

Pascack Valley Regional High School District

**Pascack Hills High School, Montvale, New Jersey
Pascack Valley High School, Hillsdale, New Jersey**

Course Name: Earth's Natural Disasters

Born On: August, 2017
Revised On: August, 2020
Revised On: August 2022
Current Revision: August, 2023
Board Approval: 8/28/2023

New Jersey Curricular Mandates for Science Instruction

Disabled & LGBT:

18A:35-4.35 - History of disabled and LGBT persons included in middle and high school curriculum. A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards.

Diversity, Equity, and Inclusion (DEI):

C.18A:35-4.36a - Curriculum to include instruction on diversity and inclusion. 1. a. Beginning in the 2021-2022 school year, each school district shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards. b. The instruction shall: (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance; (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs. c. The Commissioner of Education shall provide school districts with sample learning activities and resources designed to promote diversity and inclusion.

Amistad Law:

N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Climate Change:

2020 NJSL-Science: Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities. Global climate change has already resulted in a wide range of impacts across New Jersey and in many sectors of its economy. The addition of academic standards that focus on climate change is important so that all students will have a basic understanding of the climate system, including the natural and human-caused factors that affect it. The underpinnings of climate change span across physical, life, as well as Earth and space sciences. The goal is for students to understand climate science as a way to inform decisions that improve quality of life for themselves, their community, and globally and to know how engineering solutions can allow us to mitigate impacts, adapt practices, and build resilient systems.

Dissection Law

N.J.S.A. 18A:35-4.25 and N.J.S.A. 18A:35-4.24 authorizes parents or guardians to assert the right of their children to refuse to dissect, vivisect, incubate, capture or otherwise harm or destroy animals or any parts thereof as part of a course of instruction.

Earth's Natural Disasters		
Unit 1: Introduction to Earth's Natural Disasters		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that cause changes to other Earth systems.		
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.		
HS-ESS3-4 Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.		
HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).		
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.		
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 impacts.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Developing and Using Models</p> <ul style="list-style-type: none"> Use a model to provide mechanistic accounts of phenomena. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. Design or refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. Evaluate a solution to a complex real-world problem, based on scientific knowledge, student-generated 	<p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. <p>ESS2.D: Weather and Climate</p> <ul style="list-style-type: none"> Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (<i>secondary</i>) The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>-----</p> <p style="text-align: center;">-</p> <p style="text-align: center;">Connections to Engineering, Technology, and Applications of Science</p>

<p>sources of evidence, prioritized criteria, and tradeoff considerations.</p> <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze data using computational models in order to make valid and reliable scientific claims. 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. <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Analyze complex real-world problems by specifying criteria and constraints for successful solutions. 	<p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. <p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. <p>ESS3.D: Global Climate Change</p> <ul style="list-style-type: none"> Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> 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. 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. <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> 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. (<i>secondary</i>) 	<p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Engineers continuously modify these technological systems by applying scientific knowledge and engineering design practices to increase benefits while decreasing costs and risks. Modern civilization depends on major technological systems. 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. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> What classifies an event as a natural disaster? What is the difference between natural hazards and natural disasters? Why is understanding these natural hazards important to engineers and everyone's survival on our planet? 	<ul style="list-style-type: none"> List the many types of natural hazards—avalanche, earthquake, flood, forest fire, hurricane, landslide, thunderstorm, tornado, tsunami and volcano Identify specific examples of natural disasters. 	<ul style="list-style-type: none"> Hands on Laboratory Activities: practice with a variety of techniques and devices used to detect disasters. Project: students choose a disaster, provide background, research the causes, effects (long and short term), and compare to another disaster (of the same kind 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.

	<ul style="list-style-type: none"> - Use real-time data to analyze how often natural disasters occur. - Generate a model of the Earth explaining the internal and external forces causing natural disasters. - Research the economic impact of specific disasters to gain a sense of scale. - Describe tools and methods for detecting natural disasters - Compare and contrast several disasters that have caused the most loss in terms of lives and money. - Describe methods for mitigation against such disasters. - Explain why engineers care about natural disasters. 	<p>in a different location or of a different kind in the same location) (<i>Disaster Summary</i>)</p> <ul style="list-style-type: none"> - Project: Imagine a world where a specific disaster hadn't yet occurred. What would be the same? What would be different? - Engineering to Prevent Natural Disasters: Save Our City! for students to learn about some of the basic methods that engineers use to detect and prevent natural disasters and are challenged to decide where to place these devices on a map of an hypothetical city. - Write a paper in which you imagine that a natural disaster occurs in our community. What have engineers created that would help you survive the dangerous situation? (Engineer-designed examples might include: Strong roof, insulated walls, heating system, lighting, communication devices (radio, television, phones), indoor plumbing and electricity, stoves and refrigerators, warm clothing made with modern fabrics, weather predicting and warning devices, safe vehicles, etc.) - Project: Imagine you could go back in time and warn the citizens of a particular time/ location of a 	<ul style="list-style-type: none"> - Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation. - Assessment of providing and using feedback by completing a peer review for your classmate's project.
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		particular disaster. Where would you choose? What would you tell them to do? How much time would you need to give them?	
Resources/Materials	https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf https://www.teachengineering.org/curricularunits/view/cub_natdis_curricularunit		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>WHST.9-12.1 - Write arguments focused on discipline-specific content.</p>		
Interdisciplinary Connections	<p><u>ELA/Literacy</u></p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>		
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p> <p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p>		

	<p>Career Readiness, Life Literacies, and Key Skills Practices Act as a responsible and contributing community member and employee Consider the environmental, social, and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Work productively in teams while using cultural/global competence.</p>		
<p>Computer Science and Design Thinking</p>	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor). 8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation. 8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience. 8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>		
Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. 	<ul style="list-style-type: none"> ● Provide adequate scaffolds for the design process. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons ● Get a written list of instructions ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner 	<ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. 	<ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research outside of project requirements.

