: none"> <li>● I can define and calculate the period of a mass on a spring.</li> <li>● I can apply the relationship between period and frequency.</li> <li>● I can experimentally determine that period is independent of amplitude.</li> </ul>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px;"></td> <td>Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Simple oscillation lab
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● 3.B.3.1: Predict which properties determine the motion of a simple harmonic oscillator and what the dependence of the motion is on those properties.</li> <li>● 3.B.3.2: Design a plan and collect data in order to ascertain the characteristics of the motion of a system undergoing oscillatory motion caused by a restoring force.</li> </ul>			ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.								
(3) Spring potential energy	<ul style="list-style-type: none"> <li>● I can appreciate that objects store energy due to their deformation.</li> <li>● I can calculate the energy stored in a deformed spring.</li> <li>● I can solve problems involving the transfer of spring energy into other forms.</li> </ul>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px;"></td> <td>Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Performance</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance	SEP	DCI	CCC	<a href="#">Elastic potential energy lab</a>		
				Selected Response										
x	Constructed Response													
x	Performance													
			<ul style="list-style-type: none"> <li>● 3.B.3.2: Design a plan and collect data in order to ascertain the characteristics of the motion of a system undergoing oscillatory motion caused by a restoring force.</li> <li>● 3.B.3.4: Construct a qualitative and/or quantitative explanation of oscillatory behavior given evidence of a restoring force.</li> </ul>			ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3								

		<table border="1"> <tr> <td></td> <td>Observation</td> </tr> </table>		Observation		Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.									
	Observation														
(4) Pendulums	<ul style="list-style-type: none"> <li>I can experimentally determine what factors affect the period of a pendulum.</li> <li>I can calculate the period of a pendulum of a given length.</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td></td> <td>Constructed Response</td> </tr> <tr> <td></td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response		Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>3.B.3.2: Design a plan and collect data in order to ascertain the characteristics of the motion of a system undergoing oscillatory motion caused by a restoring force.</li> <li>3.B.3.3: Analyze data to identify qualitative and quantitative relationships between given values and variables (i.e., force, displacement, acceleration, velocity, period of motion, frequency, spring constant, string length, mass) associated with objects in oscillatory motion and use those data to determine the value of an unknown.</li> </ul>	SEP	DCI	CCC	<a href="#">Pendulum lab</a> <a href="#">Simple harmonic motion quiz</a>  ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
	Selected Response														
	Constructed Response														
	Performance														
	Observation														
SEP	DCI	CCC													

## UNIT 7: Gravitation

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-1 Analyze data to support the claim that Newton’s second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	SEP	<b>Analyzing and Interpreting Data</b> <ul style="list-style-type: none"> <li>Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or determine an optimal design solution.</li> </ul>	<ul style="list-style-type: none"> <li>Gravity</li> <li>Inverse Square</li> <li>Action at a Distance</li> <li>Field</li> <li>Gravitational Field Strength</li> <li>Kepler’s Laws</li> <li>Elliptical</li> <li>Focus</li> <li>Orbital Motion</li> <li>Synchronous Orbit</li> <li>Satellite</li> </ul>
	DCI	<b>PS2.A: Forces and Motion</b> <ul style="list-style-type: none"> <li>Newton’s second law accurately predicts changes in the motion of macroscopic objects.</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>	
HS-PS2-4 Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between objects.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul>	
	CCC	<b>Patterns</b> <ul style="list-style-type: none"> <li>Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li> </ul>	
HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.	SEP	<b>Using Mathematical and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical or computational representations of phenomena to describe explanations.</li> </ul>	
	DCI	<b>ESS1.B: Earth and the Solar System</b> <ul style="list-style-type: none"> <li>Kepler’s laws describe common features of the motions of orbiting objects, including their elliptical paths around the sun. Orbits may change due to the gravitational effects from, or collisions with, other objects in the solar system.</li> </ul>	
	CCC	<b>Scale, Proportion, and Quantity</b> <ul style="list-style-type: none"> <li>Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).</li> </ul>	

## UNIT 7 Gravitation

Unit Narrative: All forces are different manifestations of a small number of fundamental forces. The same force that holds us to the Earth also holds the moon in its orbit.

Unit Essential Questions:

- How does a change in mass or distance impact gravitational force?
- What is a field theory and why is it important to the study of physics?
- What is a gravitational field? How is a gravitational field calculated?
- What are Kepler's laws?
- What is the relationship between a body in orbit and the gravitational force?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Gravitation	<ul style="list-style-type: none"> <li>● I can understand and explain the relationship between gravity and mass.</li> <li>● I can calculate the force between two given masses separated by a given distance using Newton's Universal Law of gravity.</li> <li>● I can use the inverse square law to predict how force changes with separation.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Newton's Universal Law of Gravitation calculations/practice</p>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Use mathematical or computational representations of phenomena to describe explanations.</li> <li>● Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields</li> <li>● Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.WHST.11-12.1.B Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.</p>								
(2) Gravitation Fields	<ul style="list-style-type: none"> <li>● I can use the value of a field theory to explain forces acting at a distance.</li> <li>● I can calculate the gravitational field strength/acceleration of gravity at a given distance from a given body.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Gravitational field calculations Acceleration of gravity calculations</p>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Use mathematical or computational representations of phenomena to describe explanations.</li> <li>● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> <li>● Algebraic thinking is used to examine scientific data and predict the effect of a change in one variable on another (e.g., linear growth vs. exponential growth).</li> </ul>			<p>ELA/Math Connection: CCSS.MATH.CONTENT.HSA.REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.</p>								

<p>(3) Kepler's Laws</p>	<ul style="list-style-type: none"> <li>I can state Kepler's Laws.</li> <li>I can use Kepler's laws to describe a body in orbit.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<p><b>SEP</b></p>	<p><b>DCI</b></p>	<p><b>CCC</b></p>	<p>Kepler's laws calculations Body in Orbit Model-Kepler's Laws</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
<p>(4) Orbital Motion</p>	<ul style="list-style-type: none"> <li>I can explain how orbital motion is achieved.</li> <li>I can identify gravity as the centripetal force acting on an orbiting body.</li> <li>I can determine the speed and period of a body in orbital motion.</li> <li>I can explain the advantages of a satellite in a synchronous orbit.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<p><b>SEP</b></p>	<p><b>DCI</b></p>	<p><b>CCC</b></p>	<p>Body in Orbit Model (continued) <a href="#">Quiz on gravitation</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													

## UNIT 8: Heat

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*	SEP	<b>Obtaining, Evaluating, and Communicating Information</b> <ul style="list-style-type: none"> <li>Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>	<ul style="list-style-type: none"> <li>Temperature</li> <li>Specific Heat</li> <li>Heat</li> <li>Calorimetry</li> <li>Transfer</li> <li>Linear Expansion</li> </ul>
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.</li> </ul>	
	CCC	<b>Structure and Function</b> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul>	
HS-PS3-2 Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motion of particles (objects) and energy associated with the relative positions of particles (objects).	SEP	<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	
	DCI	<b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system's total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> <li>At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.</li> <li>These relationships are better understood at the microscopic scale, at which all of the different manifestations of energy can be modeled as a combination of energy associated with the motion of particles and energy associated with the configuration (relative position of the particles). In some cases the relative position energy can be thought of as stored in fields (which mediate interactions between particles). This last concept includes radiation, a phenomenon in which energy stored in fields moves across space.</li> </ul>	
	CCC	<b>Energy and Matter</b> <ul style="list-style-type: none"> <li>Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.</li> </ul>	

## UNIT 8 Heat

Unit narrative: The concept of energy is expanded to include heat.

Unit Essential Questions:

- What is heat?
- How is heat exchanged?
- How does heat exchange relate to the Law of Conservation of Energy?
- How can heat exchange be used to identify unknown substances?
- What is the relationship between mechanical energy and heat energy?
- How are the dimensions of substances impacted by a change in temperature?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Heat	<ul style="list-style-type: none"> <li>● I can identify heat as a form of energy.</li> <li>● I can explain the relationship between the heat of a substance and the kinetic energy of the energy possessed by the particles of the substance.</li> <li>● I can explain how heat is exchanged from one object to another.</li> <li>● I can associate specific heat as an energy “tank”.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Specific heat calculations
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.</li> <li>● Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system’s total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.</p>								
(2) Calorimetry	<ul style="list-style-type: none"> <li>● I can investigate and explain heat exchange through the lens of energy conservation.</li> <li>● I can use data to identify a substance by the amount of heat it has exchanged.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Calorimetry calculations <a href="#">Calorimetry lab</a>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Energy is a quantitative property of a system that depends on the motion and interactions of matter and radiation within that system. That there is a single quantity called energy is due to the fact that a system’s total energy is conserved, even as, within the system, energy is continually transferred from one object to another and between its various possible forms.</li> <li>● At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.</li> <li>● Energy cannot be created or destroyed—only moves between one place and another place, between objects and/or fields, or between systems.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>								
(3) Mechanical Equivalent of	<ul style="list-style-type: none"> <li>● I can explain the relationship between mechanical and heat energy.</li> </ul>		SEP	DCI	CCC	<a href="#">The mechanical equivalent of heat lab</a>								

Heat	<ul style="list-style-type: none"> <li>I can solve problems involving the conversion of energy to different forms</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<ul style="list-style-type: none"> <li>At the macroscopic scale, energy manifests itself in multiple ways, such as in motion, sound, light, and thermal energy.</li> <li>Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p>			
	Selected Response																
x	Constructed Response																
x	Performance																
	Observation																
(4) Thermal Expansion	<ul style="list-style-type: none"> <li>I can explain why matter changes physical dimension due to a change in temperature.</li> <li>I can quantify the change in physical dimension.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr><td>SEP</td></tr> </table>	SEP	<table border="1"> <tr><td>DCI</td></tr> </table>	DCI	<table border="1"> <tr><td>CCC</td></tr> </table>	CCC	<p>Thermal activity-Change in dimension</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
	Selected Response																
x	Constructed Response																
x	Performance																
	Observation																
SEP																	
DCI																	
CCC																	

## UNIT 9: Electrostatics

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*	SEP	<b>Obtaining, Evaluating, and Communicating Information</b> <ul style="list-style-type: none"> <li>Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>	<ul style="list-style-type: none"> <li>Electrostatics</li> <li>Charge</li> <li>Conductor</li> <li>Insulator</li> <li>Charging by Contact</li> <li>Induced</li> <li>Ground</li> <li>Charging by Induction</li> <li>Polarization</li> <li>Elementary Charge</li> <li>Coulomb</li> <li>Coulomb's Law</li> <li>Electric Field Strength</li> <li>Lines of force</li> <li>Test Charge</li> <li>Point Charge</li> <li>Electric Potential</li> <li>Electric Potential difference</li> <li>Voltage</li> <li>Electric Potential Energy</li> </ul>
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.</li> </ul>	
	CCC	<b>Structure and Function</b> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul>	
HS-PS2-4 Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul>	
	CCC	<b>Patterns</b> <ul style="list-style-type: none"> <li>Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li> </ul>	
HS-PS1-3 Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	SEP	<b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	
	DCI	<b>PS1.A: Structure and Properties of Matter</b> <ul style="list-style-type: none"> <li>PS1.A: Structure and Properties of Matter</li> <li>The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.</li> </ul> <b>PS2.B: Types of Interactions</b>	

		<ul style="list-style-type: none"><li>• Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects. (secondary)</li></ul>	
	CCC	<b>Patterns</b> <ul style="list-style-type: none"><li>• Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li></ul>	

## UNIT 9 Electrostatics

Unit Narrative: The production and distribution of electricity is indispensable for modern life. Here we begin our study of electricity beginning with the charges of matter and their static effects.

Unit Essential Questions:

- What is the charged nature of particles?
- How do charged particles behave in proximity with one another?
- What is Coulomb's law?
- What is the relationship between an electric field and the force acting on a charged body?
- What is voltage?
- How are gravitational and electric potential similar? Different?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Electrical properties of matter	<ul style="list-style-type: none"> <li>● I can identify two distinct forms of charge, and their sources.</li> <li>● I can contrast conductors and insulators.</li> <li>● I can explain charge transfer.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<a href="#">Quiz on electrostatics</a>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● The structure and interactions of matter at the bulk scale are determined by electrical forces within and between atoms.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.2 Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.</p>								
(2) Coulomb's Law	<ul style="list-style-type: none"> <li>● I can construct a model to describe that pairs of charges exert repulsive or attractive forces on each other.</li> <li>● I can calculate the force between two given charges separated by a given distance using Coulomb's Law.</li> <li>● I can use the inverse square law to predict how force changes with separation.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	Model-Attractive and Repulsive forces
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Use mathematical representations of phenomena to describe explanations.</li> <li>● Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.</li> <li>● Newton's law of universal gravitation and Coulomb's law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> <li>●</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>								

<p>(3) Electric fields</p>	<ul style="list-style-type: none"> <li>I can associate a field with an action-at-a-distance force.</li> <li>I can explain that an electric field can exert a force on a charge.</li> <li>I can calculate the force on a charge in an E-field</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<p>SEP</p>	<p>DCI</p>	<p>CCC</p>	<p>CER-Electric field and force</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
<p>(4) Electric Potential</p>	<ul style="list-style-type: none"> <li>I can relate the gravitational potential energy to electric potential energy.</li> <li>I can associate voltage with the presence of an electric field.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<p>SEP</p>	<p>DCI</p>	<p>CCC</p>	<p>CER-Gravitational potential vs. Electric potential</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													

## UNIT 10: Electric Circuits

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	SEP	<b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<ul style="list-style-type: none"> <li>Circuit</li> <li>Schematic symbol</li> <li>Resistor</li> <li>Current</li> <li>Resistance</li> <li>Amp</li> <li>Ohm</li> <li>Series</li> <li>Parallel</li> </ul>
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. (HS-PS2-4)</li> <li>Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul> <b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>“Electrical energy” may mean energy stored in a battery or energy transmitted by electric currents. (secondary)</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>	

## UNIT 10 Electric Circuits

Unit Narrative: Charges are now allowed to move through wires and have practical applications.

Unit Essential Questions:

- What is an electric current?
- How are electric currents measured?
- What is the relationship between current, resistance and voltage?
- What are the different types of circuits? How do they compare?
- How do you map and construct a circuit?
- How do resistors convert energy?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Simple Circuits	<ul style="list-style-type: none"> <li>● I can define electric current</li> <li>● I can define resistance</li> <li>● I can model an electric circuit using schematic symbols.</li> <li>● I can experimentally relate current, resistance, and voltage.</li> <li>● I can calculate the rate at which a resistance transfers energy.</li> </ul>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px;"></td> <td>Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p><a href="#">The electrical equivalent of heat Model-Electric Circuit</a></p>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. (HS-PS2-4)</li> <li>● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> <li>● “Electrical energy” may mean energy stored in a battery or energy transmitted by electric currents. (secondary)</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>								
(2) Complex circuits	<ul style="list-style-type: none"> <li>● I can solve series circuits</li> <li>● I can solve parallel circuits</li> <li>● I can differentiate between series and parallel arrangements</li> <li>● I can experimentally construct series and parallel circuits, and perform measurements of current and voltage.</li> </ul>	<table border="1" style="width: 100%;"> <tr> <td style="width: 20px;"></td> <td>Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Laboratory-Circuit building</p>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. (HS-PS2-4)</li> <li>● Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> <li>● “Electrical energy” may mean energy stored in a battery or energy transmitted by electric currents. (secondary)</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>								

## UNIT 11: Magnetism

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS2-4 Use mathematical representations of Newton’s Law of Gravitation and Coulomb’s Law to describe and predict the gravitational and electrostatic forces between objects.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena to describe explanations.</li> </ul>	<ul style="list-style-type: none"> <li>Pole</li> <li>Dipole</li> <li>Monopole</li> <li>Electromagnetic induction</li> <li>Flux</li> </ul>
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects.</li> <li>Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul>	
	CCC	<b>Patterns</b> <ul style="list-style-type: none"> <li>Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.</li> </ul>	
HS-PS2-5 Plan and conduct an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current.	SEP	<b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	
	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"> <li>Newton’s law of universal gravitation and Coulomb’s law provide the mathematical models to describe and predict the effects of gravitational and electrostatic forces between distant objects. (HS-PS2-4)</li> <li>Forces at a distance are explained by fields (gravitational, electric, and magnetic) permeating space that can transfer energy through space. Magnets or electric currents cause magnetic fields; electric charges or changing magnetic fields cause electric fields.</li> </ul> <b>PS3.A: Definitions of Energy</b> <ul style="list-style-type: none"> <li>“Electrical energy” may mean energy stored in a battery or energy transmitted by electric currents. (secondary)</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>	
HS-PS2-6 Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*	SEP	<b>Obtaining, Evaluating, and Communicating Information</b> <ul style="list-style-type: none"> <li>Communicate scientific and technical information (e.g. about the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>	

	DCI	<b>PS2.B: Types of Interactions</b> <ul style="list-style-type: none"><li>• Attraction and repulsion between electric charges at the atomic scale explain the structure, properties, and transformations of matter, as well as the contact forces between material objects.</li></ul>	
	CCC	<b>Structure and Function</b> <ul style="list-style-type: none"><li>• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li></ul>	

## UNIT 11 Magnetism

Unit Narrative: Flowing charges create magnetic fields. Magnetic fields exert forces on moving charges.

Unit Essential Questions:

- What are the properties of magnets?
- What are the similarities and differences between magnetic forces and electric forces?
- How do magnetic fields impact a current-carrying wire?
- What is a magnetic flux?
- How can a magnetic flux create induced current?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Magnetic fields	<ul style="list-style-type: none"> <li>● I can identify that magnets have poles, and magnets exert attractive and repulsive forces on other magnets.</li> <li>● I can model the similarities and differences between magnetic and electric forces.</li> <li>● I can identify the magnetic force as an action-at-a-distance force, so there is a magnetic field.</li> <li>● I can model the 3-d nature of magnetism.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Model-Electric vs magnetic forces Model-3D nature of magnetism</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) Forces due to magnetic fields	<ul style="list-style-type: none"> <li>● I can calculate the force on a moving charge in a magnetic field, magnitude and direction.</li> <li>● I can calculate the force on a current-carrying wire in a magnetic field, magnitude and direction.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<p>Calculations-Magnetic fields</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(3) Electromagnetic Induction	<ul style="list-style-type: none"> <li>● I can model a magnetic flux with a flow of magnetic lines of force through an area.</li> <li>● I can calculate the induced voltage due to a change in magnetic flux.</li> <li>● I can determine the direction of the induced current.</li> <li>● I can calculate the motional voltage on a</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> </table>		Selected Response	x	Constructed Response	SEP	DCI	CCC	<p>CER-induced current flow</p> <ul style="list-style-type: none"> <li>● “Electrical energy” may mean energy stored in a battery or energy transmitted by electric currents. (secondary)</li> <li>● Attraction and repulsion between electric charges at the atomic scale explain the</li> </ul>				
	Selected Response													
x	Constructed Response													

	<p>wire moving in a magnetic field.</p>	<table border="1"> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>	x	Performance		Observation	<p>structure, properties, and transformations of matter, as well as the contact forces between material objects.</p>	<p>ELA/Math Connection:          CCSS.ELA-LITERACY.RST.11-12.9          Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
x	Performance							
	Observation							

## UNIT 12: Waves

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS4-1 Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	SEP	<b>Using Mathematics and Computational Thinking</b> <ul style="list-style-type: none"> <li>Use mathematical representations of phenomena or design solutions to describe and/or support claims and/or explanations.</li> </ul>	<ul style="list-style-type: none"> <li>Pulse</li> <li>Periodic wave</li> <li>Medium</li> <li>Crest</li> <li>Trough</li> <li>Equilibrium line</li> <li>Wavelength</li> <li>Interference</li> <li>Superposition</li> <li>Interface</li> <li>Incident ray</li> <li>Reflected ray</li> <li>Refracted ray</li> <li>Normal line</li> <li>Angle of incidence</li> <li>Angle of reflection</li> <li>Angle of refraction</li> <li>Index of refraction</li> <li>Total internal reflection</li> <li>Critical angle</li> <li>Reflection</li> <li>Refraction</li> <li>Dispersion</li> <li>Convex</li> <li>Concave</li> <li>Converging</li> <li>Diverging</li> <li>Real focus</li> <li>Virtual focus</li> <li>Focal length</li> <li>Radius of curvature</li> <li>Real image</li> <li>Virtual image</li> <li>Magnification</li> <li>Aberration</li> <li>Diffraction</li> </ul>
	DCI	<b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is pass</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>	
HS-PS4-3 Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other.	SEP	<b>Engaging in Argument from Evidence</b> <ul style="list-style-type: none"> <li>Evaluate the claims, evidence, and reasoning behind currently accepted explanations or solutions to determine the merits of arguments.</li> </ul>	
	DCI	<b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>[From the 3–5 grade band endpoints] Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.)</li> </ul> <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features.</li> </ul>	
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.</li> </ul>	

## UNIT 12 Waves

Unit Narrative: Waves transfer energy without transfer of matter.

Unit Essential Questions:

- What are the parts and properties of periodic waves?
- What are the different types of waves?
- What is wave interference?
- What is the difference between reflection and refraction?
- How are refracted light rays predictable?
- What is the nature of light?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) Wave motion	<ul style="list-style-type: none"> <li>● I can model a wave with a disturbance in a medium.</li> <li>● I can name parts and properties of periodic waves.</li> <li>● I can explain the relationship between wavelength, frequency and the speed of a wave.</li> <li>● I can explain the relationship between the period and frequency of a wave</li> <li>● I can identify a transverse and longitudinal wave and state examples of each.</li> <li>● I can model and explain wave interference by superposition.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI		Model-Wave and Wave disturbance
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is pass</li> <li>● [From the 3–5 grade band endpoints] Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.)</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>								
(2) Sound	<ul style="list-style-type: none"> <li>● I can explain how wave frequency impacts pitch or tone</li> <li>● I can explain the relationship between wave amplitude and loudness.</li> <li>● I can experimentally determine the speed of sound</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<a href="#">Speed of sound lab</a>
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● The wavelength and frequency of a wave are related to one another by the speed of travel of the wave, which depends on the type of wave and the medium through which it is pass</li> <li>● Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>								
(3) Light	<ul style="list-style-type: none"> <li>● I can associate light as part of the electromagnetic spectrum</li> <li>● I can draw a ray diagram</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> </table>		Selected Response	SEP	DCI	CCC	Calculations-Speed of Light Activity-Refraction						
	Selected Response													
			<ul style="list-style-type: none"> <li>● [From the 3–5 grade band endpoints] Waves</li> </ul>											

	<ul style="list-style-type: none"> <li>• I can predict of the path of a reflecting ray</li> <li>• I can calculate the speed of light in a given medium</li> <li>• I can use Snell's Law to predict the path of a refracting ray</li> <li>• I can determine whether a ray will reflect or refract at an interface</li> <li>• I can state practical applications of total internal reflection</li> <li>• I can recognize that index of refraction is wavelength independent</li> </ul>	<table border="1"> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>	x	Constructed Response	x	Performance		Observation	<p>can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.)</p> <ul style="list-style-type: none"> <li>• Electromagnetic radiation (e.g., radio, microwaves, light) can be modeled as a wave of changing electric and magnetic fields or as particles called photons. The wave model is useful for explaining many features of electromagnetic radiation, and the particle model explains other features.</li> </ul>	<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.4 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 11-12 texts and topics.</p>					
x	Constructed Response														
x	Performance														
	Observation														
<p>(4) Geometric Optics</p>	<ul style="list-style-type: none"> <li>• I can understand that light can be focused and create images by reflection and refraction</li> <li>• I can use ray tracing to locate images and determine their properties</li> <li>• I can use analytical methods to locate images and determine their properties</li> <li>• I can use experimental methods to locate images and determine their properties</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>• [From the 3–5 grade band endpoints] Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.)</li> </ul>	SEP	DCI	CCC	<p><a href="#">Intro to lenses lab</a> <a href="#">Lens quiz</a></p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<p>(5) Physical Optics</p>	<ul style="list-style-type: none"> <li>• I can define diffraction</li> <li>• I can explain Young's Experiment by means of wave interference</li> <li>• I can model inferences about nature of light from interference experiments</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>• [From the 3–5 grade band endpoints] Waves can add or cancel one another as they cross, depending on their relative phase (i.e., relative position of peaks and troughs of the waves), but they emerge unaffected by each other. (Boundary: The discussion at this grade level is qualitative only; it can be based on the fact that two different sounds can pass a location in different directions without getting mixed up.)</li> </ul>	SEP	DCI	CCC	<p>Model-Nature of Light</p> <p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													

## UNIT 13: The Particle Nature of Light

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary
HS-PS4-4 Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter.	SEP	<b>Obtaining, Evaluating, and Communicating Information</b> <ul style="list-style-type: none"> <li>Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible.</li> </ul>	<ul style="list-style-type: none"> <li>Quantum</li> <li>Photon</li> <li>Work function</li> <li>KE max</li> <li>Photoelectron</li> <li>Intensity</li> <li>Threshold frequency</li> <li>Nucleus</li> <li>Energy level</li> <li>Ionization</li> <li>Absorption</li> <li>Emission</li> <li>Spectral line</li> <li>Bohr Model of the atom</li> </ul>
	DCI	<b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>When light or longer wavelength electromagnetic radiation is absorbed in matter, it is generally converted into thermal energy (heat). Shorter wavelength electromagnetic radiation (ultraviolet, X-rays, gamma rays) can ionize atoms and cause damage to living cells.</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining what is known about smaller scale mechanisms within the system.</li> </ul>	
HS-PS4-5 Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*	SEP	<b>Obtaining, Evaluating, and Communicating Information</b> <ul style="list-style-type: none"> <li>Communicate technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>	
	DCI	<b>PS3.D: Energy in Chemical Processes</b> <ul style="list-style-type: none"> <li>Solar cells are human-made devices that likewise capture the sun's energy and produce electrical energy. (secondary)</li> </ul> <b>PS4.A: Wave Properties</b> <ul style="list-style-type: none"> <li>Information can be digitized (e.g., a picture stored as the values of an array of pixels); in this form, it can be stored reliably in computer memory and sent over long distances as a series of wave pulses.</li> </ul> <b>PS4.B: Electromagnetic Radiation</b> <ul style="list-style-type: none"> <li>Photoelectric materials emit electrons when they absorb light of a high-enough frequency.</li> </ul> <b>PS4.C: Information Technologies and Instrumentation</b> <ul style="list-style-type: none"> <li>Multiple technologies based on the understanding of waves and their interactions with matter are part of everyday experiences in the modern world (e.g., medical imaging, communications, scanners) and in scientific research. They are essential tools for producing, transmitting, and capturing signals and for storing and interpreting the information contained in them.</li> </ul>	
	CCC	<b>Cause and Effect</b> <ul style="list-style-type: none"> <li>Systems can be designed to cause a desired effect.</li> </ul>	

## UNIT 13 The Particle Model of Light

Unit Narrative: A wave model of light can not explain all that light can do.

Unit Essential Questions:

- What are situations in which the wave model of light is insufficient?
- How does the wave particle model of light explain the photoelectric effect?

Learning Sequence	Objective(s): The students will be able to:	Summative Assessment Strategy	Priority NGSS Dimensions			Common Learning Experiences								
(1) The photoelectric effect	<ul style="list-style-type: none"> <li>● I can explain why a wave model of light fails to predict how light interacts with matter.</li> <li>● I can solve problems involving work function, maximum kinetic energy and frequency.</li> <li>● I can analyze the relationships between the above quantities on a graph.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	CER-Wave model of Light
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Photoelectric materials emit electrons when they absorb light of a high-enough frequency.</li> <li>● Communicate technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.</p>								
(2) Atomic models	<ul style="list-style-type: none"> <li>● I can explain the limitations of the Rutherford model of the atom and why it needed to be updated</li> <li>● I can state the assumptions of the Bohr model of the hydrogen atom</li> <li>● I can predict the wavelength of an emitted or absorbed photon during an electron transition</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	CER-Limitations of the Rutherford Model
				Selected Response										
x	Constructed Response													
x	Performance													
	Observation													
			<ul style="list-style-type: none"> <li>● Photoelectric materials emit electrons when they absorb light of a high-enough frequency.</li> <li>● Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible.</li> </ul>			<p>ELA/Math Connection: CCSS.ELA-LITERACY.RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.</p>								



**Bristol Public Schools**  
Office of Teaching & Learning

<b>Department</b>	Science
<b>Department Philosophy</b>	Bristol Public Schools science programming provides students with knowledge of the science and engineering practices, crosscutting concepts, and the core ideas of science and engineering to engage in public discussions on science related issues, to be critical consumers of scientific information related to their everyday lives, and continue to learn science throughout their lives. To ensure this level of scientific literacy, Bristol Public Schools anchor science units in phenomena, this practice promotes student ownership of learning and supports student application of the science content as it pertains to the real world. In each science unit, students work to explain phenomena through the applications of the three dimensions of the Next Generation Science Standards: (1) science and engineering practices, (2) disciplinary core ideas, and (3) cross cutting concepts. Bristol's use of phenom-based units and the three dimensions ensure that students connect with and build a deep conceptual understanding of science concepts. Throughout the kindergarten through grade 12 experience, this philosophy provides all Bristol students with the skills and concepts to be scientifically literate adults.
<b>Course</b>	<a href="#">AP Biology</a>
<b>Course Description for Program of Studies</b>	The AP Biology course provides students with a college-level foundation to support future advanced coursework in biology. Students cultivate their understanding of biology through inquiry-based investigations, as they explore content such as: evolution, energetics, information storage and transfer, and system interactions.. The AP Biology course is designed to be the equivalent of the general biology course usually taken during the first college year. This course requires that 25 percent of instructional time engages students in lab investigations. This includes a minimum of 16 hands-on labs (at least six of which are inquiry-based). It is recommended that students keep a lab notebook throughout.
<b>Grade Level</b>	11,12
<b>Pre-requisites</b>	Academic Biology (90 or better) or Accelerated Biology (85 or better); have taken high school chemistry (Acad >90 or Acl >85) or taking concurrently Accelerated or UConn Chemistry. Permission from Instructor if prerequisites are in question.
<b>Credit (if applicable)</b>	1.0

[College Board AP Biology Course Framework](#)



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<b>Course</b>	ECE Biology
<b>Course Description for Program of Studies</b>	ECE UCONN Biology 1107 is equivalent to the course that is offered on campus during the Fall semester. It is designed for students that have a strong interest in, or desire to pursue a career in the sciences, and will provide a foundation for more advanced college courses in Biology and related sciences. Topics covered include biochemistry, cell biology (energetics, structure, transport, communication, genomics, protein synthesis), and animal form and function. The course will consist of 50% lecture and 50% laboratory. Students must be willing to participate in all laboratory exercises in BIOL 1107, including the dissection of preserved animals. This is a course is designed to 1) present a rigorous, comprehensive College-Level Study of the Biological Sciences; 2) encourage learners to apply biological principles to real-world problems; 3) help students develop college-level critical thinking skills, writing skills, and study habits; and 4) develop a love of Biology and its complexity and a curiosity for the natural world. A course exit exam created by the University of Connecticut Professors will be cumulative for the content from the entire course (year). The student's UConn grade will be determined as follows: 85% BC grade and 15% Exit Exam grade. A final grade of "C" (73) or better is required to receive UConn credit.
<b>Grade Level</b>	11,12
<b>Pre-requisites</b>	Academic Biology (90 or better) or Accelerated Biology (85 or better); have taken high school chemistry (Acad >90 or Acl >85) or taking concurrently Accelerated or UConn Chemistry. Permission from Instructor if prerequisites are in question.
<b>Credit (if applicable)</b>	1.0

## Course Details and Documents

- [University of Connecticut Syllabus](#)
- [Implementation Guide](#)



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<b>Course</b>	Anatomy and Physiology
<b>Course Description for Program of Studies</b>	The anatomy and physiology course is designed for students who plan to enter a health-related career or have an interest in a more extensive exploration of human anatomy. The relationship between structures and their functions is emphasized and examined through the use of models, preserved animals or their organs. Students who wish to earn accelerated credit will have the opportunity to by completing independent extensions to their learning and assessments.
<b>Grade Level</b>	11-12
<b>Pre-requisites</b>	Passed or taken concurrently with Biology
<b>Credit (if applicable)</b>	<a href="#">Challenge by Choice Designation</a> -ACA or ACC by student choice.

[District Learning Expectations and Standards](#)

[NGSS Standards and Dimensions](#)

[UNIT 1-Scientific Literacy and Communication](#)

[UNIT 1-Organization of the Human Body](#)

[UNIT 1-Cellular Metabolism](#)

[UNIT 2: Nervous System](#)

[UNIT 3: Somatic and Special Senses](#)

[UNIT 4: Endocrine System](#)

[UNIT 5: Skeletal System](#)

[UNIT 6: Muscular System](#)

[UNIT 7: Integumentary System](#)

[UNIT 8: Cardiovascular System and Blood](#)

[UNIT 9: Digestion and Nutrition](#)

[UNIT 10: Lymphatic System](#)

[UNIT 11: Respiratory System](#)

[UNIT 12: Urinary System](#)

<b>District Learning Expectations and Standards</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>HS-LS1-2:</b> Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.		X	X	X			X	X				X		
<b>HS-LS1-3:</b> Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.		X				X						X		
<b>HS-LS1-7:</b> Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.			X					X			X		X	
<b>Nature of Science (SEP-related)</b> These understandings about the nature of science are closely associated with the science and engineering practices	X	X	X							X			X	X
<b>SEP-Developing and Using Models</b> A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.			X	X	X					X			X	X
<b>SEP-Planning and Carrying Out Investigations</b> Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.	X													
<b>SEP-Constructing Explanations and Designing Solutions</b> The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.	X	X		X									X	X
<b>SEP-Obtaining, Evaluating and Communicating Information</b> Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences and progresses to evaluating the validity and reliability of the claims, methods, and designs.	X	X			X	X			X	X				
<b>CCC-Systems and System Models</b>		X						X						

A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.														
<b>CCC-Structure and Function</b> The way an object is shaped or structured determines many of its properties and functions.		X	X	X	X	X				X			X	
<b>CCC-Stability and Change</b> For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.			X											

## NGSS Standards and Dimensions

### UNWRAPPED STANDARDS

Standard	Dimensions of the NGSS Standard		Concepts and Disciplinary-Specific Vocabulary	Academic Vocabulary
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	SEP	<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	<ul style="list-style-type: none"> <li>Conceptual, multicellular, nutrient, organic matter, inorganic matter, specialized, structural, tissue, anatomical characteristic, derive, destabilize, enzyme, feedback mechanism, hierarchical, homeostasis, neural, regulate</li> </ul>	<ul style="list-style-type: none"> <li>Model, relationship, organism</li> </ul>
	DCI	<b>LS1.A: Structure and Function</b> <ul style="list-style-type: none"> <li>Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> </ul>		
	CCC	<b>Systems and System Models</b> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.</li> </ul>		
HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	SEP	<b>Planning and Carrying Out Investigations</b> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<ul style="list-style-type: none"> <li>Conceptual, multicellular, nutrient, organic matter, inorganic matter, specialized, structural, tissue, anatomical characteristic, derive, destabilize, enzyme, feedback mechanism, hierarchical, homeostasis, neural, regulate</li> </ul>	<ul style="list-style-type: none"> <li>Investigation, variable independent variable, dependent variable, constant, control, data, reliable, quantitative, qualitative, measurement, hypothesis</li> </ul>
	DCI	<b>LS1.A: Structure and Function</b> <ul style="list-style-type: none"> <li>Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.</li> </ul>		
	CCC	<b>Stability and Change</b> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul>		
HS-LS1-7: Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and	SEP	<b>Developing and Using Models</b> <ul style="list-style-type: none"> <li>Use a model based on evidence to illustrate the</li> </ul>	<ul style="list-style-type: none"> <li>Carbon, chemical process, chemical reaction,</li> </ul>	<ul style="list-style-type: none"> <li>Model, revise, refine, relationships, connections, energy,</li> </ul>

oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.		relationships between systems or between components of a system.	interdependent, molecule, nutrient, protein, amino acid, biological molecule, chemical equation, compound, hydrocarbon, hydrogen,	transfer
	DCI	<b>LS1.C: Organization for Matter and Energy Flow in Organisms</b> <ul style="list-style-type: none"> <li>As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</li> <li>As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.</li> </ul>		
	CCC	<b>Energy and Matter</b> <ul style="list-style-type: none"> <li>Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.</li> </ul>		
<b>Nature of Science (SEP-related)</b> These understandings about the nature of science are closely associated with the science and engineering practices	NoS	<ul style="list-style-type: none"> <li>Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory.</li> </ul>	<ul style="list-style-type: none"> <li>Theory, empirical evidence, evaluate, natural system, patterns, argument, investigation, technology, discourse, precision, accuracy</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
	NoS	<ul style="list-style-type: none"> <li>Science knowledge is based on empirical evidence.</li> <li>Science disciplines share common rules of evidence used to evaluate explanations about natural systems.</li> <li>Science includes the process of coordinating patterns of evidence with current theory.</li> <li>Science arguments are strengthened by multiple lines of evidence supporting a single explanation.</li> </ul>		
	NoS	<ul style="list-style-type: none"> <li>Science investigations use diverse methods and do not always use the same set of procedures to obtain data.</li> <li>New technologies advance scientific knowledge.</li> <li>Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> <li>The discourse practices of science are organized around disciplinary domains that share examples for making decisions regarding the values, instruments, methods, models, and evidence to adopt and use.</li> <li>Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.</li> </ul>		
<b>Science and Engineering Practices: Developing and Using Models</b> A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and	SEP	<ul style="list-style-type: none"> <li>Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.</li> </ul>	<ul style="list-style-type: none"> <li>Model, system, components, mechanistic, analysis, analyze, computational, phenomenon</li> </ul>	<ul style="list-style-type: none"> <li>Revise, illustrate, predict, relationship</li> </ul>