Earth's Natural Disasters		
Unit 2: Severe Weather		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.		
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.		
HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.		
HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).		
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.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Developing and Using Models</p> <ul style="list-style-type: none"> Use a model to provide mechanistic accounts of phenomena. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze data using computational models in order to make valid and reliable scientific claims. 	<p>ESS1.B: Earth and the Solar System</p> <ul style="list-style-type: none"> Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes. (<i>secondary</i>) <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles. <p>ESS2.D: Weather and Climate</p> <ul style="list-style-type: none"> Current models predict that, although future 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. <p style="text-align: center;">-----</p> <p style="text-align: center;">Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems.

Asking Questions and Defining Problems

- Analyze complex real-world problems by specifying criteria and constraints for successful solutions.

Connections to Nature of Science

Scientific Investigations Use a Variety of Methods

- Science investigations use diverse methods and do not always use the same set of procedures to obtain data.
- New technologies advance scientific knowledge.
 - Science arguments are strengthened by multiple lines of evidence supporting a single explanation.

Scientific Knowledge is Based on Empirical Evidence

- Science knowledge is based on empirical evidence.
- Science arguments are strengthened by multiple lines of evidence supporting a single explanation.

regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (*secondary*)

- The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space.

ESS3.A: Natural Resources

- Resource availability has guided the development of human society.

ESS3.B: Natural Hazards

- Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations.

ESS3.D: Global Climate Change

- Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts.
- Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities.

ETS1.A: Defining and Delimiting Engineering Problems

- 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.
- 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

Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.

engineering. These global challenges also may have manifestations in local communities.

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> - What evidence is there, if any, for a change in severe weather patterns, both locally and globally? - How do natural disasters affect human life in New Jersey? - How are our air patterns different from those in other regions of the US and how does this affect the types of severe weather that we experience? 	<ul style="list-style-type: none"> - Create models to show how weather phenomena work. - Investigate the types of storms that form in the United States and why they occur. - Identify methods by which our atmosphere gets heated - Describe the effects of air masses, fronts and global wind patterns on severe weather. - Identify primary, secondary and tertiary effects of natural disasters. - Diagram and describe how a thunderstorm forms. 	<ul style="list-style-type: none"> - Laboratory Activities <ul style="list-style-type: none"> - Simple designs of structures and compare their strength. - Watch documentaries on storm formation and cataclysms - Project: Design a “storm-proof” residential dwelling. - Project: Design and build a way to safely and accurately deliver relief goods (represented by an egg) to people in a natural disaster area with no road access. Similar to real-world engineering design teams, students must design their devices with constraints such as limited materials. 	<ul style="list-style-type: none"> - Assessment of written and verbal mastery of unit-specific vocabulary. - Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. - Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation. - Assessment of Engineering Design Process skill by completing a project including supporting documentation.
<p>Resources/Materials</p>	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.teachengineering.org/activities/view/duk_consenergy_rde_act 		

<p>ELA Companion Standards</p>	<p>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> <p>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> <p>WHST.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>WHST.9-12.1 - Write arguments focused on discipline-specific content.</p>
<p>Interdisciplinary Connections</p>	<p><u>ELA/Literacy</u></p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>
<p>Career Readiness, Life Literacies, and Key Skills</p>	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p> <p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</p> <p>Act as a responsible and contributing community member and employee</p> <p>Consider the environmental, social, and economic impacts of decisions.</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Work productively in teams while using cultural/global competence.</p>

<p>Computer Science and Design Thinking</p>	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.</p> <p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).</p> <p>8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.</p> <p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.</p> <p>8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>
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Modifications

Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Restate design steps aloud before project activity. ● Assign a native language partner. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide a variety of texts and resources on curriculum topics at a range of reading levels. ● Provide models of completed homework assignments, projects, etc. 	<ul style="list-style-type: none"> ● Provide extended time for the creation of products. ● Scaffolded explanations for proper use of equipment. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions. ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner 	<ul style="list-style-type: none"> ● Provide peer mentoring to improve techniques. ● Provide an outline for project tasks. ● Incorporate student choice ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. ● Classroom activities should be noncompetitive. 	<ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Advanced projects.

Earth's Natural Disasters		
Unit 3: Hurricanes and Floods		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.		
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.		
HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.		
HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).		
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.		
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.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Developing and Using Models</p> <ul style="list-style-type: none"> Use a model to provide mechanistic accounts of phenomena. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. 	<p>ESS1.B: Earth and the Solar System</p> <ul style="list-style-type: none"> Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes. (<i>secondary</i>) <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles. <p>ESS2.D: Weather and Climate</p> <ul style="list-style-type: none"> Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible.

<p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze data using computational models in order to make valid and reliable scientific claims. <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Analyze complex real-world problems by specifying criteria and constraints for successful solutions. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Investigations Use a Variety of Methods</p> <ul style="list-style-type: none"> Science investigations use diverse methods and do not always use the same set of procedures to obtain data. New technologies advance scientific knowledge. Science arguments are strengthened by multiple lines of evidence supporting a single explanation. <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science knowledge is based on empirical evidence. Science arguments are strengthened by multiple lines of evidence supporting a single explanation. 	<p>ways in which these gases are absorbed by the ocean and biosphere. (<i>secondary</i>)</p> <ul style="list-style-type: none"> The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. <p>ESS3.D: Global Climate Change</p> <ul style="list-style-type: none"> Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> 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. 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. <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> 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. 	<p>-----</p> <p style="text-align: center;">Connections to Engineering, Technology, and Applications of Science</p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> What are the characteristics that made Hurricane Sandy so devastating to New Jersey? 	<ul style="list-style-type: none"> Name and classify hurricanes Describe some of the most devastating hurricanes on record. 	<ul style="list-style-type: none"> Hands on Laboratory Activities <ul style="list-style-type: none"> Storm tracking using NOAA weather 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of modeling

<ul style="list-style-type: none"> - What actions should one take before a hurricane to prepare? 	<ul style="list-style-type: none"> - Describe the factors that contribute to the damage caused by hurricanes. - Identify the differences between hurricanes, typhoons, cyclones and tropical storms. - Create models to show how hurricanes form. - Compare and contrast various historical storms with respect to timing, economic impact and lives lost. - Determine how hurricanes are tracked, categorized and predicted. - Understand how to stay safe and protect against hurricanes and floods. - Identify regions in our area that are at risk for flooding. 	<p style="text-align: center;">website</p> <ul style="list-style-type: none"> - Create a model of hurricane formation. - Research historical storms with respect to timing, economic impact and lives lost. - Activity: Hurricane tracking dice game - Hurricane Katrina case study report - Hurricane Sandy case study presentations - Activity: Collect and analyze hurricane data to determine how they are tracked, categorized and predicted. - Create a plan to advise local residents how to stay safe and protect against hurricanes and floods. - Investigate and present flood risks for a particular region in our area, and describe the economic and social consequences (short and long term). 	<ul style="list-style-type: none"> - skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. - Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted - Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>		

	WHST.9-12.1 - Write arguments focused on discipline-specific content.
Interdisciplinary Connections	<p><i>ELA/Literacy</i></p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><i>Mathematics</i></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p> <p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</p> <p>Act as a responsible and contributing community member and employee</p> <p>Consider the environmental, social, and economic impacts of decisions.</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Work productively in teams while using cultural/global competence.</p>
Computer Science and Design Thinking	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.</p> <p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).</p> <p>8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.</p> <p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.</p>

8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints			
Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> • When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. • Provide models of completed homework assignments, projects, etc. • Assign a native language partner. • Use sentence/paragraph frames to assist with writing peer review. • Provide extended time for written responses and reports. 	<ul style="list-style-type: none"> • Use scaffolds, such as prompting to assist with the design process. • Provide extended time for written responses and reports. • Use a graphic organizer to categorize concepts. • Get a written list of instructions • Receive large project as smaller tasks with individual deadlines • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management • Work with a partner 	<ul style="list-style-type: none"> • Use a graphic organizer to categorize concepts. • Provide an outline for research and design tasks. • Provide extended time for written responses and reports. • Incorporate student choice • Provide peer mentoring to improve techniques • Use effort and achievement rubrics • Assure students they can be successful • Promote mastery or challenging tasks • Allow students many opportunities for practice and learning • Use scaffolding for complex tasks • Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	<ul style="list-style-type: none"> • Interview someone in the field of technology education about how they use the design process in their profession. • Offer choices, once finished with basic tasks, with personal interest being the key.

Earth's Natural Disasters		
Unit 4: Plate Tectonics		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS1-5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.		
HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.		
HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.		
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.		
HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. <p>Developing and Using Models</p> <ul style="list-style-type: none"> Develop a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems. <p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> Evaluate the validity and reliability of multiple claims that appear in scientific 	<p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust. Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior. <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a framework for understanding its geologic history. <i>(ESS2.B Grade 8 GBE) (secondary)</i> 	<p>Patterns</p> <ul style="list-style-type: none"> Empirical evidence is needed to identify patterns. <p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. <p>Energy and Matter</p> <ul style="list-style-type: none"> Energy drives the cycling of matter within and between systems. <p>Systems and System Models</p> <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information

<p>and technical texts or media reports, verifying the data when possible.</p> <p>-----</p> <p style="text-align: center;">--</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science knowledge is based on empirical evidence. Science disciplines share common rules of evidence used to evaluate explanations about natural systems. Science includes the process of coordinating patterns of evidence with current theory. 	<ul style="list-style-type: none"> The radioactive decay of unstable isotopes continually generates new energy within Earth's crust and mantle, providing the primary source of the heat that drives mantle convection. Plate tectonics can be viewed as the surface expression of mantle convection. <p>PS1.C: Nuclear Processes</p> <ul style="list-style-type: none"> Spontaneous radioactive decays follow a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials. (<i>secondary</i>) <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet. (<i>secondary to HS-ESS2-3</i>) <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> 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. <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. 	<p>flows— within and between systems at different scales.</p> <p>Cause and Effect</p> <ul style="list-style-type: none"> 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. <p>-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Science and engineering complement each other in the cycle known as research and development (R&D). Many R&D projects may involve scientists, engineers, and others with wide ranges of expertise.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> How does the structure of the Earth at and beneath the surface influence our lives? What are the geologic and economic impacts of a dynamic earth? 	<ul style="list-style-type: none"> Describe the materials that comprise the earth in terms of material, temperature, state, and motion. Describe the layers of the Earth. Make a scale model. Compare a model of the Earth with what it represents. Explain why engineers need 	<ul style="list-style-type: none"> Hands on Laboratory Activities <ul style="list-style-type: none"> Plate tectonics puzzle game Design a 3-D scale model of the Earth and its layers. Activity: Calculate how far some continents will travel in 100 years, using the constant speed equation. Support the theory of plate 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of modeling skills by drawing and labeling diagrams, creating 3-D objects, making analogies, and/or making observational sketches. Assessment of research, argumentation, and/or