<p>explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.</p>	SEP	<ul style="list-style-type: none"> <li>Use a model to provide mechanistic accounts of phenomena.</li> </ul>		
<p><b>Science and Engineering Practices: Planning and Carrying Out Investigations</b> Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.</p>	SEP	<ul style="list-style-type: none"> <li>Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.</li> </ul>	<ul style="list-style-type: none"> <li>Investigation, design, test, data collection, phenomenon, variables, confounding, evaluate, directional hypothesis, manipulated variable</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
<p><b>Science and Engineering Practices: Constructing Explanations and designing Solutions</b> The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p>	SEP	<ul style="list-style-type: none"> <li>Plan an investigation or test a design individually and collaboratively to produce data to serve as the basis for evidence as part of building and revising models, supporting explanations for phenomena, or testing solutions to problems. Consider possible variables or effects and evaluate the confounding investigation’s design to ensure variables are controlled.</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative, qualitative, relationship, scientific reasoning, evidence, simulation</li> </ul>	<ul style="list-style-type: none"> <li>construct/revise, theory, law</li> </ul>
<p><b>Science and Engineering Practices: Obtaining, Evaluating and Communicating Information</b> Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity. Obtaining, evaluating, and communicating information in 9–12 builds on K–8 experiences</p>	SEP	<ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<ul style="list-style-type: none"> <li>Evidence, integrate, media, format, scientific question,</li> </ul>	<ul style="list-style-type: none"> <li>Model, information, paraphrase, solve, communicate, graphically, mathematically</li> </ul>
<p><b>Science and Engineering Practices: Constructing Explanations and designing Solutions</b> The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p>	SEP	<ul style="list-style-type: none"> <li>Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative, qualitative, relationship, scientific reasoning, evidence, simulation</li> </ul>	<ul style="list-style-type: none"> <li>construct/revise, theory, law</li> </ul>
<p><b>Science and Engineering Practices: Constructing Explanations and designing Solutions</b> The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p>	SEP	<ul style="list-style-type: none"> <li>Apply scientific reasoning, theory, and/or models to link evidence to the claims to assess the extent to which the reasoning and data support the explanation or conclusion.</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative, qualitative, relationship, scientific reasoning, evidence, simulation</li> </ul>	<ul style="list-style-type: none"> <li>construct/revise, theory, law</li> </ul>
<p><b>Science and Engineering Practices: Constructing Explanations and designing Solutions</b> The products of science are explanations and the products of engineering are solutions. Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.</p>	SEP	<ul style="list-style-type: none"> <li>Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul>	<ul style="list-style-type: none"> <li>Quantitative, qualitative, relationship, scientific reasoning, evidence, simulation</li> </ul>	<ul style="list-style-type: none"> <li>construct/revise, theory, law</li> </ul>

and progresses to evaluating the validity and reliability of the claims, methods, and designs.	SEP	<ul style="list-style-type: none"> <li>Compare, integrate and evaluate sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a scientific question or solve a problem.</li> </ul>		
	SEP	<ul style="list-style-type: none"> <li>Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>		
<b>Crosscutting Concepts: Systems and System Models</b> A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.	CCC	<ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.</li> </ul>	<ul style="list-style-type: none"> <li>Physical model, computational model, matter flow, scale, system, investigate, precision, reliability, input, output, conditions</li> </ul>	<ul style="list-style-type: none"> <li>assumption, conditions, approximations, inherent</li> </ul>
	CCC	<ul style="list-style-type: none"> <li>Models can be used to predict the behavior of a system, but these predictions have limited precision and reliability due to the assumptions and approximations inherent in models.</li> </ul>		
	CCC	<ul style="list-style-type: none"> <li>When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs and outputs analyzed and described using models.</li> </ul>		
<b>Crosscutting Concepts: Structure and Function</b> The way an object is shaped or structured determines many of its properties and functions.	CCC	<ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul>	<ul style="list-style-type: none"> <li>Properties, components, conditions, function, natural, designed, molecular substructure,</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
	CCC	<ul style="list-style-type: none"> <li>The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.</li> </ul>		
<b>Crosscutting Concepts: Stability and Change</b> For both designed and natural systems, conditions that affect stability and factors that control rates of change are critical elements to consider and understand.	CCC	<ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul>	<ul style="list-style-type: none"> <li>Feedback mechanism, feedback loop, positive feedback, negative feedback, stable</li> </ul>	<ul style="list-style-type: none"> <li></li> </ul>
	CCC	<ul style="list-style-type: none"> <li>Much of science deals with constructing explanations of how things change and how they remain stable.</li> </ul>		

## UNIT 1-Scientific Literacy and Communication

Unit Essential Questions:

- How is scientific knowledge created and communicated?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
<p>(1) Scientific Inquiry</p>	<ul style="list-style-type: none"> <li>• I can identify questions that can be answered through scientific investigation.</li> <li>• I can design and conduct appropriate types of scientific investigations to answer different questions.</li> <li>• I can formulate a testable hypothesis and demonstrate logical connections between scientific concepts guiding the hypothesis and design of the experiment.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>• Scientific Variable Review POGIL-Part 1</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Experiment, factor, hypothesis, investigation, observation, prediction, test, variable, experimental design</p>		<ul style="list-style-type: none"> <li>• Science investigations use diverse methods and do not always use the same set of procedures to obtain data.</li> <li>• Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> <li>• Scientific investigations use a variety of methods, tools, and techniques to revise and produce new knowledge.</li> <li>• Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>												
<p>(2) Scientific Literacy</p>	<ul style="list-style-type: none"> <li>• I can identify independent and dependent variables, including those that are kept constant and those used as controls.</li> <li>• I can use appropriate tools and techniques to make observations and gather data.</li> <li>• I can read, interpret and examine the credibility and validity of scientific claims in different sources of information.</li> <li>• I can articulate conclusions and explanations based on results of the research, and assess the validity based on the design of the investigation.</li> </ul>	<table border="1"> <tr><td>x</td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>	x	Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>• Scientific Variable Review POGIL-Part 2</li> <li>• Data analysis activity</li> </ul>
	x	Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Independent variable, dependent variable, control group, constant, gather, observe, obtain, study, mitigate, quantify, clarify, convey, present, synthesize, reliable</p>		<ul style="list-style-type: none"> <li>• Make directional hypotheses that specify what happens to a dependent variable when an independent variable is manipulated.</li> <li>• Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> <li>• Make a quantitative and/or qualitative claim regarding the relationship between dependent and independent variables.</li> </ul>												

(3) Scientific Numeracy	<ul style="list-style-type: none"> <li>I can communicate about science in different formats, using relevant science vocabulary, supporting evidence, and clear logic.</li> <li>I can assess the reliability of the data that was generated in the investigation</li> <li>I can use mathematical operations to analyze and interpret data, and present relationships between variables in appropriate forms</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Scientific Variable Review POGIL-Part 3</li> <li>Data analysis activity</li> </ul>
			Selected Response											
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Challenge by Choice Assessment Options</b></p>						<ul style="list-style-type: none"> <li>Unit 1 <a href="#">Base Assessment (ACA-only)</a>;</li> <li>ACC Assessment Add-on: <a href="#">Unit 1 ACCELERATED Extension</a></li> </ul>								

## UNIT 1-Organization of the Human Body

Unit Narrative: Unit one is the foundation that each unit will build on. The focus is on homeostasis and body organization from micro to macro. Students will build upon prior learning of feedback mechanisms in living systems and apply that specifically to the human body maintaining homeostasis.

Unit Essential Questions:

- How is the human body organized?
- How is homeostasis regulated in humans?
- What happens if homeostasis is disrupted?
- How are anatomical terms used to describe relative positions, sections, and regions?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Maintenance of Life	<ul style="list-style-type: none"> <li>● I can explain homeostasis and its importance to survival.</li> <li>● I can describe a homeostatic mechanism.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td style="text-align: center;">Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">Constructed Response</td> </tr> <tr> <td></td> <td style="text-align: center;">Performance</td> </tr> <tr> <td></td> <td style="text-align: center;">Observation</td> </tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Feedback Mechanism Modeling</li> </ul>
			Selected Response											
x	Constructed Response													
	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> anatomy, physiology, atoms, molecules, macromolecule, cell, organelle, tissue, organ, organ system, organism, metabolism, movement, responsiveness, growth, reproduction, digestion, absorption, circulation, assimilation, excretion, homeostasis, homeostatic mechanism, receptors, set point, effectors, negative feedback,</p>	<ul style="list-style-type: none"> <li>● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.</li> </ul>													
(2) Organization of the Human Body	<ul style="list-style-type: none"> <li>● I can explain how body organization provides a beginning for the study of Anatomy and physiology.</li> <li>● I can describe the location of the major body cavities and identify the organs in each.</li> <li>● I can use appropriate terminology to describe body parts.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td style="text-align: center;">Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">Performance</td> </tr> <tr> <td></td> <td style="text-align: center;">Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Body Organization Lab</li> </ul>
			Selected Response											
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> anatomy, physiology, atoms, molecules, macromolecule, cell, organelle, tissue, organ, organ system, organism, axial, appendicular, cranial cavity, vertebral cavity, thoracic cavity, abdominopelvic cavity, viscera, diaphragm, parietal membrane, visceral membrane, pleural membranes, pericardium membranes, peritoneal membranes, heart, lungs, brain, spinal cord, stomach, liver, spleen,</p>	<ul style="list-style-type: none"> <li>● Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>● Science disciplines share common rules of evidence used to evaluate explanations about natural systems.</li> <li>● Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> <li>● When investigating or describing a system, the boundaries and initial conditions of the system need to be defined and their inputs</li> </ul>													

	gallbladder, intestines, ovaries/ testes, uterus, bladder, kidneys		and outputs analyzed and described using models.											
(3) Anatomical Terminology	<ul style="list-style-type: none"> <li>I can utilize the terms that describe relative positions, body secretions and regions.</li> <li>I can use appropriate terminology to describe body part location.</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Body Organization Lab</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Anatomical position, superior, inferior, anterior, posterior, medial, lateral, proximal, distal, superficial, deep, sagittal, transverse, coronal, body regions</p>	<ul style="list-style-type: none"> <li>Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> <li>The discourse practices of science are organized around disciplinary domains that share examples for making decisions regarding the values, instruments, methods, models, and evidence to adopt and use.</li> </ul>	<b>Challenge by Choice Assessment Options</b>			<ul style="list-style-type: none"> <li>Unit <a href="#">Base Assessment (ACA-only)</a>:</li> <li>ACC Assessment Add-on: <a href="#">Unit 1 ACCELERATED Extension</a></li> </ul>									

## UNIT 1-Cellular Metabolism

Unit Narrative: Unit one is the foundation that each unit will build on. The focus is on homeostasis and body organization from micro to macro. Students will build upon prior learning of feedback mechanisms in living systems and apply that specifically to the human body maintaining homeostasis.

Unit Essential Questions:

- Why are organic and inorganic compounds important in cells?
- How do cells, tissues, and organs interact to form organ systems?
- How do substances get into and out of cells?
- How are organic compounds used by cells?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Chemical Constituents of Cells	<ul style="list-style-type: none"> <li>● I can describe the functions of various types of organic and inorganic chemicals in cells.</li> <li>● I can model and describe the three types of chemical reactions.</li> </ul> <p><b>Academic Vocabulary:</b> Macromolecules, carbohydrates, lipids, proteins, nucleic acids, receptors, antibodies, amino acids, enzymes, catalyst, organic, inorganic, synthesis reaction, decomposition reaction, exchange reaction</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Model-Chemical Reactions in the Body</li> </ul>
	Selected Response													
x	Constructed Response													
	Performance													
	Observation													
(2) Cell Structure	<ul style="list-style-type: none"> <li>● I can explain how the structure of the cell is related to its function.</li> <li>● I can explain how cells connect and interact forming tissues, organs and organ systems.</li> </ul> <p><b>Academic Vocabulary:</b> Cell membrane, nucleus, cytoplasm, organelles, selectively permeable, diffusion, equilibrium, facilitated diffusion, osmosis, isotonic, hypertonic, hypotonic</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● CER-Cell Structure and Function</li> </ul>
	Selected Response													
x	Constructed Response													
	Performance													
	Observation													
(3)	<ul style="list-style-type: none"> <li>● I can model how substances move through</li> </ul>		SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Model-Movement through Cell</li> </ul>								

Movements through cell membranes	cell membranes. • I can describe the utilization and movement of carbohydrates, lipids and proteins in a cell.	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<ul style="list-style-type: none"> <li>Models, mechanisms, and explanations collectively serve as tools in the development of a scientific theory.</li> <li>Develop and/or use a model (including mathematical and computational) to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.</li> </ul>	Membranes
		Selected Response										
x	Constructed Response											
x	Performance											
	Observation											
<b>Academic Vocabulary:</b> Cell membrane, cytoplasm, selectively permeable, diffusion, equilibrium, facilitated diffusion, osmosis, isotonic, hypertonic, hypotonic, active transport, exocytosis, endocytosis, phagocytosis, pinocytosis												
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>Unit 1 <a href="#">Base Assessment (ACA-only)</a>;</li> <li>ACC Assessment Add-on: <a href="#">Unit 1 ACCELERATED Extension</a></li> </ul>								

## UNIT 2: Nervous System

Unit Narrative: The nervous system is the major controlling, regulatory, and communicating system in the body. It is the center of all mental activity including thought, learning, and memory. Together with the endocrine system, the nervous system is responsible for regulating and maintaining homeostasis. Through its receptors, the nervous system keeps us in touch with our environment, both external and internal. This unit includes a mammalian brain dissection to analyze structure and how that relates to function.

Unit Essential Questions:

- What is the anatomy and physiology of a response?
- What are the functions of the nervous system?
- What are the functions of the major areas of the brain?
- How do we receive information about the environment around us?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Neurons and Neuroglial Cells	<ul style="list-style-type: none"> <li>● I can model and describe the general structure of a neuron.</li> </ul> <p><b>Academic Vocabulary:</b> Neurons, nerve impulses, cell body, dendrites, axons, nerves, neuroglial cells, Central Nervous System, Peripheral nervous system, microglial cells, oligodendrocytes, astrocytes, ependymal cells, schwann cells, myelin, nodes of ranvier</p>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Neuron structure labeling</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) Nerve Impulse	<ul style="list-style-type: none"> <li>● I can describe the events that lead to the conduction of a nerve impulse.</li> <li>● I can explain the ways in which the nervous system processes information.</li> </ul> <p><b>Academic Vocabulary:</b> Neurons, nerve impulses, cell body, dendrites, axons, nerves, schwann cells, myelin, nodes of ranvier, cell membrane potential, resting membrane potential, sodium, potassium, threshold potential, depolarization, action potential, repolarization, ion channels, all-or-none</p>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Nerve impulse modeling/diagraming</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(3) Synapses	<ul style="list-style-type: none"> <li>● I can explain how information passes from one neuron to another and the role of neurotransmitters.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> </table>		Selected Response	x	Constructed Response	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Reflex Lab</li> </ul>				
	Selected Response													
x	Constructed Response													

	<p><b>Academic Vocabulary:</b> Axon, dendrite, Action Potential, Calcium, ion channels, membrane potential, neurotransmitter, synapse, excitatory, inhibitory, vesicles, Presynaptic neuron, post synaptic neuron</p>	<table border="1"> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>	x	Performance		Observation	peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.								
x	Performance														
	Observation														
(4) Nerve Pathways	<ul style="list-style-type: none"> <li>I can model and describe the parts and their function on the reflex arc.</li> </ul> <p><b>Academic Vocabulary:</b> Axon, dendrite, Action Potential, Calcium, ion channels, membrane potential, neurotransmitter, synapse, excitatory, inhibitory, vesicles, Presynaptic neuron, post synaptic neuron</p>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.</li> </ul>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Reflex Lab</li> </ul>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
(5) Central Nervous System	<ul style="list-style-type: none"> <li>I can model and describe the parts of the brain and the spinal cord and their respective functions.</li> </ul> <p><b>Academic Vocabulary:</b> Central Nervous System, Peripheral nervous system, cerebrum, cerebellum, brain stem, midbrain, pons, medulla oblongata, corpus callosum, frontal lobe, parietal lobe, temporal lobe, occipital lobe, meninges, spinal cord, ascending tracts, descending tracts, dura mater, arachnoid mater, pia mater, cerebral spinal fluid, subdural hematoma</p>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>Use a model to provide mechanistic accounts of phenomena.</li> </ul>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Brain Dissection Lab</li> </ul>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
(6) Peripheral and Autonomic Nervous System	<ul style="list-style-type: none"> <li>I can describe the general functions of the peripheral and autonomic nervous systems.</li> </ul> <p><b>Academic Vocabulary:</b> Somatic nervous system, autonomic nervous system, cranial nerves, spinal nerves, sympathetic nervous system, parasympathetic nervous system</p>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td></td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response		Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul>	SEP	DCI	CCC	
	Selected Response														
x	Constructed Response														
	Performance														
	Observation														
SEP	DCI	CCC													
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>Base Assessment (ACA-only): <a href="#">PART 1 Assessment</a></li> <li><a href="#">Part 2 Assessment CNS</a> (Accelerated built in)</li> </ul>											



## UNIT 3: Somatic and Special Senses

Unit Narrative: The senses unit builds on the nervous system unit with the understanding of how the cells communicate and applying that to each of the somatic and special senses. Students investigate the structure of each of the special senses and then move into the physiology of each of those senses. This unit includes a mammal eye dissection to review the structure of the eyeball and how structure relates to function.