	<p>to learn about the Earth's structure.</p> <ul style="list-style-type: none"> - Diagram and describe the process of plate tectonics - Outline the history of the plate tectonic theory. - Provide evidence-based support for the theory of plate tectonics - Describe the geologic and economic impacts of a dynamic earth. - Explain the idea that the Earth is a dynamic planet. - Collect data to support the theory of plate tectonics. - Interpret historical data to support the idea of continental drift. - Understand the concept of continental drift and be able to describe convection currents. 	<p>tectonics.(<i>Plate tectonics computer simulation</i>)</p> <ul style="list-style-type: none"> - Interpret historical data to support the idea of continental drift. - Project: research other planets to see if any have layers. How does their composition and characteristics compare to that on Earth? Do they exhibit any earthquake or volcanic activity? 	<p>presentation skills by completing a project, including supporting documentation.</p> <ul style="list-style-type: none"> - Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.teachengineering.org/activities/view/cub_natdis_lesson02_activity1 - https://www.teachengineering.org/content/cub_/activities/cub_natdis/cub_natdis_lesson02_activity2_worksheetnew.pdf - https://ngss.nsta.org/Resource.aspx?ResourceID=40 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>		

	WHST.9-12.1 - Write arguments focused on discipline-specific content.
Interdisciplinary Connections	<p><u>ELA/Literacy</u> SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u> HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling. HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. MP.2 - Reason abstractly and quantitatively. MP.4 - Model with mathematics.</p>
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice. 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving. 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions. 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices Act as a responsible and contributing community member and employee Consider the environmental, social, and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Work productively in teams while using cultural/global competence.</p>
Computer Science and Design Thinking	<p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor). 8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>

Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Provide extended time for written responses and reports. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide a variety of texts and resources on curriculum topics at a range of reading levels. ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Use sentence/paragraph frames to assist with writing reports. 	<ul style="list-style-type: none"> ● Use scaffolds, such as prompting to assist with the design process. ● Provide extended time for written responses and reports. ● Use a graphic organizer to categorize concepts. ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner 	<ul style="list-style-type: none"> ● Use a graphic organizer to categorize concepts. ● Provide an outline for research and design tasks. ● Provide extended time for written responses and reports. ● Incorporate student choice ● Provide peer mentoring to improve techniques ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	<ul style="list-style-type: none"> ● Interview someone in the field of technology education about how they use the design process in their profession. ● Offer choices, once finished with basic tasks, with personal interest being the key.

Earth's Natural Disasters		
Unit 5: Earthquakes		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS1-5 Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.		
HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.		
HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.		
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.		
HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.		
HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. <p>Developing and Using Models</p> <ul style="list-style-type: none"> Develop a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems. 	<p>ESS1.C: The History of Planet Earth</p> <ul style="list-style-type: none"> Continental rocks, which can be older than 4 billion years, are generally much older than the rocks of the ocean floor, which are less than 200 million years old. <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust. Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior. <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> Plate tectonics is the unifying theory that explains the past and current movements of the rocks at Earth's surface and provides a framework for understanding its geologic history. <i>(ESS2.B Grade 8 GBE) (secondary)</i> 	<p>Patterns</p> <ul style="list-style-type: none"> Empirical evidence is needed to identify patterns. <p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. <p>Energy and Matter</p> <ul style="list-style-type: none"> Energy drives the cycling of matter within and between systems. <p>Systems and System Models</p> <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information

<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>-----</p> <p style="text-align: center;">---</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science knowledge is based on empirical evidence. Science disciplines share common rules of evidence used to evaluate explanations about natural systems. Science includes the process of coordinating patterns of evidence with current theory. 	<ul style="list-style-type: none"> The radioactive decay of unstable isotopes continually generates new energy within Earth's crust and mantle, providing the primary source of the heat that drives mantle convection. Plate tectonics can be viewed as the surface expression of mantle convection. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. <p>PS1.C: Nuclear Processes</p> <ul style="list-style-type: none"> Spontaneous radioactive decays follow a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials. <i>(secondary)</i> <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet. <i>(secondary to HS-ESS2-3)</i> <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. 	<p>flows— within and between systems at different scales.</p> <p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Science and engineering complement each other in the cycle known as research and development (R&D). Many R&D projects may involve scientists, engineers, and others with wide ranges of expertise. <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> Where in the United States are earthquakes most likely to occur? How do people living in these areas stay safe when earthquakes do occur? Can humans cause an earthquake? 	<ul style="list-style-type: none"> Use real-time data accessed from the internet to analyze seismic activity. Design models of the different types of plate boundaries. Use instruments to model the different types of seismic waves. Explain how the concepts of 	<ul style="list-style-type: none"> Activity: Create models of the different types of faults. Lab Activity: Design an earthquake safe structure using various items and test on a shake table. Project: Presentation of a historic earthquake as part of disaster summary. 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of modeling skills by drawing and labeling diagrams, making analogies, building 3D structures, and/or making observational sketches. Assessment of lab skills

	<p>plate tectonics and continental drift account for earthquakes.</p> <ul style="list-style-type: none"> - Describe the three main types of faults: transcurrent, normal and reverse. - Explain that earthquakes and volcanoes occur along the boundaries of crustal plates. - Where are faults found on the earth's surface? - What are the three types of plate boundaries and why do earthquakes occur at these locations? - Identify the properties, compare and contrast the types of seismic waves associated with earthquakes. 		<p>(Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</p> <ul style="list-style-type: none"> - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - Earthquakes Living Lab - http://earthquake.usgs.gov/4kids/ - https://ngss.nsta.org/Resource.aspx?ResourceID=235 - http://infotrek.er.usgs.gov/pubs/ - https://ngss.nsta.org/Resource.aspx?ResourceID=533 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>WHST.9-12.1 - Write arguments focused on discipline-specific content.</p>		
Interdisciplinary Connections	<u><i>ELA/Literacy</i></u>		

	<p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><i>Mathematics</i></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>
<p>Career Readiness, Life Literacies, and Key Skills</p>	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p> <p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</p> <p>Act as a responsible and contributing community member and employee</p> <p>Consider the environmental, social, and economic impacts of decisions.</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Work productively in teams while using cultural/global competence.</p>
<p>Computer Science and Design Thinking</p>	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.</p> <p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).</p> <p>8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.</p> <p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.</p> <p>8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>

Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Provide a template for documenting the design process. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Provide extended time for written responses and reports. 	<ul style="list-style-type: none"> ● Provide additional time for project development. ● Work with a peer to develop a simpler design. ● Utilize graphics to support learning. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management 	<ul style="list-style-type: none"> ● Invite parents, neighbors, friends, the school principal and other community members to attend class performances. ● Break the design process into smaller pieces. ● Conference with teacher during the design planning process. ● Provide a detailed framework for the project design. ● Incorporate student choice ● Provide peer mentoring to improve techniques ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	<ul style="list-style-type: none"> ● Offer choices, once finished with basic tasks, with personal interest being the key. ● Develop more complex designs based on extensive research both individually and in collaboration with peers.