Unit Essential Questions:

- Where are sensory receptors in our body? Are they everywhere?
- How does one hear?
- How does one see?
- How are visions and movement related?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Somatic Senses	<ul style="list-style-type: none"> <li>● I can identify the various types of receptors.</li> <li>● I can describe sensory adaptation.</li> <li>● I can distinguish between the various types of somatic senses.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Receptor graphic organizer</li> <li>● Sensory Organ Diagram labeling</li> <li>● Sense physiology sequencing</li> <li>● Eye Dissection Lab</li> </ul>
			Selected Response											
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Receptors: Chemoreceptors, pain receptors, thermoreceptors, mechanoreceptors, photoreceptors, sensation, projection, sensory adaptation, Free nerve endings, meissner's corpuscles, pacinian corpuscles, referred pain, olfactory receptors cells, olfactory bulbs, taste buds, auricle, external acoustic meatus, eardrum, auditory ossicles, oval window, auditory tube, semicircular canals, cochlea, round window, organ of corti, equilibrium, eyelid, conjunctive, lacrimal gland, extrinsic muscles, cornea, sclera, optic nerve, choroid coat, ciliary body, lens, accommodation, aqueous humor, pupil, retina, fovea centralis, optic disc, vitreous humor, refraction, rhodopsin</p>	<ul style="list-style-type: none"> <li>● Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>													
(2) Pain	<ul style="list-style-type: none"> <li>● I can model and describe how the sense of pain is produced.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Model-Sense of Pain</li> </ul>
			Selected Response											
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Receptors: Chemoreceptors, pain receptors, thermoreceptors, mechanoreceptors, photoreceptors, sensation, projection, sensory adaptation, Free nerve</p>	<ul style="list-style-type: none"> <li>● Develop, revise, and/or use a model based on evidence to illustrate and/or predict the relationships between systems or between components of a system.</li> </ul>													

	endings, meissner's corpuscles, pacinian corpuscles, referred pain, olfactory receptors cells, olfactory bulbs, taste buds, auricle, external acoustic meatus, eardrum, auditory ossicles, oval window, auditory tube, semicircular canals, cochlea, round window, organ of corti, equilibrium, eyelid, conjunctive, lacrimal gland, extrinsic muscles, cornea, sclera, optic nerve, choroid coat, ciliary body, lens, accommodation, aqueous humor, pupil, retina, fovea centralis, optic disc, vitreous humor, refraction, rhodopsin														
(3) Special Senses	<ul style="list-style-type: none"> <li>I can relate the structure and function of the organs involved with smell, taste, hearing, equilibrium, and sight.</li> </ul> <p><b>Academic Vocabulary:</b> Receptors: Chemoreceptors, pain receptors, thermoreceptors, mechanoreceptors, photoreceptors, photoreceptors, sensation, projection, sensory adaptation, Free nerve endings, meissner's corpuscles, pacinian corpuscles, referred pain, olfactory receptors cells, olfactory bulbs, taste buds, auricle, external acoustic meatus, eardrum, auditory ossicles, oval window, auditory tube, semicircular canals, cochlea, round window, organ of corti, equilibrium, eyelid, conjunctive, lacrimal gland, extrinsic muscles, cornea, sclera, optic nerve, choroid coat, ciliary body, lens, accommodation, aqueous humor, pupil, retina, fovea centralis, optic disc, vitreous humor, refraction, rhodopsin</p>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Sensation Labs</li> <li>Eye Dissection Lab</li> </ul>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>Base Assessment (ACA-only): <a href="#">Senses Aca Unit Test</a></li> <li>ACC Assessment Add-on: <a href="#">Senses Case Study</a></li> </ul>											

## UNIT 4: Endocrine System

Unit Narrative: The Endocrine unit builds on students' learning of the organization of the human body and how cells communicate and rely on feedback mechanisms to maintain homeostasis. Students will begin with the general anatomy and then move into the physiology of the endocrine system.

Unit Essential Questions:

- How are hormones involved in regulating homeostasis?
- How do steroids and nonsteroid hormones differ in their actions on a cell?
- How are hormone secretions controlled?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Steroid and Nonsteroid Hormones	<ul style="list-style-type: none"> <li>● I can explain how steroid and nonsteroid hormones affect target cells.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Endocrine POGIL</li> <li>● Feedback POGIL</li> <li>● Endocrine Organ Diagram &amp; Model</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Steroid hormones, nonsteroid hormones</p>	<ul style="list-style-type: none"> <li>● The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials.</li> <li>● Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>													
(2) Control of Secretions	<ul style="list-style-type: none"> <li>● I can discuss how negative feedback systems regulate hormonal secretions.</li> <li>● I can explain how the nervous system controls secretion.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Feedback POGIL</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> homeostasis, homeostatic mechanism, receptors, set point, effectors, negative feedback, target cells</p>	<ul style="list-style-type: none"> <li>● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.</li> </ul>													
(3) Endocrine Glands	<ul style="list-style-type: none"> <li>● I can model locations and functions of major endocrine glands.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Endocrine glands diagram</li> <li>● Feedback POGIL</li> <li>● Cell Communication POGIL</li> </ul>		
		Selected Response												
x	Constructed Response													
x	Performance													
<p><b>Academic Vocabulary:</b></p>	<ul style="list-style-type: none"> <li>● Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>													

	Endocrine gland, target cells, hormones, paracrine, autocrine, pituitary gland, thyroid gland, parathyroid glands, adrenal glands, pancreas, pineal gland, thymus gland, ovaries, testes	<table border="1"> <tr> <td></td> <td>Observation</td> </tr> </table>		Observation		
	Observation					
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>• Base Assessment (ACA-only): <a href="#">Endocrine Assessment Academic</a></li> <li>• ACC Assessment Add-on: <a href="#">Endocrine System Case Study</a></li> </ul>		

## UNIT 5: Skeletal System

Unit Narrative: The skeletal system unit builds on student learning of cells and cell differentiation. The unit begins with overall structure and function. The focus is on bone growth and remodeling and for students to gain an understanding of the factors that impact bone development.

Unit Essential Questions:

- How is the body supported and protected?
- Why is bone considered to be a living tissue?
- Why are we so flexible?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Bone	<ul style="list-style-type: none"> <li>• I can describe the general structure and function of a bone.</li> <li>• I can model and describe the development of bone.</li> <li>• I can identify the major bones of the skeleton and their features.</li> <li>• I can use evidence to explain why bone is a living tissue.</li> </ul> <p><b>Academic Vocabulary:</b> appendicular skeleton, axial skeleton, Bones associated with each, Periosteum, compact bone, spongy bone, medullary cavity, endosteum, marrow, osteocytes, intramembranous bones, endochondral bones, osteoblasts, epiphyseal plate, osteoclasts</p>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>• Skeletal system structure labeling</li> <li>• Bone tissue formation sequencing activity</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2)	<ul style="list-style-type: none"> <li>• I can describe and locate the various types</li> </ul>		SEP	DCI	CCC	<ul style="list-style-type: none"> <li>• Joint Model/ demonstration</li> </ul>								

Joints	of joints.	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<ul style="list-style-type: none"> <li>• Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>• Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> </ul>	
	Selected Response											
x	Constructed Response											
x	Performance											
	Observation											
<b>Challenge by Choice Assessment Options</b>			<ul style="list-style-type: none"> <li>• Base Assessment (ACA-only): <a href="#">Skeletal System Assessment</a></li> <li>• ACC Assessment Add-on: <a href="#">Skeletal System Case Study</a></li> <li>• Answer Key and <a href="#">Digital Case Study</a></li> </ul>									

## UNIT 6: Muscular System

Unit Narrative: The muscular system unit builds on students learning of cells, tissue structure and skeletal organization. Students will understand the structure of skeletal muscles and the physiology of how muscles move the human body and the role in homeostasis.

Unit Essential Questions:

- How does the nervous system control muscle contraction?
- What are the components of muscles that allow it to shorten?
- How is energy involved in muscle contraction?
- What happens to a muscle that is fatigued or cramped?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Skeletal Muscle	<ul style="list-style-type: none"> <li>● I can model and describe the major parts and functions of a skeletal muscle fiber.</li> <li>● I can explain the major events of skeletal muscle contraction.</li> <li>● I can explain how energy and oxygen are used in muscle contraction.</li> <li>● I can distinguish between a twitch and a sustained contraction.</li> </ul> <p><b>Academic Vocabulary:</b> Fascia, aponeuroses, myofibrils, myosis, actin, sarcomere, sarcoplasmic reticulum, transverse tubules, motor neuron, neuromuscular junction, motor end plate, neurotransmitters motor unit, troponin, tropomyosin, sliding filament model, acetylcholine, muscle impulse, acetylcholinesterase, creatine phosphate, hemoglobin, myoglobin, oxygen debt, peristalsis</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Muscle structure diagramming</li> <li>● Muscle structure function modeling</li> <li>● Muscle contraction sequencing</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) Smooth Muscle	<ul style="list-style-type: none"> <li>● I can differentiate between skeletal and smooth muscle contraction.</li> </ul> <p><b>Academic Vocabulary:</b> Peristalsis, Smooth muscle, striated muscle,</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Muscle Type Graphic Organizer</li> </ul>		
	Selected Response													
x	Constructed Response													
x	Performance													

	cardiac muscle, origin, insertion	<table border="1"> <tr> <td></td> <td>Observation</td> </tr> </table>		Observation	<p>itself a component of the next level.</p> <ul style="list-style-type: none"> <li>As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.</li> </ul>										
	Observation														
(3) Cardiac Muscle	<ul style="list-style-type: none"> <li>I can compare the contrast mechanisms of cardiac, and skeletal muscle fibers.</li> </ul> <p><b>Academic Vocabulary:</b> Peristalsis, Smooth muscle, striated muscle, cardiac muscle, origin, insertion,</p>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.</li> </ul>	SEP	DCI	CCC	
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>Base Assessment (ACA-only): The <a href="#">Muscular System Assessment Academic</a></li> <li>ACC Assessment Add-on: <a href="#">Muscular System Case Study</a></li> <li><a href="#">Answer key and digital file</a></li> </ul>											

## UNIT 7: Integumentary System

Unit Narrative: The integumentary unit builds on students learning of cells and tissue structure. The unit begins with identifying the structures associated with the skin and their role in maintaining homeostasis.

Unit Essential Questions:

- How do the membranes of the human body compare?
- Why do we need skin?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Membranes	<ul style="list-style-type: none"> <li>● I can describe the four major types of membranes.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Model of Similarities and Differences of 4 Major Membranes</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Epidermis, dermis, subcutaneous layer, melanin, hair follicle, sebaceous glands, sweat glands</p>	<ul style="list-style-type: none"> <li>● Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>													
(2) Skin	<ul style="list-style-type: none"> <li>● I can name and describe the structures and functions of the skin.</li> <li>● I can summarize the factors that determine skin color.</li> <li>● I can describe the role of accessory organisms in maintaining homeostasis.</li> <li>● I can describe the events that are part of wound healing.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Construct and explanation of wound healing</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Epidermis, dermis, subcutaneous layer, melanin, hair follicle, sebaceous glands, sweat glands</p>	<ul style="list-style-type: none"> <li>● Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>													
<b>Challenge by Choice Assessment Options</b>						<ul style="list-style-type: none"> <li>● Base Assessment (ACA-only): <a href="#">The Integumentary Assessment</a></li> <li>● ACC Assessment Add-on: <a href="#">Case Study</a></li> </ul>								

## UNIT 8: Cardiovascular System and Blood

Unit Narrative: The cardiovascular unit builds on student learning of cells, tissues and organ structures. The unit begins with organ structure size, location, direction to then build in the physiology of organ and system function. This unit includes the dissection of a mammalian heart and student learning is applied to their final full specimen dissection.

Unit Essential Questions:

- How do various components of the blood work together to maintain homeostasis?
- How can the heart behave as a pump?
- How does blood pressure indicate well being?
- How is organ function related to blood flow?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Blood	<ul style="list-style-type: none"> <li>● I can describe the major components of blood and their functions.</li> <li>● I can review the steps in blood clotting.</li> <li>● I can explain blood typing and the consequences of mismatching blood types.</li> </ul> <p><b>Academic Vocabulary:</b> Plasma, red blood cells, erythrocytes, hemoglobin, erythropoietin, macrophages, white blood cells, leukocytes, platelets, thrombocytes, fibrinogen, blood clot, prothrombin, thrombin, thrombus, embolus, coagulation, antigen, antibodies, blood types</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Blood Clot Formation activity,</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) The Heart	<ul style="list-style-type: none"> <li>● I can model and describe the locations and functions of the major parts of the heart.</li> <li>● I can trace the pathway of blood through the heart.</li> <li>● I can relate the cardiac cycle and the ECG pattern.</li> </ul> <p><b>Academic Vocabulary:</b> Pulmonary circulation, systemic circulation, pericardium, epicardium, myocardium, endocardium, atria, ventricles, septum, tricuspid valve, bicuspid valve, pulmonary valve, aortic valve, aorta, papillary muscles, coronary arteries, cardiac sinus, cardiac cycle, systole, diastole, cardiac conduction system, sinoatrial node, pacemaker, atrioventricular node, AV bundle, purkinje fibers, Electrocardiogram</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Heart structure labeling</li> <li>● Pathway of blood activity</li> <li>● Heart dissection lab</li> <li>● Cat Dissection</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(3) Blood Vessels	<ul style="list-style-type: none"> <li>● I can compare the structures and functions of the major types of blood vessels.</li> </ul>		SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● ECG Labeling/ modeling</li> <li>● Blood pressure lab</li> </ul>								

	<ul style="list-style-type: none"> <li>• I can describe how substances are exchanged between capillaries and tissue fluid.</li> <li>• I can explain how blood pressure is produced and controlled.</li> <li>• I can compare the pulmonary and systemic circuits.</li> </ul>	<table border="1"> <tr> <td></td> <td>Selected Response</td> </tr> <tr> <td></td> <td>xConstructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response		xConstructed Response	x	Performance		Observation	<ul style="list-style-type: none"> <li>• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> <li>• Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).</li> </ul>	<ul style="list-style-type: none"> <li>• ECG Lab</li> <li>• Blood Oxygen feedback mechanism</li> </ul>
	Selected Response											
	xConstructed Response											
x	Performance											
	Observation											
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>• Base Assessment (ACA-only):<a href="#">The Cardiovascular System</a></li> <li>• <a href="#">Blood Academic Assessment</a></li> <li>• ACC Assessment Add-on: <a href="#">Cardiovascular System Case Study</a></li> <li>• <a href="#">Blood Case Study</a></li> </ul>								

## UNIT 9: Digestion and Nutrition

Unit Narrative: The unit builds on student learning cell structure and feedback mechanisms to understand how digestive secretions are regulated. The unit begins with the digestive organ anatomy and builds on that understanding to learn how each organ functions to create a functioning digestive system. Student learning is applied to their final full specimen dissection.

Unit Essential Questions:

- How does each organ of the digestive system contribute to the digestion and/or absorption of food?
- Are you what you eat?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences									
			SEP	DCI	CCC										
(1) Organs of the Digestive System	<ul style="list-style-type: none"> <li>● I can name and describe the major organs of the digestive system and their location.</li> <li>● I can explain the actions of the alimentary canal and its accessory organs.</li> <li>● I can describe the actions of enzymes on food.</li> <li>● I can describe the regulation of digestive secretions.</li> <li>● I can model and explain how the products of digestion are absorbed.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</li> <li>● As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.</li> </ul>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Digestion organs diagram and labeling</li> <li>● Digestive Enzyme model</li> <li>● Digestive secretions modeling</li> <li>● Cat Dissection</li> </ul>
			Selected Response												
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<p><b>Academic Vocabulary:</b> Digestive, esophagus, abdomen, bile, stomach, appendix, cecum, chyme, alimentary canal, descending colon, ascending colon, duodenum, ileum, epiglottis, Gallbladder, jejunum, intestines, gastrointestinal tract, mouth, liver, pancreas, sigmoid colon, peristalsis, salivary glands, transverse colon, rectum, metabolism, enzyme</p>															
(2) Nutrition	<ul style="list-style-type: none"> <li>● I can model and describe how the body uses carbohydrates, lipids, proteins, vitamins, and minerals in an adequate diet.</li> </ul>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #d9ead3;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>● Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Nutrient absorption model</li> </ul>
			Selected Response												
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<p><b>Academic Vocabulary:</b> Digestive, esophagus, abdomen, bile, stomach, appendix, cecum, chyme, alimentary canal, descending colon, ascending colon, duodenum, ileum, epiglottis, Gallbladder, jejunum, intestines,</p>															

	gastrointestinal tract, mouth, liver, pancreas, sigmoid colon , peristalsis, salivary glands, transverse colon, rectum, metabolism, enzyme			
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>• Base Assessment (ACA-only): <a href="#">The Digestive System Academic Assessment</a></li> <li>• ACC Assessment Add-on: <a href="#">The Digestive System Case Study</a></li> </ul>

## UNIT 10: Lymphatic System

Unit Narrative: The Lymphatic unit builds on students' understanding of cells and cell differentiation. The unit begins with the anatomy of the lymphatic organs and moves into the overall function of the major lymphatic glands and white blood cells in immunity.