Earth's Natural Disasters		
Unit 6: Measuring Earthquakes		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features		
HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.		
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.		
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.		
HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. <p>Developing and Using Models</p> <ul style="list-style-type: none"> Develop a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems. <p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible. 	<p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust. Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior. <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> The radioactive decay of unstable isotopes continually generates new energy within Earth's crust and mantle, providing the primary source of the heat that drives mantle convection. Plate tectonics can be viewed as the surface expression of mantle convection. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. 	<p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. <p>Energy and Matter</p> <ul style="list-style-type: none"> Energy drives the cycling of matter within and between systems. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Cause and Effect</p> <ul style="list-style-type: none"> Cause and effect relationships can be suggested and predicted for complex natural and human designed systems by examining

<p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <hr style="border-top: 1px dashed black;"/> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science knowledge is based on empirical evidence. Science disciplines share common rules of evidence used to evaluate explanations about natural systems. Science includes the process of coordinating patterns of evidence with current theory. 	<p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet. (secondary to HS-ESS2-3) <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> 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. <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. 	<p>what is known about smaller scale mechanisms within the system.</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <hr style="border-top: 1px dashed black;"/> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Science and engineering complement each other in the cycle known as research and development (R&D). Many R&D projects may involve scientists, engineers, and others with wide ranges of expertise. <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> What is the likelihood of a tsunami occurring in New Jersey? Why is it important to have a measurement system to track earthquake activity around the globe? 	<ul style="list-style-type: none"> Design an instrument to measure earthquakes. Triangulate earthquake epicenters using actual seismic data. Collect and analyze data from around the world to draw conclusions about seismic activity. Investigate how earthquakes 	<ul style="list-style-type: none"> Hands on Laboratory Activities <ul style="list-style-type: none"> Students create waves using tools provided in order to simulate earthquake waves. Redesign their earthquake safe structures from the last unit in light of new knowledge based on experimentation. Activity: Design an instrument 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. Assessment of lab skills (Experimental Design, Data

	<ul style="list-style-type: none"> can trigger other events. - Identify sources of an earthquake - Describe and use the Mercalli scale. - Describe and use the Richter scale - Compare the Mercalli and Richter scales. - Explain why we use relative values to measure earthquakes - Identify and explain the factors that influence the severity of earthquake damage. - Distinguish between a tsunami and normal ocean movement. - Describe how tsunamis are caused by earthquakes - Explain how engineers are working to create buildings that can survive tsunamis. 	<ul style="list-style-type: none"> to measure earthquakes. - Activity: Triangulate earthquake epicenters using actual seismic data. - Activity: Use USGS data to track earthquakes globally. 	<ul style="list-style-type: none"> Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.usgs.gov/faqs/how-are-earthquakes-recorded-how-are-earthquakes-measured-how-magnitude-earthquake-determined?qt-news_science_products=0#qt-news_science_products - https://www.usgs.gov/products/data-and-tools/real-time-data/earthquakes 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>		

	WHST.9-12.1 - Write arguments focused on discipline-specific content.
Interdisciplinary Connections	<p><u>ELA/Literacy</u> SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u> HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling. HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. MP.2 - Reason abstractly and quantitatively. MP.4 - Model with mathematics.</p>
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice. 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving. 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions. 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices Act as a responsible and contributing community member and employee Consider the environmental, social, and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Work productively in teams while using cultural/global competence.</p>
Computer Science and Design Thinking	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience. 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor). 8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.</p>

	<p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.</p> <p>8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>		
Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Provide a template for documenting the design process. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Provide extended time for written responses and reports. 	<ul style="list-style-type: none"> ● Provide additional time for project development. ● Work with a peer to develop a simpler design. ● Utilize graphics to support learning. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management 	<ul style="list-style-type: none"> ● Invite parents, neighbors, friends, the school principal and other community members to attend class performances. ● Break the design process into smaller pieces. ● Conference with teacher during the project planning process. ● Provide a detailed framework for the project design. ● Incorporate student choice ● Provide peer mentoring to improve techniques ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis 	<ul style="list-style-type: none"> ● Offer choices, once finished with basic tasks, with personal interest being the key. ● Develop more complex designs based on extensive research both individually and in collaboration with peers.

		of mastery and not one another. Classroom activities should be noncompetitive	
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Earth's Natural Disasters		
Unit 7: Volcanoes		
Time Allotted: Approximately 2 Weeks		
New Jersey Student Learning Standards (NJSLS)		
HS-ESS2-1 Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features		
HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.		
HS-ESS2-3 Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.		
HS-PS1-5 Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.		
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.		
Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Evaluate evidence behind currently accepted explanations or solutions to determine the merits of arguments. <p>Developing and Using Models</p> <ul style="list-style-type: none"> Develop a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Obtaining, Evaluating, and Communicating Information</p> <ul style="list-style-type: none"> Evaluate the validity and reliability of multiple claims that appear in scientific and technical texts or media reports, verifying the data when possible. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own 	<p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. Evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle and crust. Motions of the mantle and its plates occur primarily through thermal convection, which involves the cycling of matter due to the outward flow of energy from Earth's interior and gravitational movement of denser materials toward the interior. <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions</p> <ul style="list-style-type: none"> The radioactive decay of unstable isotopes continually generates new energy within Earth's crust and mantle, providing the primary source of the heat that drives mantle convection. Plate tectonics can be viewed as the surface expression of mantle convection. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. 	<p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. <p>Energy and Matter</p> <ul style="list-style-type: none"> Energy drives the cycling of matter within and between systems. <p>Cause and Effect</p> <ul style="list-style-type: none"> 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. Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