Unit Essential Questions:

- How is the lymphatic system related to the circulatory system?
- Why do we need lymph?
- How are specific and nonspecific defenses related?
- How does a person develop active and passive immunity?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences											
<p>(1) Lymphatic System</p>	<ul style="list-style-type: none"> <li>● I can compare and contrast the circulatory and lymphatic systems.</li> <li>● I can describe how tissue fluid and lymph form.</li> <li>● I can describe a lymph node and its major function.</li> <li>● I can distinguish between specific and nonspecific immunity.</li> <li>● I can model and explain how two major lymphocytes are formed, activated and function.</li> <li>● I can distinguish between active and passive immunity.</li> </ul>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px;"></td> <td>Selected Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Constructed Response</td> </tr> <tr> <td style="text-align: center;">x</td> <td>Performance</td> </tr> <tr> <td></td> <td>Observation</td> </tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.</li> <li>● Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.</li> <li>● Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>			SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Lymphatic tissues and organs diagram and modeling</li> <li>● Immune System POGIL</li> <li>● Cat Dissection</li> </ul>
			Selected Response														
x	Constructed Response																
x	Performance																
	Observation																
SEP	DCI	CCC															
<b>Challenge by Choice Assessment Options</b>					<ul style="list-style-type: none"> <li>● Base Assessment (ACA-only): <a href="#">The Lymphatic System Academic Assessment</a></li> <li>● ACC Assessment Add-on: <a href="#">The Lymphatic System Case Study</a></li> </ul>												

## UNIT 11: Respiratory System

Unit Narrative: The respiratory unit builds on students learning of cells and cell transport to understand how gasses are exchanged in the lungs and bloodstream to maintain homeostasis. The unit begins with the structures of the respiratory system and moves into the physiology. Student learning is applied to their final full specimen dissection.

Unit Essential Questions:

- How does the respiratory system contribute to metabolism?
- How does one inhale and exhale?
- How are gases exchanged at the lungs and transported?
- How is breathing controlled?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Organs of the Respiratory System	<ul style="list-style-type: none"> <li>● I can name and describe the structure and function of each of the organs of the respiratory system.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● Respiratory Organs Diagram</li> <li>● Lung Model / Demonstration</li> <li>● Cat Dissection</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen</p>	<ul style="list-style-type: none"> <li>● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</li> <li>● Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul>													
(2) Breathing Mechanism	<ul style="list-style-type: none"> <li>● I can model and explain the mechanism of inhalation and exhalation.</li> <li>● I can investigate and explore lung volumes and respiratory capacities.</li> </ul>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td>Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td style="width: 20px;"></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● How we breath lab/ activity</li> </ul>
		Selected Response												
x	Constructed Response													
x	Performance													
	Observation													
<p><b>Academic Vocabulary:</b> Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen</p>	<ul style="list-style-type: none"> <li>● As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</li> <li>● Use a model to provide mechanistic accounts of phenomena.</li> </ul>													
(3) Control of Breathing	<ul style="list-style-type: none"> <li>● I can describe various factors that influence breathing.</li> </ul>		SEP	DCI	CCC	<ul style="list-style-type: none"> <li>● How we breath lab/ activity</li> </ul>								

		<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<ul style="list-style-type: none"> <li>As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</li> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul>				
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
(4) Gas Exchange	<ul style="list-style-type: none"> <li>I can model and explain how air and blood exchange gases.</li> </ul> <p><b>Academic Vocabulary:</b> Respiratory, esophagus, respiration, carbon dioxide, pharynx, larynx, mucus, trachea, cilia, diaphragm, oral cavity, epiglottis, breathe, lungs, breath, expiration, air, inspiration, alveoli, ventilation, asthma, thorax, pneumonia, trachea, bronchi, septum, nasal cavity, exhale, mouth, oxygen</p>	<table border="1"> <tr><td></td><td>Selected Response</td></tr> <tr><td>x</td><td>Constructed Response</td></tr> <tr><td>x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	<table border="1"> <tr> <td style="background-color: #d9e1f2;">SEP</td> <td style="background-color: #fce4d6;">DCI</td> <td style="background-color: #e2efda;">CCC</td> </tr> </table> <ul style="list-style-type: none"> <li>As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.</li> <li>Use a model to provide mechanistic accounts of phenomena.</li> </ul>	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>Gas exchange model</li> </ul>
	Selected Response														
x	Constructed Response														
x	Performance														
	Observation														
SEP	DCI	CCC													
<b>Challenge by Choice Assessment Options</b>				<ul style="list-style-type: none"> <li>Base Assessment (ACA-only): <a href="#">The Respiratory System Assessment</a></li> <li>ACC Assessment Add-on: <a href="#">The Respiratory System Case Study</a></li> </ul>											

## UNIT 12: Urinary System

Unit Narrative: The Urinary system builds on student learning of cells and tissues. The unit begins with the structure of the organs of the urinary system and moves into physiology of filtering the blood to remove wastes and expel from the human body to maintain homeostasis. Student learning is applied to their final full specimen dissection.

Unit Essential Questions:

- How are the kidneys involved in maintaining blood and body fluid homeostasis?
- How is urine formed?

Learning Sequence	Student Learning Target(s): I can...	Summative Assessment Strategy	Connection to the NGSS Dimensions			Common Learning Experiences								
(1) Kidneys	<ul style="list-style-type: none"> <li>• I can identify the location, structure, and functions of the kidneys.</li> <li>• I can model and describe the structure and function of a nephron.</li> </ul> <p><b>Academic Vocabulary:</b> Kidney, retroperitoneally, renal pelvis, nephrons, renal blood vessels, glomerulus, glomerular capsule, glomerular filtration, glomerular filtrate, urine, tubular secretions, tubular reabsorption, urea, uric acid, ureter, urinary bladder, urethra</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>• Urinary organs diagram</li> <li>• Kidney diagram</li> <li>• Cat Dissection</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
(2) Urine Formation	<ul style="list-style-type: none"> <li>• I can explain the factors that affect the rate of glomerular filtration.</li> <li>• I can discuss the role of tubular reabsorption and secretion in urine formation.</li> <li>• I can describe the process of micturition and the structures that are involved.</li> </ul> <p><b>Academic Vocabulary:</b> Kidney, retroperitoneally, renal pelvis, nephrons, renal blood vessels, glomerulus, glomerular capsule, glomerular filtration, glomerular filtrate, urine, tubular secretions, tubular reabsorption, urea, uric acid, ureter, urinary bladder, urethra</p>	<table border="1" style="width: 100%;"> <tr><td style="width: 20px;"></td><td style="width: 80%;">Selected Response</td></tr> <tr><td style="text-align: center;">x</td><td>Constructed Response</td></tr> <tr><td style="text-align: center;">x</td><td>Performance</td></tr> <tr><td></td><td>Observation</td></tr> </table>		Selected Response	x	Constructed Response	x	Performance		Observation	SEP	DCI	CCC	<ul style="list-style-type: none"> <li>• Nephron Diagram</li> </ul>
	Selected Response													
x	Constructed Response													
x	Performance													
	Observation													
<b>Challenge by Choice Assessment Options</b>						<ul style="list-style-type: none"> <li>• Base Assessment (ACA-only): <a href="#">The Urinary System Assessment</a></li> <li>• ACC Assessment Add-on: <a href="#">The Urinary System Case Study</a></li> </ul>								

## ADDITIONAL CONSIDERATIONS

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT

## RESOURCES

Dissection Specimens-Cat, Brain  
POGIL Resources



**Bristol Public Schools**  
**Office of Teaching & Learning**

<b>Department</b>	Elementary Humanities
<b>Department Philosophy</b>	<p>The fundamental purpose of our organization is to ensure high levels of learning for ALL students and adults by shifting the focus on teaching to a focus on learning. To ensure all students and adults learn at high levels, we must focus on results to inform and improve professional practice through job-embedded, differentiated professional development, and to meet the needs of students' through intervention and enrichment. Helping all students and adults learn requires a collaborative and collective effort through the instructional improvement cycle.</p> <p>Curriculum is a coherent plan for instruction and learning, integrating content and action. When we develop our curriculum, we identify the critical knowledge, skills, behaviors, and attitudes toward learning that we believe are essential for ALL students within our community based on our vision of successful graduates, and state and national standards. We identify the most high-leverage, research-based and engaging instructional strategies and assessment practices as a guide for teaching. Feedback and grading practices should be aligned to the instruction and learning articulated within the curriculum.</p> <p>To ensure equity for ALL, collaborative teams implement a guaranteed and viable curriculum that is aligned to essential grade-level standards with the appropriate depth and intention with a coherent set of evidence-based instructional practices in whole class, small group, and individual contexts.</p> <p>Here are the 5 Core Instructional Practices that we believe all students should engage in;</p> <ol style="list-style-type: none"><li>1. Clear Learning Targets aligned to the grade level essential learning</li><li>2. Purposeful and engaging learning tasks</li><li>3. Student Discourse and Discussion Protocols</li></ol>

	4. Formative Assessment and Feedback 5. Goal Setting and Growth Mindset
<b>Course</b>	Social Studies
<b>Grade Level</b>	Kindergarten

<b>District Learning Expectations and Standards</b>	<b>Unit 1</b>	<b>Unit 2</b>	<b>Unit 3</b>
INQ K–2.1 Explain why the compelling question is important to the student.	x	x	x
INQ K–2.2 Identify disciplinary ideas associated with a compelling question.	x	x	x
INQ K–2.3 Identify facts and concepts associated with a supporting question.	x	x	x
INQ K–2.4 Make connections between supporting questions and compelling questions.	x	x	x
INQ K–2.5 Determine the kinds of sources that will be helpful in answering compelling questions and supporting questions.	x	x	x
INQ K–2.6 Gather relevant information from one or two sources while using the origin and structure to guide the selection.	x	x	x
INQ K–2.7 Evaluate a source by distinguishing between facts and opinion.	x	x	x
INQ K–2.8 (begins in Grades 3–5)			
INQ K–2.9 (begins in Grades 3–5)			
INQ K–2.10 Construct an argument with reasons.	x	x	x

INQ K–2.11 Construct explanations using correct sequence and relevant information.	x	x	x
INQ K–2.12 Present a summary of an argument using print, oral, and digital technologies.	x	x	x
INQ K–2.13 Ask and answer questions about arguments.	x	x	x
INQ K–2.14 Ask and answer questions about explanations.	x	x	x
INQ K–2.15 Identify and explain a range of local, regional, and global problems, and some ways in which people are trying to address these problems.	x	x	x
INQ K–2.16 Identify ways to take action to help address local, regional, and global problems.	x	x	x
INQ K–2.17 Use listening, consensus-building, and voting procedures to decide on and take action in their classrooms.	x	x	x
HIST K.1 Compare life in the past to life today.			x
HIST K.2 Generate questions about individuals and groups who have shaped a significant historical change.			x
HIST K.3 Compare perspectives of people in the past to those in the present.			x
HIST K.4 Identify different kinds of historical sources.			x
HIST K.5 Explain how historical sources can be used to study the past.			x
HIST K.6 Identify the maker, date, and place of origin for a historical source from information within the source itself.			x
HIST K.7 Generate questions about a particular historical source as it relates to a particular historical event or development.			x
HIST K.8 Generate possible reasons for an event or development in the past.			x

CIV K.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police)	x		x
CIV K.2 Explain how all people, not just official leaders, play an important role in a community.	x		x
CIV K.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority.	x		x
CIV K.4 Apply civic virtues when participating in school settings.	x		x
CIV K.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group.	x		x
CIV K.6 Explain the need for and purposes of rules in various settings inside and outside of school.	x		x
CIV K.7 Explain how people can work together to make decisions in the classroom.	x		x
CIV K.8 Identify and explain how rules function in public.	x		x
CIV K.9 Describe how people have tried to improve their communities over time.	x		x
ECO K.1 Explain how scarcity necessitates decision-making.	x	x	x
ECO K.2 Identify the benefits and costs of making various personal decisions	x	x	x
GEO K.1 Construct maps, graphs and other representations of familiar places.		x	
GEO K.2 Use maps, graphs, photographs and other representations to describe places and the relationships and interactions that shape them.		x	
GEO K.3 Use maps, globes, and other simple geographic models to identify cultural and environmental characteristics of places.		x	

GEO K.4 Explain how weather, climate, and other environmental characteristics affect people’s lives in places or regions.		x	
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**UNIT 1: Me as a Citizen in My Community**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific / Academic
CIV K.1-K-9	CIV K.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police) CIV K.2 Explain how all people, not just official leaders, play an important role in a community. CIV K.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority. CIV K.4 Apply civic virtues when participating in school settings. CIV K.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group. CIV K.6 Explain the need for and purposes of rules in various settings inside and outside of school. CIV K.7 Explain how people can work together to make decisions in the classroom. CIV K.8 Identify and explain how rules function in public. CIV K.9 Describe how people have tried to improve their communities over time.	x	Content Knowledge	Roles Responsibilities Authority Judge Mayor Governor Official leaders Accomplish Police Official leaders Community Civic virtues Rules Conflict
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
ECO K.1-K.2	ECO K.1 Explain how scarcity necessitates decision-making. ECO K.2 Identify the benefits and costs of making various personal decisions.	x	Content Knowledge	Cost & benefit Decision making Scarcity Necessity
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	

			Physical Skill	
		x	Product Development	
			Learning Behavior	

**UNIT ESSENTIAL QUESTIONS**

- What makes a community?
- Who are the people in my school and town who create rules and make sure people follow the rules?
- What does a community provide for people who live there?
- What are the ways that people contribute to our community?

CCSS Standard #	Objective(s): The students will be able to:	Summative Assessment Strategy	Additional Student Outcomes					Common Learning Experiences			
CIV K.1-K-9	I can explain why we have police, firefighters, teachers, and schools.	x Selected Response	x	Reading	x	Writing		Math		Tech	<p>Examine the need for rules and consequences at home, at school, and in the community</p> <p>Explore the roles, rights, and responsibilities of being a good citizen within a family, school, and community</p> <p>Analyze the roles people play within a family, school, and community</p>
	I can tell the classroom and school rules and why we need to follow them.	x Constructed Response	<b>Additional CT Core Standards:</b> CCSS.ELA-Literacy.RI.K.1, CCSS.ELA-Literacy.W.K.7, CCSS.ELA-Literacy.SL.K.1  Students will question, form opinions and arguments, provide explanations and their point of view on civic and economic topics.								
		x Performance									
		x Observation									
I can explain how people work together to make decisions											
ECO K.1-K.2	I can identify how the community provides for people who live there.	x Selected Response	x	Reading	x	Writing		Math		Tech	<p>Explore the roles, rights, and responsibilities of being a good citizen within a family, school, and community</p> <p>Analyze the roles people play within a family, school, and</p>
	I can identify some of the resources my family has.	x Constructed Response	<b>Additional CT Core Standards:</b> CCSS.ELA-Literacy.RI.K.1, CCSS.ELA-Literacy.W.K.7, CCSS.ELA-Literacy.SL.K.1								
		x Performance									
		x Observation									

	I can identify some of the resources my school has.		Students will question, form opinions and arguments, provide explanations and their point of view on civic and economic topics.	community
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**ADDITIONAL CONSIDERATIONS**

<b>COMMON MISCONCEPTIONS</b>	<b>PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT</b>	<b>ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY</b>	<b>OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT</b>
	n/a	<p>Exposure to additional grade level economic and civic engagement learning targets at a deeper level</p> <p>Inquiry and study of additional community members</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts</p>	Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of economics and civics

**RESOURCES**

Teacher Resources: **Possible Slide deck**

Books:

- Watch Out
- Making Money
- School
- What Rules Should We Have in Our Classroom?
- How You Can Be a Good Friend?
- This Is My School
- Teachers
- Staying Safe at School
- My First Day at School
- Who's Who at School
- At the Library
- Schools Have Rules

- I am Honest
- The Zookeeper
- At the Farm

**UNIT 2: Me, My Family, My Community and Geography**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary/ Academic Vocabulary
ECO K.1-K. 2	ECO K.1 Explain how scarcity necessitates decision-making. ECO K.2 Identify the benefits and costs of making various personal decisions.	x	Content Knowledge	Resources Family Needs vs. wants
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
GEO K.1-K. 4	GEO K.1 Construct maps, graphs and other representations of familiar places. GEO K.2 Use maps, graphs, photographs and other representations to describe places and the relationships and interactions that shape them. GEO K.3 Use maps, globes, and other simple geographic models to identify cultural and environmental characteristics of places. GEO K.4 Explain how weather,	x	Content Knowledge	Purpose Function Map Weather Influence Seasonal
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	

climate, and other environmental characteristics affect people's lives in places or regions.		
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**UNIT ESSENTIAL QUESTIONS**

How does where people live affect how they live?  
 How do we use maps and globes to learn about the world?