<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> <ul style="list-style-type: none"> Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science knowledge is based on empirical evidence. Science disciplines share common rules of evidence used to evaluate explanations about natural systems. Science includes the process of coordinating patterns of evidence with current theory. 	<p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Geologists use seismic waves and their reflection at interfaces between layers to probe structures deep in the planet. (secondary to HS-ESS2-3) <p>PS1.B: Chemical Reactions</p> <ul style="list-style-type: none"> Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> 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. 	<p>Patterns</p> <ul style="list-style-type: none"> 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. <p>-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Science and engineering complement each other in the cycle known as research and development (R&D). Many R&D projects may involve scientists, engineers, and others with wide ranges of expertise. <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> Is there a volcano in the United States that poses a significant threat to the people living nearby? What determines whether volcanoes are deadly or not? What secrets lie beneath the volcano and provide clues to how it will erupt? Can volcanoes have a global effect on the earth? Why do volcanoes have different shapes/sizes? 	<ul style="list-style-type: none"> Relate the concept of plate tectonics related to volcanoes Describe how plate boundaries affect the chemistry of magma. List the three types of volcanoes and describe how the magma is different in each. Describe what a hot spot is Relate a geyser to volcanoes? Understand how and why volcanoes are monitored Understand how and why eruptions are predicted 	<ul style="list-style-type: none"> Hands on Laboratory Activities <ul style="list-style-type: none"> Design a model of a volcano. Perform viscosity experiments with various liquids and apply data to the viscosity of different types of magma. Use data from the internet to monitor volcanic activity and draw conclusions. Use the internet to research notable eruptions in the past. Eruption board game. Presentation of a historic 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted

		volcanic eruption as part of disaster summary.	- Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.usgs.gov/natural-hazards/volcano-hazards?utm_source=Science%20Explorer&utm_medium=Highlighted%20Box&utm_campaign=Volcano%20Program 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>WHST.9-12.1 - Write arguments focused on discipline-specific content.</p>		
Interdisciplinary Connections	<p><u>ELA/Literacy</u></p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>		
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p> <p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension</p>		

	<p>tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices Act as a responsible and contributing community member and employee Consider the environmental, social, and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Work productively in teams while using cultural/global competence.</p>
<p>Computer Science and Design Thinking</p>	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.</p> <p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).</p> <p>8.2.12.ITH.2: Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.</p> <p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.</p> <p>8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>

Modifications

Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Provide a template for documenting the design process. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Provide extended time for written responses and 	<ul style="list-style-type: none"> ● Provide additional time for project development. ● Work with a peer to develop a simpler design. ● Utilize graphics to support learning. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few 	<ul style="list-style-type: none"> ● Invite parents, neighbors, friends, the school principal and other community members to attend class performances. ● Break the design process into smaller pieces. ● Conference with teacher during the design planning process. ● Provide a detailed framework for the project design. ● Incorporate student choice ● Provide peer mentoring to improve techniques 	<ul style="list-style-type: none"> ● Offer choices, once finished with basic tasks, with personal interest being the key. ● Develop more complex designs based on extensive research both individually and in collaboration with peers.

reports.	<p>distractions</p> <ul style="list-style-type: none"> ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management 	<ul style="list-style-type: none"> ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	
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Earth's Natural Disasters

Unit 8: Fires

Time Allotted: Approximately 2 Weeks

New Jersey Student Learning Standards (NJSL)

HS-ESS2-4 Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

HS-ESS3-5 Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

HS-ESS3-6 Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity (i.e., climate change).

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

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.

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

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

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Developing and Using Models</p> <ul style="list-style-type: none"> Use a model to provide mechanistic accounts of phenomena. Develop a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. Design a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations. Apply scientific principles and evidence to provide an explanation of phenomena and solve design problems, taking into account possible unanticipated effects. <p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use a computational representation of phenomena or design solutions to describe and/or support claims and/or explanations. <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> Analyze data using computational models in order to make valid and reliable scientific claims. <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Analyze complex real-world problems by specifying criteria and constraints for successful solutions. <p>----- --</p>	<p>ESS1.B: Earth and the Solar System</p> <ul style="list-style-type: none"> Cyclical changes in the shape of Earth's orbit around the sun, together with changes in the tilt of the planet's axis of rotation, both occurring over hundreds of thousands of years, have altered the intensity and distribution of sunlight falling on the earth. These phenomena cause a cycle of ice ages and other gradual climate changes. (<i>secondary</i>) <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> The geological record shows that changes to global and regional climate can be caused by interactions among changes in the sun's energy output or Earth's orbit, tectonic events, ocean circulation, volcanic activity, glaciers, vegetation, and human activities. These changes can occur on a variety of time scales from sudden (e.g., volcanic ash clouds) to intermediate (ice ages) to very long-term tectonic cycles. <p>ESS2.D: Weather and Climate</p> <ul style="list-style-type: none"> Current models predict that, although future regional climate changes will be complex and varied, average global temperatures will continue to rise. The outcomes predicted by global climate models strongly depend on the amounts of human-generated greenhouse gases added to the atmosphere each year and by the ways in which these gases are absorbed by the ocean and biosphere. (<i>secondary</i>) The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. <p>ESS3.D: Global Climate Change</p> <ul style="list-style-type: none"> Though the magnitudes of human impacts are greater than they have ever been, so too are human abilities to model, predict, and manage current and future impacts. Through computer simulations and other studies, important discoveries are still being made about how the ocean, the atmosphere, and the biosphere interact and are modified in response to human activities. 	<p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. <p>Energy and Matter</p> <ul style="list-style-type: none"> Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. <p>Patterns</p> <ul style="list-style-type: none"> 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. <p>-----</p>