<b>CCSS Standard #</b>	<b>Objective(s):</b> The students will be able to:	<b>Summative Assessment Strategy</b>	<b>Additional Student Outcomes</b>	<b>Common Learning Experiences</b>
ECO K.1-K.2	I can name resources used by my family.	x Selected Response	x Reading x Writing Math Tech	Analyze how people live differently in other places
	I can name resources used by my school.	x Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.K.1, CCSS.ELA-Literacy.W.K.7, CCSS.ELA-Literacy.SL.K.1	
		x Performance		
		x Observation		
I can explain the difference between needs and wants.	x Observation			
GEO K.1-K.4	I can explain the purposes and functions of maps.	x Selected Response	x Reading x Writing Math Tech	Examine the purpose and function of maps  Explore absolute and relative location  Apply the concepts of directionality, spatial relations, and size  Identify how weather affects individuals and understand
	I can explain how the weather influences our homes, our seasonal activities, and our community	x Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.K.1, CCSS.ELA-Literacy.W.K.7, CCSS.ELA-Literacy.SL.K.1	
		x Performance		
		x Observation		

				<p>how seasonal changes affect daily choices</p> <p>Analyze how people live differently in other places</p>
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**ADDITIONAL CONSIDERATIONS**

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT
		<p>Exposure to additional grade level geography learning targets at a deeper level</p> <p>Inquiry and study of additional maps and communities</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of geography</p>

**RESOURCES**

Teacher Resources: **Possible Slide deck**

Books:

- My Street
- The School Garden
- Celeste Goes to School
- Hui Goes to School
- Pablo Goes to School
- Capstone Pattern Books:
- Things I Want and Things I Need
- Geodes:
- Tap-Tap to Tuk-Tuk (Module 4 Set 4)

- Floating Market (Module 4 Set 3)
- Pele (Module 1 Set 1 Part 1)
- Galapagos Adventures (Module 1 Set 1 Part 2)
- Fabric of the Andes (Module 1 Set 1 Part 2)
- A Day at the Market (Module 1 Set 1 Part 2)

**UNIT 3: Me, My Family, My Community and the Past**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary Academic Vocabulary
HIST. K.1- K.8	HIST K.1 Compare life in the past to life today.	x	Content Knowledge	Life Past
	HIST K.2 Generate questions about individuals and groups who have shaped a significant historical change.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	Today Shaped Significant Historical
	HIST K.3 Compare perspectives of people in the past to those in the present.	x	Product Development	Change Perspectives
	HIST K.4 Identify different kinds of historical sources.		Learning Behavior	Compare Identify Sources Study Origin Maker Particular Development Event
	HIST K.5 Explain how historical sources can be used to study the past.			
HIST K.6 Identify the maker, date, and place of origin for a historical source from information within the source itself.				
HIST K.7 Generate questions about a particular historical source as it relates to a particular historical event				

	or development. HIST K.8 Generate possible reasons for an event or development in the past.			
CIV K.1- K.9	CIV K.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police) CIV K.2 Explain how all people, not just official leaders, play an important role in a community. CIV K.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority. CIV K.4 Apply civic virtues when participating in school settings. CIV K.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group. CIV K.6 Explain the need for and purposes of rules in various settings inside and outside of school. CIV K.7 Explain how people can work together to make decisions in the classroom. CIV K.8 Identify and explain how rules function in public. CIV K.9 Describe how people have tried to improve their communities over time.	x	Content Knowledge	Roles Responsibilities Authority Judge Mayor Governor Official leaders Accomplish Police Official leaders Community Civic virtues Rules Conflict
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
ECO K.1-K. 2	ECO K.1 Explain how scarcity necessitates decision-making. ECO K.2 Identify the benefits and costs of	x	Content Knowledge	Resources Family Needs vs. wants
		x	Skill (Problem-Solving, Writing,	

	making various personal decisions.		Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	

**UNIT ESSENTIAL QUESTIONS**

How do our communities and the people who live in them change over time?

CCSS Standard #	Objective(s): The students will be able to:	Summative Assessment Strategy	Additional Student Outcomes							Common Learning Experiences		
HIST. K.1-K.8	<p>I can identify how the past is different from today.</p> <p>I can identify how families are the same and different.</p> <p>I can identify how past and present actions of people in a community influence the way they live.</p>	x	Selected Response	x	Reading	x	Writing		Math		Tech	Investigate how the past is represented through a sequence of events and the purpose of tools for representing time (e.g., timelines, dates)
		x	Constructed Response									
		x	Performance									
		x	Observation									
CIV K.1-K.9	I can identify the ways people contributed to our community.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore the ways that people from other times can be alike and different from people today
		x	Constructed Response									
		x	Performance									
		x	Observation									
ECO K.1-K.2	I can explain how needs and wants change over time.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Compare family life today to family life in the recent past
		x	Constructed Response									
		x	Performance									

		x	Observation		
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**ADDITIONAL CONSIDERATIONS**

COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT
		<p>Exposure to additional grade level history learning targets at a deeper level</p> <p>Inquiry and study of additional past communities</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of historical events &amp; communities</p>

**RESOURCES**

Books:  
 The Old Days and Now  
 Old and New Schools  
 Old and New  
 Capstone Pattern Books:  
 Geodes:  
 Map to the Past (Module 4 Set 4)  
 Build a Log Cabin (Module 3 Set 1)  
 Bath Night (Module 3 Set 1)  
 Three Sisters (Module 3 Set 1)  
 Ice Harvest (Module 3 Set 1)  
 Statue of Liberty (Module 3 Set 4)  
 Washington Crossing the Delaware (Module 3 Set 4)  
 Sea to Shining Sea (Module 3 Set 4)  
 Call a Cab (Module 3 Set 2)  
 The First Car to Get That Far (Module 3 Set 2)  
 The Golden Gate (Module 3 Set 2)

Fly, Amelia, Fly (Module 3 Set 2)  
Lightning Ben (Module 3 Set 3)  
Ella Sang Back (Module 3 Set 3)  
Frank's Ice Pops (Module 3 Set 3)  
Scraping the Sky (Module 3 Set 3)

Use Capstone Books:  
The Old Days and Now  
Old and New Schools  
Old and New



Bristol Public Schools  
Office of Teaching & Learning

Department	Elementary Humanities
Department Philosophy	<p>The fundamental purpose of our organization is to ensure high levels of learning for ALL students and adults by shifting the focus on teaching to a focus on learning. To ensure all students and adults learn at high levels, we must focus on results to inform and improve professional practice through job-embedded, differentiated professional development, and to meet the needs of students’ through intervention and enrichment. Helping all students and adults learn requires a collaborative and collective effort through the instructional improvement cycle.</p> <p>Curriculum is a coherent plan for instruction and learning, integrating content and action. When we develop our curriculum, we identify the critical knowledge, skills, behaviors, and attitudes toward learning that we believe are essential for ALL students within our community based on our vision of successful graduates, and state and national standards. We identify the most high-leverage, research-based and engaging instructional strategies and assessment practices as a guide for teaching. Feedback and grading practices should be aligned to the instruction and learning articulated within the curriculum.</p> <p>To ensure equity for ALL, collaborative teams implement a guaranteed and viable curriculum that is aligned to essential grade-level standards with the appropriate depth and intention with a coherent set of evidence-based instructional practices in whole class, small group, and individual contexts.</p> <p>Here are the 5 Core Instructional Practices that we believe all students should engage in;</p> <ol style="list-style-type: none"> <li>1. Clear Learning Targets aligned to the grade level essential learning</li> <li>2. Purposeful and engaging learning tasks</li> <li>3. Student Discourse and Discussion Protocols</li> <li>4. Formative Assessment and Feedback</li> <li>5. Goal Setting and Growth Mindset</li> </ol>

Course	Social Studies
Grade Level	Grade 1

District Learning Expectations and Standards	Unit 1	Unit 2	Unit 3
INQ K–2.1 Explain why the compelling question is important to the student.	x	x	x
INQ K–2.2 Identify disciplinary ideas associated with a compelling question.	x	x	x
INQ K–2.3 Identify facts and concepts associated with a supporting question.	x	x	x
INQ K–2.4 Make connections between supporting questions and compelling questions.	x	x	x
INQ K–2.5 Determine the kinds of sources that will be helpful in answering compelling questions and supporting questions.	x	x	x
INQ K–2.6 Gather relevant information from one or two sources while using the origin and structure to guide the selection.	x	x	x
INQ K–2.7 Evaluate a source by distinguishing between facts and opinion.	x	x	x
INQ K–2.8 (begins in Grades 3–5)			
INQ K–2.9 (begins in Grades 3–5)			
INQ K–2.10 Construct an argument with reasons.	x	x	x
INQ K–2.11 Construct explanations using correct sequence and relevant information.	x	x	x
INQ K–2.12 Present a summary of an argument using print, oral, and digital technologies.	x	x	x

INQ K–2.13 Ask and answer questions about arguments.	x	x	x
INQ K–2.14 Ask and answer questions about explanations.	x	x	x
INQ K–2.15 Identify and explain a range of local, regional, and global problems, and some ways in which people are trying to address these problems.	x	x	x
INQ K–2.16 Identify ways to take action to help address local, regional, and global problems.	x	x	x
INQ K–2.17 Use listening, consensus-building, and voting procedures to decide on and take action in their classrooms.	x	x	x
HIST 1.1 Compare life in the past to life in the present.	x	x	x
HIST 1.2 Generate questions about individuals and groups who have shaped a significant historical change.	x	x	x
HIST 1.3 Compare perspectives of people in the past to those in the present.	x	x	x
HIST 1.4 Identify different kinds of historical sources	x	x	x
HIST 1.5 Explain how historical sources can be used to study the past.	x	x	x
HIST 1.6 Identify the maker, date, and place of origin for a historical source from information within the source itself	x	x	x
HIST 1.7 Generate questions about a particular historical source as it relates to a particular historical event or development.	x	x	x
HIST 1.8 Generate possible reasons for an event or development in the past.	x	x	x
CIV1.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police).	x	x	x
CIV 1.2 Explain how all people, not just official leaders, play an important role in a community.	x	x	x
CIV 1.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority.	x	x	x

CIV 1.4 Apply civic virtues when participating in school settings.	x	x	x
CIV 1.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group.	x	x	x
CIV 1.6 Explain the need for and purposes of rules in various settings inside and outside of school.	x	x	x
CIV 1.7 Explain how people can work together to make decisions in the classroom.	x	x	x
CIV 1.8 Identify and explain how rules function in public.	x	x	x
CIV 1.9 Describe how people have tried to improve their communities over time.	x	x	x
ECO 1.1 Explain how scarcity necessitates decision-making.	x	x	x
ECO 1.2 Identify the benefits and costs of making various personal decisions.	x	x	x
ECO 1.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.	x	x	x
ECO 1.4 Explain how people earn income.	x	x	x
GEO 1.1 Construct maps, graphs and other representations of familiar places.	x	x	x
GEO 1.2 Use maps, graphs, photographs and other representations to describe places and the relationships and interactions that shape them.	x	x	x
GEO 1.3 Use maps, globes, and other simple geographic models to identify cultural and environmental characteristics of places.	x	x	x
GEO 1.4 Explain how weather, climate, and other environmental characteristics affect people's lives in places or regions.	x	x	x

**UNIT 1: Citizenship in Our Community/Geography and Maps**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary/ Academic Vocabulary
HIST 1.1-1.8	HIST 1.1 Compare life in the past to life in the present.	x	Content Knowledge	Compare Life Past Present Significant Shaped Historical Change Perspectives Sources Study Origin Information Event Development Reasons
	HIST 1.2 Generate questions about individuals and groups who have shaped a significant historical change.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	HIST 1.3 Compare perspectives of people in the past to those in the present.		Physical Skill	
	HIST 1.4 Identify different kinds of historical sources.	x	Product Development	
	HIST 1.5 Explain how historical sources can be used to study the past.		Learning Behavior	
CIV 1.1-1.9	CIV1.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police).	x	Content Knowledge	Roles Responsibilities Authority Local State National Judge Mayor Governor Police
	CIV 1.2 Explain how all people, not just official leaders, play an important role in a community.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	CIV 1.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority.		Physical Skill	
	CIV 1.4 Apply civic virtues when participating in school settings.	x	Product Development	
			Learning Behavior	

	<p>CIV 1.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group.</p> <p>CIV 1.6 Explain the need for and purposes of rules in various settings inside and outside of school.</p> <p>CIV 1.7 Explain how people can work together to make decisions in the classroom.</p> <p>CIV 1.8 Identify and explain how rules function in public.</p> <p>CIV 1.9 Describe how people have tried to improve their communities over time.</p>			<p>Official leaders</p> <p>Important</p> <p>Community</p> <p>Communities</p> <p>Tasks</p> <p>Civic virtues</p> <p>Decisions</p> <p>School</p> <p>Function</p> <p>improve</p>
ECO 1.1-1.4	<p>ECO 1.1 Explain how scarcity necessitates decision-making.</p> <p>ECO 1.2 Identify the benefits and costs of making various personal decisions.</p> <p>ECO 1.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.</p> <p>ECO 1.4 Explain how people earn income.</p>	x	Content Knowledge	<p>Scarcity</p> <p>Necessity</p> <p>Decision-making</p> <p>Benefits</p> <p>Cost</p> <p>Goods</p> <p>Services</p> <p>Local</p> <p>Income</p>
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
GEO 1.1-1.4	<p>GEO 1.1 Construct maps, graphs and other representations of familiar places.</p> <p>GEO 1.2 Use maps, graphs, photographs and other representations to describe places and the relationships and interactions that shape them.</p> <p>GEO 1.3 Use maps, globes, and other simple geographic models to identify cultural and environmental characteristics of places.</p> <p>GEO 1.4 Explain how weather, climate, and other environmental characteristics affect people's lives in places or regions.</p>	x	Content Knowledge	<p>Maps</p> <p>Graphs</p> <p>Places</p> <p>Photographs</p> <p>Representations</p> <p>Relationships</p> <p>Interactions</p> <p>Globes</p> <p>Models</p> <p>Cultural</p> <p>Environmental</p> <p>Characteristics</p> <p>Weather</p> <p>Climate</p> <p>Places</p>
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	





ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT
		<p>Exposure to additional grade level economic, civic engagement, historical events and geography learning targets at a deeper level.</p> <p>Inquiry and study of additional community members.</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts.</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of geography, history, economics and civic engagement.</p>
RESOURCES			
<p>Teacher Resources: Possible Slide deck</p> <p>Books:</p> <ul style="list-style-type: none"> <li>● All Kinds of Families - C3 Framework, Capstone</li> <li>● Growing Up - C3 Framework, Capstone</li> <li>● City Life/Farm Life - C3 Framework, Capstone</li> <li>● Clothes around the World - C3 Framework, Capstone</li> <li>● The Farm - C3 Framework, Capstone</li> <li>● Houses around the World - C3 Framework, Capstone</li> <li>● In the Past - C3 Framework, Capstone</li> <li>● Life Now and Long Ago - C3 Framework, Capstone</li> <li>● Community Helpers at a Fire - C3 Framework, Capstone</li> <li>● Community Helpers at School - C3 Framework, Capstone</li> <li>● Community Helpers at a Construction Site - C3 Framework, Capstone</li> <li>● Community Helpers at the Hospital - C3 Framework, Capstone</li> <li>● Find out about Farming - C3 Framework, Capstone</li> <li>● Following Rules - C3 Framework, Capstone</li> <li>● Going to School- C3 Framework, Capstone</li> <li>● Going to the Doctor - C3 Framework, Capstone</li> </ul>			

- Homes that Move - C3 Framework, Capstone
- Let's Communicate - C3 Framework, Capstone
- Our Community Center - C3 Framework, Capstone
- Our Fire Station - C3 Framework, Capstone
- People At Work - C3 Framework, Capstone
- People Who Keep Us Safe - C3 Framework, Capstone
- Rural Homes - C3 Framework, Capstone
- Safe at Play - C3 Framework, Capstone
- Sports Rules -
- Taking a Trip, Comparing Past and Present
- Teachers Help
- At the Library
- Where do People Work?
- France - Geode Module 4, Set 1
- Egypt - Geode Module 4, Set 1
- Ireland - Geode Module 4, Set 1
- Russia - Geode Module 4, Set 1
- Sharing Stories Geode Module 4, set1
- Unusual Libraries - Geode, Module 1, set 2

**UNIT 2: Our Needs as a Community/Geography and Maps**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary Academic Vocabulary
HIST 1.1-1.8	HIST 1.1 Compare life in the past to life in the present.	x	Content Knowledge	Compare Life Past Present Significant Shaped Historical Change Perspectives
	HIST 1.2 Generate questions about individuals and groups who have shaped a significant historical change.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	HIST 1.3 Compare perspectives of people in the past to those in the present.		Physical Skill	
	HIST 1.4 Identify different kinds of historical sources.	x	Product Development	
			Learning Behavior	

	<p>HIST 1.5 Explain how historical sources can be used to study the past.</p> <p>HIST 1.6 Identify the maker, date, and place of origin for a historical source from information within the source itself.</p> <p>HIST 1.7 Generate questions about a particular historical source as it relates to a particular historical event or development.</p> <p>HIST 1.8 Generate possible reasons for an event or development in the past.</p>			<p>Sources</p> <p>Study</p> <p>Origin</p> <p>Information</p> <p>Event</p> <p>Development</p> <p>Reasons</p>
CIV 1.1-1.9	<p>CIV1.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police).</p> <p>CIV 1.2 Explain how all people, not just official leaders, play an important role in a community.</p> <p>CIV 1.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority.</p> <p>CIV 1.4 Apply civic virtues when participating in school settings.</p> <p>CIV 1.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group.</p> <p>CIV 1.6 Explain the need for and purposes of rules in various settings inside and outside of school.</p> <p>CIV 1.7 Explain how people can work together to make decisions in the classroom.</p> <p>CIV 1.8 Identify and explain how rules function in public.</p> <p>CIV 1.9 Describe how people have tried to improve their communities over time.</p>	x	Content Knowledge	<p>Roles</p> <p>Responsibilities</p> <p>Authority</p> <p>Local</p> <p>State</p> <p>National</p> <p>Judge</p> <p>Mayor</p> <p>Governor</p> <p>Police</p> <p>Official leaders</p> <p>Important</p> <p>Community</p> <p>Communities</p> <p>Tasks</p> <p>Civic virtues</p> <p>Decisions</p> <p>School</p> <p>Function</p> <p>improve</p>
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
ECO 1.1-1.4	ECO 1.1 Explain how scarcity necessitates decision-making.	x	Content Knowledge	<p>Scarcity</p> <p>Necessity</p>

	ECO 1.2 Identify the benefits and costs of making various personal decisions. ECO 1.3 Describe the goods and services that people in the local community produce and those that are produced in other communities. ECO 1.4 Explain how people earn income.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	Decision-making Benefits
			Physical Skill	Cost Goods
		x	Product Development	Services Local
			Learning Behavior	Income
GEO 1.1-1.4	GEO 1.1 Construct maps, graphs and other representations of familiar places. GEO 1.2 Use maps, graphs, photographs and other representations to describe places and the relationships and interactions that shape them. GEO 1.3 Use maps, globes, and other simple geographic models to identify cultural and environmental characteristics of places. GEO 1.4 Explain how weather, climate, and other environmental characteristics affect people's lives in places or regions.	x	Content Knowledge	Maps Graphs
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	Places Photographs
			Physical Skill	Representations Relationships
		x	Product Development	Interactions Globes
			Learning Behavior	Models Cultural Environmental Characteristics Weather Climate Places regions

#### UNIT ESSENTIAL QUESTIONS

- How do needs and wants affect how we live?
- How is someone's life different based on where they live?
- What factors change a community?
- How do the leaders in our community help to make it a good place to live?
- How do people earn a living in our community and how do various jobs affect our community?
- Why is money important?
- How are the ways people earned a living in the past different from the ways people earn a living today?
- How does weather/climate affect the way we live?
- What do maps tell us about the communities we belong to?

CCSS Standard #	Objective(s): The students will be able to:	Summative Assessment Strategy		Additional Student Outcomes						Common Learning Experiences		
HIST 1.1-1.8	I can explain why communities change.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore how communities have changed  Explore why communities have changed  Compare and contrast past and present communities  Explore man-made and geographical landforms and how we use and need maps.
		x	Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1  Students will form opinions and arguments, engage in shared research, gather sources and evidence while providing clarifications and explanations about the impact of historical events.								
	I can explain the reasons why communities change.	x	Performance									
		x	Observation									
CIV 1.1-1.9	I can explain who the leaders are in our community.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Create a school community flowchart  Determine duties of members of the community (mayor, superintendent, building leaders, etc).
		x	Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1  Students will form opinions and arguments, engage in shared research, gather sources and evidence while providing clarifications and explanations about civic responsibilities and engagement.								
	I can explain what the leaders in our community do.	x	Performance									
	I can explain how the leaders in our community make our community a good place to live.	x	Observation									
ECO 1.1-1.4	I can explain how people earn a living in our community.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore the difference between wants and needs and how a lack of resources affects everyone
		x	Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1								
	I can explain the various jobs in our community.	x	Performance									

	<p>I can identify jobs in our community and how they affect our community.</p> <p>I can explain why money is important.</p> <p>I can compare and contrast the different ways to earn a living from the past to the present.</p>	x	Observation	<p>CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1</p> <p>Students will form opinions and arguments, engage in shared research, gather sources and evidence while providing clarifications and explanations about economics.</p>	<p>Analyze basic functions of earning/spending and the role of money while broadening their perspective of the world</p>
GEO 1.1-1.4	<p>I can explain how the weather affects where I live.</p> <p>I can understand how maps tell us about the communities we belong to.</p> <p>I can understand how a map can help me to understand my community.</p>	x	Selected Response	<p>x Reading x Writing Math Tech</p>	<p>Examine map features and functions while drawing conclusions and comparing various locations</p> <p>Explore man-made and geographical landforms and how we use and need maps</p>
		x	Constructed Response	<p>Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1</p>	
		x	Performance		
		x	Observation		

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT
		<p>Exposure to additional grade level economic, civic engagement, historical events and geography learning targets at a deeper level.</p> <p>Inquiry and study of additional community members.</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts.</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of geography, history, economics and civic engagement.</p>
RESOURCES			
<p>Teacher Resources: Possible Slide deck</p> <p>Books:</p> <ul style="list-style-type: none"> <li>● Compass Roses and Directions</li> <li>● A Visit to the Farm</li> <li>● Homes that Move</li> <li>● Houses Around the World</li> <li>● Map Scales</li> <li>● Maps Can Tell us Things</li> <li>● Rural Homes</li> <li>● A School Map</li> <li>● Symbols and Keys</li> <li>● Types of Maps</li> <li>● What is a Map?</li> <li>● Wind and Earth-Geode, Module 3, set 1</li> <li>● The Mighty Wind - Geode, Module 3, set 4</li> </ul>			

## UNIT 3: The Relationship Between Family, School, and Community/Geography and Maps

### UNWRAPPED STANDARDS

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary/ Academic Vocabulary
HIST 1.1-1.8	HIST 1.1 Compare life in the past to life in the present.	x	Content Knowledge	Compare Life Past Present Significant Shaped Historical Change Perspectives Sources Study Origin Information Event Development Reasons
	HIST 1.2 Generate questions about individuals and groups who have shaped a significant historical change.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	HIST 1.3 Compare perspectives of people in the past to those in the present.		Physical Skill	
	HIST 1.4 Identify different kinds of historical sources.	x	Product Development	
	HIST 1.5 Explain how historical sources can be used to study the past.		Learning Behavior	
CIV 1.1-1.9	CIV1.1 Describe roles and responsibilities of people in authority (local/state/national e.g., judge, mayor, governor, police).	x	Content Knowledge	Roles Responsibilities Authority Local State National Judge Mayor Governor Police
	CIV 1.2 Explain how all people, not just official leaders, play an important role in a community.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	CIV 1.3 Describe how communities work to accomplish common tasks, establish responsibilities, and fulfill roles of authority.		Physical Skill	
	CIV 1.4 Apply civic virtues when participating in school settings.	x	Product Development	
			Learning Behavior	

	<p>CIV 1.5 Follow agreed upon rules for discussions while responding attentively to others when addressing ideas and making decisions as a group.</p> <p>CIV 1.6 Explain the need for and purposes of rules in various settings inside and outside of school.</p> <p>CIV 1.7 Explain how people can work together to make decisions in the classroom.</p> <p>CIV 1.8 Identify and explain how rules function in public.</p> <p>CIV 1.9 Describe how people have tried to improve their communities over time.</p>			<p>Official leaders</p> <p>Important</p> <p>Community</p> <p>Communities</p> <p>Tasks</p> <p>Civic virtues</p> <p>Decisions</p> <p>School</p> <p>Function</p> <p>improve</p>
ECO 1.1-1.4	<p>ECO 1.1 Explain how scarcity necessitates decision-making.</p> <p>ECO 1.2 Identify the benefits and costs of making various personal decisions.</p> <p>ECO 1.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.</p> <p>ECO 1.4 Explain how people earn income.</p>	x	Content Knowledge	<p>Scarcity</p> <p>Necessity</p> <p>Decision-making</p> <p>Benefits</p> <p>Cost</p> <p>Goods</p> <p>Services</p> <p>Local</p> <p>Income</p>
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
GEO 1.1-1.4	<p>GEO 1.1 Construct maps, graphs and other representations of familiar places.</p> <p>GEO 1.2 Use maps, graphs, photographs and other representations to describe places and the relationships and interactions that shape them.</p> <p>GEO 1.3 Use maps, globes, and other simple geographic models to identify cultural and environmental characteristics of places.</p> <p>GEO 1.4 Explain how weather, climate, and other environmental characteristics affect people's lives in places or regions.</p>	x	Content Knowledge	<p>Maps</p> <p>Graphs</p> <p>Places</p> <p>Photographs</p> <p>Representations</p> <p>Relationships</p> <p>Interactions</p> <p>Globes</p> <p>Models</p> <p>Cultural</p> <p>Environmental</p> <p>Characteristics</p> <p>Weather</p> <p>Climate</p> <p>Places</p> <p>regions</p>
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	

**UNIT ESSENTIAL QUESTIONS**

- How do past actions in our community still influence our community today?
- What do maps tell us about the communities we belong to?
- How do you and your family remember important events?
- How do people and events from the past influence each other?
- Why are communities constantly changing? What changes them?
- What happens when people don't agree on the changes?
- What is my role within my community?
- How do my actions affect others who live in my community?
- How do members of our community help each other with our needs?
- How do you use maps to identify places that represent your cultural history?

CCSS Standard #	Objective(s): The students will be able to:	Summative Assessment Strategy	Additional Student Outcomes						Common Learning Experiences	
HIST 1.1-1.9	I can identify the important events in my life.	x Selected Response	x	Reading	x	Writing		Math		Explore personal history and relationships with family, school, and community to better understand culture and its importance in shaping students' lives
	I can identify the important events in my family.	x Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1							
	I can think of different ways to remember important events in my life and my family.	x Performance								
	I can explain why communities change.	x Observation								
I can explain different ways a community changes and list the reasons why.										
I can explain the reasons why people don't agree on changes and discuss possible solutions.										

CIV 1.1-1.9	I can explain how the leaders in my community make it a good place to live.  I can identify the role models within the community I belong to.  I can identify my role within my community.  I can explain my role within my community.  I can explain how my actions affect others who live in my community.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore personal history and relationships with family, school, and community to better understand culture and its importance in shaping students' lives  Create a class book about the community	
		x	Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1									
		x	Performance										
		x	Observation										
ECO 1.1-1.4	I can explain the difference between needs and wants.  I can explain how members of the community help each other with our needs.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Research the natural and manmade features in and around our community/ selected place	
		x	Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1									
		x	Performance										
		x	Observation										
GEO 1.1-1.4	I can identify places on a map that represent my culture.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Examine map features and functions while drawing conclusions and comparing various location  Explore man-made and geographical landforms and how we use and need maps	
		x	Constructed Response	Additional CT Core Standards: CCSS.ELA-Literacy.RI.1.1-10 CCSS.ELA-Literacy.W.1.7-10 CCSS.ELA-Literacy.SL.1.1 CCSS.ELA-Literacy.W.1.1-2 CCSS.ELA-Literacy.L.1.1									
		x	Performance										
		x	Observation										

ADDITIONAL CONSIDERATIONS			
COMMON MISCONCEPTIONS	PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT	ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY	OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT
		<p>Exposure to additional grade level economic, civic engagement, historical events and geography learning targets at a deeper level</p> <p>Inquiry and study of additional community members/ personal history</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of geography, history, economics and civic engagement.</p>
RESOURCES			
<p>Teacher Resources</p> <p>Books:</p> <ul style="list-style-type: none"> <li>● Bradford Street Buddies: Backyard Camp Out, Block Party Surprise, Springtime Blossoms</li> <li>● Clothes Around the World - C3 Framework, Capstone</li> <li>● Counting Money - C3 Framework, Capstone</li> <li>● Finding out about Money - C3 Framework, Capstone</li> <li>● Things I Want and Things I Need</li> <li>● Wants or Needs</li> <li>● Toys in the Past</li> <li>● We Need Money</li> </ul>			



**Bristol Public Schools**  
**Office of Teaching & Learning**

<b>Department</b>	Elementary Humanities
<b>Department Philosophy</b>	<p>The fundamental purpose of our organization is to ensure high levels of learning for ALL students and adults by shifting the focus on teaching to a focus on learning. To ensure all students and adults learn at high levels, we must focus on results to inform and improve professional practice through job-embedded, differentiated professional development, and to meet the needs of students' through intervention and enrichment. Helping all students and adults learn requires a collaborative and collective effort through the instructional improvement cycle.</p> <p>Curriculum is a coherent plan for instruction and learning, integrating content and action. When we develop our curriculum, we identify the critical knowledge, skills, behaviors, and attitudes toward learning that we believe are essential for ALL students within our community based on our vision of successful graduates, and state and national standards. We identify the most high-leverage, research-based and engaging instructional strategies and assessment practices as a guide for teaching. Feedback and grading practices should be aligned to the instruction and learning articulated within the curriculum.</p> <p>To ensure equity for ALL, collaborative teams implement a guaranteed and viable curriculum that is aligned to essential grade-level standards with the appropriate depth and intention with a coherent set of evidence-based instructional practices in whole class, small group, and individual contexts.</p> <p>Here are the 5 Core Instructional Practices that we believe all students should engage in;</p> <ol style="list-style-type: none"><li>1. Clear Learning Targets aligned to the grade level essential learning</li><li>2. Purposeful and engaging learning tasks</li><li>3. Student Discourse and Discussion Protocols</li></ol>

	4. Formative Assessment and Feedback 5. Goal Setting and Growth Mindset
<b>Course</b>	Social Studies
<b>Grade Level</b>	Grade 2

District Learning Expectations and Standards	Unit 1	Unit 2	Unit 3
INQ K–2.1 Explain why the compelling question is important to the student.	x	x	x
INQ K–2.2 Identify disciplinary ideas associated with a compelling question.	x	x	x
INQ K–2.3 Identify facts and concepts associated with a supporting question.	x	x	x
INQ K–2.4 Make connections between supporting questions and compelling questions.	x	x	x
INQ K–2.5 Determine the kinds of sources that will be helpful in answering compelling questions and supporting questions.	x	x	x
INQ K–2.6 Gather relevant information from one or two sources while using the origin and structure to guide the selection.	x	x	x
INQ K–2.7 Evaluate a source by distinguishing between facts and opinion.	x	x	x
INQ K–2.8 (begins in Grades 3–5)			
INQ K–2.9 (begins in Grades 3–5)			
INQ K–2.10 Construct an argument with reasons.	x	x	x

INQ K–2.11 Construct explanations using correct sequence and relevant information.	x	x	x
INQ K–2.12 Present a summary of an argument using print, oral, and digital technologies.	x	x	x
INQ K–2.13 Ask and answer questions about arguments.	x	x	x
INQ K–2.14 Ask and answer questions about explanations.	x	x	x
INQ K–2.15 Identify and explain a range of local, regional, and global problems, and some ways in which people are trying to address these problems.	x	x	x
INQ K–2.16 Identify ways to take action to help address local, regional, and global problems.	x	x	x
INQ K–2.17 Use listening, consensus-building, and voting procedures to decide on and take action in their classrooms.	x	x	x
HIST 2.1 Create a chronological sequence of multiple events.	x	x	x
HIST 2.2 Compare life in the past to life today.	x	x	x
HIST 2.3 Generate questions about individuals and groups who have shaped a significant historical change	x	x	x
HIST 2.4 Explain perspectives of people in the past to those of people in the present.	x	x	x
HIST 2.5 Compare different accounts of the same historical event.	x	x	x
HIST 2.6 Identify different kinds of historical sources.	x	x	x
HIST 2.7 Explain how historical sources can be used to study the past.	x	x	x
HIST 2.8 Identify the maker, date, and place of origin for a historical source from information within the source itself.	x	x	x
HIST 2.9 Generate questions about a particular historical source as it relates to a particular historical event or development.	x	x	x

HIST 2.10 Generate possible reasons for an event or development in the past.	x	x	x
HIST 2.11 Select which reasons might be more likely than others to explain a historical event or development.	x	x	x
CIV 2.1 Describe how communities work to accomplish common tasks, establish responsibilities and fulfill roles of authority.	x	x	x
CIV 2.2 Follow agreed upon rules for discussion while responding attentively to others when addressing ideas and making decisions as a group.	x	x	x
CIV 2.3 Describe democratic principles such as equality, fairness, and respect for legitimate authority and rules.	x	x	x
CIV 2.4 Compare their own point of view with others' perspectives.	x	x	x
CIV 2.5 Explain how people can work together to make decisions in the classroom.	x	x	x
CIV 2.6 Identify and explain how rules function in public (classroom and school) settings	x	x	x
CIV 2.7 Describe how people have tried to improve their communities over time.	x	x	x
ECO 2.1 Explain how scarcity necessitates decision-making.	x	x	x
ECO 2.2 Identify the benefits and costs of making various personal decisions.	x	x	x
ECO 2.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.	x	x	x
GEO 2.1 Construct geographic representations of familiar places.	x	x	x
GEO 2.2 Use geographic representations to describe places and interactions that shape them.	x	x	x
GEO 2.3 Use geographic representations to identify cultural and environmental characteristics of a place.	x	x	x

GEO 2.4 Explain how the environment affects people’s lives.	x	x	x
GEO 2.5 Explain how humans affect the culture and environment of places/regions.	x	x	x
GEO 2.6 Identify cultural and environmental characteristics of a place/region.	x	x	x

**UNIT 1: Unit 1: Government**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary Academic Vocabulary
HIST 2.1- 2.11	HIST 2.1 Create a chronological sequence of multiple events.	x	Content Knowledge	Chronological Sequence Events Compare Past Shaped Significant Historical Perspectives Accounts Sources Maker Information Particular Development
	HIST 2.2 Compare life in the past to life today.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	HIST 2.3 Generate questions about individuals and groups who have shaped a significant historical change.		Physical Skill	
	HIST 2.4 Explain perspectives of people in the past to those of people in the present.	x	Product Development	
	HIST 2.5 Compare different accounts of the same historical event.		Learning Behavior	
	HIST 2.6 Identify different kinds of historical sources.			
	HIST 2.7 Explain how historical sources can be used to study the past.			
	HIST 2.8 Identify the maker, date, and place of origin for a historical source from information within the source itself.			
	HIST 2.9 Generate questions about a particular historical source as it relates to a particular historical event or development.			
	HIST 2.10 Generate possible reasons for an event or development in the past.			
	HIST 2.11 Select which reasons might be more likely than others to explain a historical event or			

	development.			
CIV 2.1-2.7	<p>CIV 2.1 Describe how communities work to accomplish common tasks, establish responsibilities and fulfill roles of authority.</p> <p>CIV 2.2 Follow agreed upon rules for discussion while responding attentively to others when addressing ideas and making decisions as a group.</p> <p>CIV 2.3 Describe democratic principles such as equality, fairness, and respect for legitimate authority and rules.</p> <p>CIV 2.4 Compare their own point of view with others' perspectives.</p> <p>CIV 2.5 Explain how people can work together to make decisions in the classroom.</p> <p>CIV 2.6 Identify and explain how rules function in public (classroom and school) settings.</p> <p>CIV 2.7 Describe how people have tried to improve their communities over time.</p>	x	Content Knowledge	Communities Accomplish Task Common Responsibilities Rules Democratic Principles Equality Fairness Legitimate Authority Rules Perspectives Point of view Function Improve Community
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
ECO 2.1-2.3	<p>ECO 2.1 Explain how scarcity necessitates decision-making.</p> <p>ECO 2.2 Identify the benefits and costs of making various personal decisions.</p> <p>ECO 2.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.</p>	x	Content Knowledge	Scarcity Necessity Benefits Costs Decisions Services Goods Local Produce produced
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
GEO 2.1-2.6	<p>GEO 2.1 Construct geographic representations of familiar places.</p> <p>GEO 2.2 Use geographic representations to describe places and interactions that shape them.</p> <p>GEO 2.3 Use geographic representations to identify cultural and environmental characteristics of a place.</p>	x	Content Knowledge	Environment Affects Culture places/regions Environmental Characteristics
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	

<p>GEO 2.4 Explain how the environment affects people’s lives.  GEO 2.5 Explain how humans affect the culture and environment of places/regions.  GEO 2.6 Identify cultural and environmental characteristics of a place/region.</p>	<p>Learning Behavior</p>	
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**UNIT ESSENTIAL QUESTIONS**

- What is ‘government’ and what does the government do?
- How do people and groups decide how to make the world a different place?