<p><i>Connections to Nature of Science</i></p> <p>Scientific Investigations Use a Variety of Methods</p> <ul style="list-style-type: none"> Science investigations use diverse methods and do not always use the same set of procedures to obtain data. New technologies advance scientific knowledge. Science arguments are strengthened by multiple lines of evidence supporting a single explanation. <p>Scientific Knowledge is Based on Empirical Evidence</p> <ul style="list-style-type: none"> Science knowledge is based on empirical evidence. Science arguments are strengthened by multiple lines of evidence supporting a single explanation. 	<p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> 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. 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. <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> 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. <p>PS1.A: Structure and Properties of Matter</p> <ul style="list-style-type: none"> A stable molecule has less energy than the same set of atoms separated; one must provide at least this energy in order to take the molecule apart. <p>PS1.B: Chemical Reactions</p> <ul style="list-style-type: none"> Chemical processes, their rates, and whether or not energy is stored or released can be understood in terms of the collisions of molecules and the rearrangements of atoms into new molecules, with consequent changes in the sum of all bond energies in the set of molecules that are matched by changes in kinetic energy. 	<p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems. <p>-----</p> <p><i>Connections to Nature of Science</i></p> <p>Science Addresses Questions About the Natural and Material World</p> <ul style="list-style-type: none"> Scientific knowledge can describe the consequences of actions but does not necessarily prescribe the decisions that society takes.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> How do people stay safe during a wildfire? What is the impact of fire on communities, economics, and environments? What roles do humans play in creating, controlling, and stopping wildfires? 	<ul style="list-style-type: none"> Identify the different stages of fires. Explain the chemistry behind fires. Explain how ecosystems depend on fires, despite their destructive nature. Describe the different ways by which fire spreads Explain how weather conditions lead to fires Identify areas that are at high 	<ul style="list-style-type: none"> Research areas that are at high risk for fires. Research what plans are in place for alerting the public about the dangers and risks involving fires. Flash Point board game Guest lecturer about building fire codes Create an evacuation plan for a school. 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.

	<p>risk for fires.</p> <ul style="list-style-type: none"> - Describe what fire codes and evacuations plans are and why we have them. - 		
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.usgs.gov/science-explorer-results?es=wildfires&classification=science_project - https://www.cdc.gov/disasters/wildfires/index.html - https://www.nifc.gov/fireInfo/nfn.htm - https://www.ready.gov/wildfires - https://www.doi.gov/blog/7-burning-questions-wildfires-public-lands - https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5107845.pdf 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>WHST.9-12.1 - Write arguments focused on discipline-specific content.</p>		
Interdisciplinary Connections	<p><u>ELA/Literacy</u></p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>		
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p>		

	<p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices Act as a responsible and contributing community member and employee Consider the environmental, social, and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Work productively in teams while using cultural/global competence.</p>
<p>Computer Science and Design Thinking</p>	<p>8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.</p> <p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).</p> <p>8.2.12.EC.3: Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society, and environment and share this information with the appropriate audience.</p> <p>8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>

Modifications

Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Provide a template for documenting the design process. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Provide extended time for 	<ul style="list-style-type: none"> ● Provide additional time for project development. ● Work with a peer to develop a simpler design. ● Utilize graphics to support learning. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a 	<ul style="list-style-type: none"> ● Invite parents, neighbors, friends, the school principal and other community members to attend class performances. ● Break the design process into smaller pieces. ● Conference with teacher during the design planning process. ● Provide a detailed framework for the project design. ● Incorporate student choice ● Provide peer mentoring to 	<ul style="list-style-type: none"> ● Offer choices, once finished with basic tasks, with personal interest being the key. ● Develop more complex designs based on extensive research both individually and in collaboration with peers.

written responses and reports.	quiet room with few distractions <ul style="list-style-type: none"> ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management 	improve techniques <ul style="list-style-type: none"> ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	
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Earth's Natural Disasters

Unit 9: Impacts with Space Objects

Time Allotted: Approximately 2 Weeks

New Jersey Student Learning Standards (NJSLS)

HS-ESS1-4 Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.

HS-ESS2-2 Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

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

HS-ETS1-4 Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Science & Engineering Practices