<b>CCSS Standard #</b>	<b>Objective(s):</b> The students will be able to:	<b>Summative Assessment Strategy</b>	<b>Additional Student Outcomes</b>							<b>Common Learning Experiences</b>										
<p>HIST 2.1-2.11</p>	<p>I can examine how a community is shaped by the different views of people and groups in the community. Capstone Books: Traditions Around the World, Games Around the World</p> <p>I can examine the reasons why people take action in their community to make it a better place.</p>	<table border="1"> <tr> <td>x</td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td>x</td> <td>Observation</td> </tr> </table>	x	Selected Response	x	Constructed Response	x	Performance	x	Observation	<table border="1"> <tr> <td>x</td> <td>Reading</td> <td>x</td> <td>Writing</td> <td></td> <td>Math</td> <td></td> <td>Tech</td> </tr> </table> <p><b>CT Core Standards:</b>  CCSS.ELA-Literacy.SL.2.1  CCSS.ELA-Literacy.RI.2.1-10  CCSS.ELA-Literacy.W.2.1-2  CCSS.ELA-Literacy.W.2.7-10  CCSS.ELA-Literacy.L.2.1-3</p>	x	Reading	x	Writing		Math		Tech	<p>Explore how people and groups with different views shaped a community.</p> <p>Explore what causes people in our schools and community to take action to make the world a better place.</p>
x	Selected Response																			
x	Constructed Response																			
x	Performance																			
x	Observation																			
x	Reading	x	Writing		Math		Tech													
<p>CIV 2.1-2.7</p>	<p>I can explain what a government is.</p> <p>I can explain what a government does.</p> <p>I can explain what freedom is.</p> <p>I can examine the responsibilities that come from freedom.</p>	<table border="1"> <tr> <td>x</td> <td>Selected Response</td> </tr> <tr> <td>x</td> <td>Constructed Response</td> </tr> <tr> <td>x</td> <td>Performance</td> </tr> <tr> <td>x</td> <td>Observation</td> </tr> </table>	x	Selected Response	x	Constructed Response	x	Performance	x	Observation	<table border="1"> <tr> <td>x</td> <td>Reading</td> <td>x</td> <td>Writing</td> <td></td> <td>Math</td> <td></td> <td>Tech</td> </tr> </table> <p><b>CT Core Standards:</b>  CCSS.ELA-Literacy.SL.2.1  CCSS.ELA-Literacy.RI.2.1-10  CCSS.ELA-Literacy.W.2.1-2  CCSS.ELA-Literacy.W.2.7-10  CCSS.ELA-Literacy.L.2.1-3</p>	x	Reading	x	Writing		Math		Tech	<p>Explore different ways students can make a difference in their community.</p> <p>Explore the roles and responsibilities of a government.</p>
x	Selected Response																			
x	Constructed Response																			
x	Performance																			
x	Observation																			
x	Reading	x	Writing		Math		Tech													

											Explore what it means to be free and what responsibilities come with freedom.		
ECO 2.1-2.3	I can examine the differences individuals and groups make by where they live and what they have. I can explain how my family makes decisions about what to buy and how to spend money. I can explain how my school makes decisions about what to buy and how to spend money.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore how individuals and groups make a difference by influencing how we live and what we have.  Explore how families and schools make decisions about what to buy and how to spend their budget.	
		x	Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3									
		x	Performance										
		x	Observation										
GEO 21-2.6	I can examine how the environment affects people's lives.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore how the environment of our city has changed over time.	
		x	Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3									
		x	Performance										
		x	Observation										

**ADDITIONAL CONSIDERATIONS**

<b>COMMON MISCONCEPTIONS</b>	<b>PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT</b>	<b>ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY</b>	<b>OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT</b>
		<p>Exposure to additional grade level content around local and national government including methods used to address challenges and problems that arise.</p> <p>Inquiry and study of additional community organizations and their role with supporting our community.</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts.</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of government.</p>

**RESOURCES**

Books:

- What Makes a Community?
- How Can People Help Communities?
- Show Me Community Helpers
- How Can We Help Out in Our Community?
- Firefighters
- Librarians Help
- Firefighters Help
- Nurses Help
- Police Officers Help
- A Day in the Life of an Emergency Medical Technician
- Using Maps
- The World of Maps
- Traditions Around the World
- Games Around the World

- Module 3/Set 1 - Right to Learn
- Module 3/Set 2 - Extraordinary
- Module 3/Set 3 - Uniting Communities
- Module 3/Set 4 - I Voted

## UNIT 2: Rights and Responsibilities of Citizens in Society (Bristol)

### UNWRAPPED STANDARDS

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary Academic Vocabulary
HIST 2.1- 2.11	HIST 2.1 Create a chronological sequence of multiple events.	x	Content Knowledge	Chronological Sequence Events Compare Past Shaped Significant Historical Perspectives Accounts Sources Maker Information Particular Development
	HIST 2.2 Compare life in the past to life today.	x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
	HIST 2.3 Generate questions about individuals and groups who have shaped a significant historical change.		Physical Skill	
	HIST 2.4 Explain perspectives of people in the past to those of people in the present.	x	Product Development	
	HIST 2.5 Compare different accounts of the same historical event.		Learning Behavior	
HIST 2.6 Identify different kinds of historical sources.				
HIST 2.7 Explain how historical sources can be used to study the past.				
HIST 2.8 Identify the maker, date, and place of origin for a historical source from information within the source itself.				
HIST 2.9 Generate questions about a particular historical source as it relates to a particular historical event or development.				
HIST 2.10 Generate possible reasons for an event or development in the past.				
HIST 2.11 Select which reasons might be more likely than others to explain a historical event or				

	development.			
CIV 2.1-2.7	CIV 2.1 Describe how communities work to accomplish common tasks, establish responsibilities and fulfill roles of authority. CIV 2.2 Follow agreed upon rules for discussion while responding attentively to others when addressing ideas and making decisions as a group. CIV 2.3 Describe democratic principles such as equality, fairness, and respect for legitimate authority and rules. CIV 2.4 Compare their own point of view with others' perspectives. CIV 2.5 Explain how people can work together to make decisions in the classroom. CIV 2.6 Identify and explain how rules function in public (classroom and school) settings. CIV 2.7 Describe how people have tried to improve their communities over time.	x	Content Knowledge	Communities Accomplish Task Common Responsibilities Rules Democratic Principles Equality Fairness Legitimate Authority Rules Perspectives Point of view Function Improve Community
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
ECO 2.1-2.3	ECO 2.1 Explain how scarcity necessitates decision-making. ECO 2.2 Identify the benefits and costs of making various personal decisions. ECO 2.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.	x	Content Knowledge	Scarcity Necessity Benefits Costs Decisions Services Goods Local Produce produced
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	
			Learning Behavior	
GEO 2.1-2.6	GEO 2.1 Construct geographic representations of familiar places. GEO 2.2 Use geographic representations to describe places and interactions that shape them.	x	Content Knowledge	Environment Affects Culture places/regions Environmental Characteristics
		x	Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
		x	Product Development	

	<p>GEO 2.3 Use geographic representations to identify cultural and environmental characteristics of a place.</p> <p>GEO 2.4 Explain how the environment affects people's lives.</p> <p>GEO 2.5 Explain how humans affect the culture and environment of places/regions.</p> <p>GEO 2.6 Identify cultural and environmental characteristics of a place/region.</p>	Learning Behavior	
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**UNIT ESSENTIAL QUESTIONS**

- How have people tried to improve communities over time?
- How have actions of people in the past influence our community today?
- What are the different roles people play in our local community and how does their work affect our lives and the decisions we make in our town?
- What does it mean to make a difference in your community?
- What are the rights and responsibilities of citizens within a community?
- How do needs and wants affect how communities are formed and how they function?
- How do things we use get to our community?
- What services are provided in our town?
- How does where we live affect how we live?
- How can maps help us to learn about the important places in our town?

CCSS Standard #	Objective(s): The students will be able to:	Summative Assessment Strategy		Additional Student Outcomes						Common Learning Experiences						
HIST 2.1-2.11	<p>I can examine how the actions of people in the past influence our community today.</p> <p>I can identify the different roles people play in our local community.</p>	x	Selected Response	x	Reading	x	Writing		Math		Tech	<p>Explore historical landmarks and their significance</p> <p>Examine the lives of people who have promoted the common good including issues of equality, justice, and the rights of the individual</p> <p>Explore different ways</p>				
		x	Constructed Response	<p><b>CT Core Standards:</b></p> <p>CCSS.ELA-Literacy.SL.2.1</p> <p>CCSS.ELA-Literacy.RI.2.1-10</p> <p>CCSS.ELA-Literacy.W.2.1-2</p> <p>CCSS.ELA-Literacy.W.2.7-10</p> <p>CCSS.ELA-Literacy.L.2.1-3</p>												
		x	Performance													
		x	Observation													



	I can discuss services provided in our town.											
GEO 2.1-2.6	I can discuss where we live affects how we live.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Explore current Bristol maps of community  Explore Bristol historical landmarks
		x	Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3								
	x	Performance										
	x	Observation										

**ADDITIONAL CONSIDERATIONS**

<b>COMMON MISCONCEPTIONS</b>	<b>PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT</b>	<b>ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY</b>	<b>OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT</b>
		<p>Exposure to additional grade level content around local and national government roles and responsibilities such as that of mayors, previous mayors, presidents, etc. including methods used to address challenges and problems that arise under their leadership.</p> <p>Inquiry and study of additional community organizations and their role with supporting our community.</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts.</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of citizenship and roles and responsibilities.</p>

**RESOURCES**

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Possible Slide deck

Books:

- The U.S. Constitution
- The U.S Presidency
- Abraham Lincoln
- Booker T. Washington
- Election Day
- Our Heroes
- Mae Jemison
- Wants Versus Needs: A Place to Live
- Wants Versus Needs: Clothes
- Wants Versus Needs: Possessions
- Where Do Vegetables Come From
- Where Do Fruits Come From
- Where Do Grains Come From
- How Do Animals Give Us Food
- At a Factory
- Oranges: From Fruit to Juice
- Needs and Wants
- Spend Money
- Save Money
- Learn About Money
- Make Money Choices
- Staying Safe on the Playground
- Staying Safe on the School Bus

**Unit 3: People from the Past who Contribute to Society**

**UNWRAPPED STANDARDS**

Standard		Type of Standard		Concepts and Disciplinary-Specific Vocabulary Academic Vocabulary
HIST 2.1- 2.11	HIST 2.1 Create a chronological sequence of multiple events.	x	Content Knowledge	Chronological Sequence Events
	HIST 2.2 Compare life in the past to		Skill (Problem-Solving, Writing,	

	<p>life today.</p> <p>HIST 2.3 Generate questions about individuals and groups who have shaped a significant historical change.</p> <p>HIST 2.4 Explain perspectives of people in the past to those of people in the present.</p> <p>HIST 2.5 Compare different accounts of the same historical event.</p> <p>HIST 2.6 Identify different kinds of historical sources.</p> <p>HIST 2.7 Explain how historical sources can be used to study the past.</p> <p>HIST 2.8 Identify the maker, date, and place of origin for a historical source from information within the source itself.</p> <p>HIST 2.9 Generate questions about a particular historical source as it relates to a particular historical event or development.</p> <p>HIST 2.10 Generate possible reasons for an event or development in the past.</p> <p>HIST 2.11 Select which reasons might be more likely than others to explain a historical event or development.</p>		<p>Speaking, Listening, Reasoning)</p> <p>Physical Skill</p> <p>Product Development</p> <p>Learning Behavior</p>	<p>Compare Past Shaped Significant Historical Perspectives Accounts Sources Maker Information Particular Development</p>
<p>CIV 2.1-2. 7</p>	<p>CIV 2.1 Describe how communities work to accomplish common tasks, establish responsibilities and fulfill roles of authority.</p> <p>CIV 2.2 Follow agreed upon rules for discussion while responding attentively to others when addressing ideas and making decisions as a group.</p>	<p>x</p>	<p>Content Knowledge</p> <p>Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)</p> <p>Physical Skill</p> <p>Product Development</p> <p>Learning Behavior</p>	<p>Communities Accomplish Task Common Responsibilities Rules Democratic Principles Equality</p>

	<p>CIV 2.3 Describe democratic principles such as equality, fairness, and respect for legitimate authority and rules.</p> <p>CIV 2.4 Compare their own point of view with others' perspectives.</p> <p>CIV 2.5 Explain how people can work together to make decisions in the classroom.</p> <p>CIV 2.6 Identify and explain how rules function in public (classroom and school) settings.</p> <p>CIV 2.7 Describe how people have tried to improve their communities over time.</p>			<p>Fairness</p> <p>Legitimate</p> <p>Authority</p> <p>Rules</p> <p>Perspectives</p> <p>Point of view</p> <p>Function</p> <p>Improve</p> <p>Community</p>
ECO 2.1-2.3	<p>ECO 2.1 Explain how scarcity necessitates decision-making.</p> <p>ECO 2.2 Identify the benefits and costs of making various personal decisions.</p> <p>ECO 2.3 Describe the goods and services that people in the local community produce and those that are produced in other communities.</p>	x	Content Knowledge	<p>Scarcity</p> <p>Necessity</p> <p>Benefits</p> <p>Costs</p> <p>Decisions</p> <p>Services</p> <p>Goods</p> <p>Local</p> <p>Produce</p> <p>produced</p>
			Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
			Product Development	
			Learning Behavior	
GEO 2.1-2.6	<p>GEO 2.1 Construct geographic representations of familiar places.</p> <p>GEO 2.2 Use geographic representations to describe places and interactions that shape them.</p> <p>GEO 2.3 Use geographic representations to identify cultural and environmental characteristics of a place.</p> <p>GEO 2.4 Explain how the environment affects people's lives.</p>	x	Content Knowledge	<p>Environment</p> <p>Affects</p> <p>Culture</p> <p>places/regions</p> <p>Environmental</p> <p>Characteristics</p>
			Skill (Problem-Solving, Writing, Speaking, Listening, Reasoning)	
			Physical Skill	
			Product Development	
			Learning Behavior	

<p>GEO 2.5 Explain how humans affect the culture and environment of places/regions.</p> <p>GEO 2.6 Identify cultural and environmental characteristics of a place/region.</p>		
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**UNIT ESSENTIAL QUESTIONS**

- How have the actions and beliefs of people throughout time made an impact on society?
- What is your role in society?
- What evidence do we have that individuals have impacted society?
- How and why do we remember certain people and how do we honor their thinking and influence?
- How do we know individuals or people have made a difference in society?
- Who are the people who have impacted Bristol in the past and how have they impacted the way we live today?
- What were the contributions/goods and services made by individuals and groups?
- How has the economic choices of those from the past impacted the economic choices we make today?
- How have humans affected the culture and the environment of the communities we live in? (Town, state, country)
- How can maps help us learn more about the significant changes that people have made in our community?

CCSS Standard #	Objective(s): The students will be able to:	Summative Assessment Strategy	Additional Student Outcomes						Common Learning Experiences			
HIST 2.1-2.11	I can discuss how individuals made an impact on society with evidence.	x Selected Response	x	Reading	x	Writing		Math		Tech	Study of famous Americans such as Booker T. Washington, Mae Jemison, Madam C.J. Walker and George Washington Carver and their contributions to society.	
		x Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3									
	I can explain why and how we remember certain people.	x Performance										
	I can explain why we honor their thinking.	x Observation										

CIV 2.1-2.7	I can explain how individuals and people made a difference in our society. I can identify who the people are that have impacted Bristol in the past. I can discuss how the people in Bristol impacted the way we live today.	x	Selected Response	x	Reading		Writing		Math		Tech	Study of important people in Bristol's town government and school system such as Mayor, councilman, BOE members, and Superintendent.  Study of famous Bristol citizens and their impact and contribution to Bristol.	
		x	Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3									
		x	Performance										
		x	Observation										
ECO 2.1-2.3	I can explain the different goods and services made by individuals and groups.  I can discuss how the economic choices of the people of the past have impacted the economic choices we make today.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Study of famous Americans and the impact on services and goods such as Madam C.J. Walker and George Washington Carver.  Explore economic differences between then and now.	
		x	Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3									
		x	Performance										
		x	Observation										
GEO 2.1-2.6	I can discuss how humans have affected the culture and the environment we live in. (Town, state, country)  I can use a map to help me learn more about the significant changes people have made in our community.	x	Selected Response	x	Reading	x	Writing		Math		Tech	Study maps from the past and compare them to present maps.  Use of Google Earth.  Study of Bristol through the Bristol Historical Society.	
		x	Constructed Response	<b>CT Core Standards:</b> CCSS.ELA-Literacy.SL.2.1 CCSS.ELA-Literacy.RI.2.1-10 CCSS.ELA-Literacy.W.2.1-2 CCSS.ELA-Literacy.W.2.7-10 CCSS.ELA-Literacy.L.2.1-3									
		x	Performance										
		x	Observation										

**ADDITIONAL CONSIDERATIONS**

<b>COMMON MISCONCEPTIONS</b>	<b>PRIOR KNOWLEDGE NEEDED TO MASTER STANDARDS FOR THIS UNIT</b>	<b>ADVANCED STANDARDS FOR STUDENTS WHO HAVE DEMONSTRATED PRIOR MASTERY</b>	<b>OPPORTUNITIES FOR STUDENT-DIRECTED LEARNING WITHIN THE UNIT</b>
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		<p>Exposure to additional grade level content around famous Americans and their contributions and impact on economics and civics.</p> <p>Provide text with a higher lexile level so students can practice concepts and inquiry with more complex texts.</p>	<p>Student centered social studies stations that integrate additional reading, writing, and inquiry stations in the areas of important contributions to society and Bristol.</p>
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### RESOURCES

- Madam C.J Walker
- George Washington Carver
- History Around You
- Then and Now
- Talking About the Past
- Finding Out About Your Family History
- Families Then and Now
- History Rocks
- River Communities Past and Present
- Desert Communities Past and Present
- Arctic Communities Past and Present
- Plains Communities Past and Present

**Geodes:**

- Module 2/Set 1 - Looking West
- Module 2/Set 2 - Go West
- Module 2/Set 3-Mountains Majestic
- Module 2/Set 4 - Mavericks of the West
- Module 3/Set 1 - Right to Learn
- Module 3/Set 2 - Extraordinary
- Module 3/Set 3 - Uniting Communities
- Module 3/Set 4 - I Voted