Disciplinary Core Ideas

Cross-Cutting Concepts

<p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Use mathematical models and/or computer simulations to predict the effects of a design solution on systems and/or the interactions between systems. Use mathematical or computational representations of phenomena to describe explanations. <p>Analyzing and Interpreting Data</p> <ul style="list-style-type: none"> 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. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Analyze complex real-world problems by specifying criteria and constraints for successful solutions. 	<p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> 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. 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. <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> Both physical models and computers can be used in various ways to aid in the engineering design process. Computers are useful for a variety of purposes, such as running simulations to test different ways of solving a problem or to see which one is most efficient or economical; and in making a persuasive presentation to a client about how a given design will meet his or her needs. <p>ESS1.B: Earth and the Solar System</p> <ul style="list-style-type: none"> 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. <p>ESS2.A: Earth Materials and Systems</p> <ul style="list-style-type: none"> Earth's systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. <p>ESS2.D: Weather and Climate</p> <ul style="list-style-type: none"> The foundation for Earth's global climate systems is the electromagnetic radiation from the sun, as well as its reflection, absorption, storage, and redistribution among the atmosphere, ocean, and land systems, and this energy's re-radiation into space. <p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. 	<p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Scale, Proportion, and Quantity</p> <ul style="list-style-type: none"> 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). <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>-----</p> <p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Engineering, Technology, and Science on Society and the Natural World</p> <ul style="list-style-type: none"> 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. Modern civilization depends on major technological systems. <p>Interdependence of Science, Engineering, and Technology</p> <ul style="list-style-type: none"> Science and engineering complement each other in the cycle known as research and development (R&D). Many R&D projects may involve scientists, engineers, and others with wide ranges of expertise.
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<p>Essential Questions</p>	<p>Student Learning Objectives</p>	<p>Suggested Tasks/Activities</p>	<p>Evidence of Learning (Assessment)</p>
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<ul style="list-style-type: none"> - How often is the Earth struck by extraterrestrial objects? - What evidence suggests that mass extinctions have been caused by impacts? - Does space junk pose a threat to working satellites? - How do experts determine the severity of a potential impact event, warn of its timing and potential effects, and determine the means to mitigate the impact? - What are measures that can be implemented to deflect or disrupt an object on an impact course with Earth? - Is it likely that an asteroid will impact Earth in the near future? 	<ul style="list-style-type: none"> - Understand how cratering on Earth occurs. - Identify specific craters on Earth and describe what they look like. - Understand what may have caused craters on the Earth, and what result the collision had. - Predict when the next big impact will be. - Identify the possible sources of space debris. - Describe the types of near-Earth objects that pose of hazard of impacting Earth - Characterize the near-Earth objects to compare their relative orbit trajectory, size, shape, mass, composition, rotational dynamics and/or other parameters. 	<ul style="list-style-type: none"> - Hands on Laboratory Activities <ul style="list-style-type: none"> - Analysis of data to predict impacts - Crater formation simulation - Create a story that describes a mass extinction starting with the birth of space debris through the effects of the impact on Earth. - Use a model to demonstrate how cratering on Earth occurs - Research specific craters on Earth, and find out what may have caused them, and what resulted. - Interpret data to predict when the next big impact will be. 	<ul style="list-style-type: none"> - Assessment of written and verbal mastery of unit-specific vocabulary. - Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. - Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.nasa.gov/planetarydefense/faq - https://cneos.jpl.nasa.gov/sentry/ - https://www.tulane.edu/~sanelson/Natural_Disasters/impacts.htm 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>WHST.9-12.1 - Write arguments focused on discipline-specific content.</p>		

<p>Interdisciplinary Connections</p>	<p><u>ELA/Literacy</u> SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u>Mathematics</u> HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling. HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. MP.2 - Reason abstractly and quantitatively. MP.4 - Model with mathematics.</p>		
<p>Career Readiness, Life Literacies, and Key Skills</p>	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice. 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving. 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions. 9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices Act as a responsible and contributing community member and employee Consider the environmental, social, and economic impacts of decisions. Demonstrate creativity and innovation. Utilize critical thinking to make sense of problems and persevere in solving them. Work productively in teams while using cultural/global competence.</p>		
<p>Computer Science and Design Thinking</p>	<p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor). 8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>		
<p>Modifications</p>			
<p>● Multi-Lingual Learners</p>	<p>● Special Education</p>	<p>● At-Risk</p>	<p>● Gifted and Talented</p>
<ul style="list-style-type: none"> ● Provide a template for documenting the design process. ● When possible, modify 	<ul style="list-style-type: none"> ● Provide additional time for project development. ● Work with a peer to develop a simpler design. 	<ul style="list-style-type: none"> ● Invite parents, neighbors, friends, the school principal and other community members to attend class 	<ul style="list-style-type: none"> ● Offer choices, once finished with basic tasks, with personal interest being the key.

<p>assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc.</p> <ul style="list-style-type: none"> ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Provide extended time for written responses and reports. 	<ul style="list-style-type: none"> ● Utilize graphics to support learning. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management 	<p>performances.</p> <ul style="list-style-type: none"> ● Break the design process into smaller pieces. ● Conference with teacher during the design planning process. ● Provide a detailed framework for the project design. ● Incorporate student choice ● Provide peer mentoring to improve techniques ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	<ul style="list-style-type: none"> ● Develop more complex designs based on extensive research both individually and in collaboration with peers.
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Earth's Natural Disasters

Unit 10: Biological Disasters

Time Allotted: Approximately 2 Weeks

New Jersey Student Learning Standards (NJSLS)

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS2-1 Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-7 Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS4-5 Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-ESS3-1 Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

HS-ESS3-3 Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

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.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p>Using Mathematics and Computational Thinking</p> <ul style="list-style-type: none"> Create a computational model or simulation of a phenomenon, designed device, process, or system. Use mathematical and/or computational representations of phenomena or design solutions to support explanations. <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, 	<p>ESS3.A: Natural Resources</p> <ul style="list-style-type: none"> Resource availability has guided the development of human society. <p>ESS3.B: Natural Hazards</p> <ul style="list-style-type: none"> Natural hazards and other geologic events have shaped the course of human history; [they] have significantly altered the sizes of human populations and have driven human migrations. <p>ESS3.C: Human Impacts on Earth Systems</p> <ul style="list-style-type: none"> The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> 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. <p>LS2.A: Interdependent Relationships in Ecosystems</p> <ul style="list-style-type: none"> Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. <p>LS2.C: Ecosystem Dynamics, Functioning, and Resilience</p> <ul style="list-style-type: none"> Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. 	<p>Stability and Change</p> <ul style="list-style-type: none"> Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. Much of science deals with constructing explanations of how things change and how they remain stable. <p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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. <p>Scale, Proportion, and Quantity</p> <ul style="list-style-type: none"> The significance of a phenomenon is dependent on

<p>student-generated sources of evidence, prioritized criteria, and tradeoff considerations.</p> <p>Developing and Using Models</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. 	<p>LS4.C: Adaptation</p> <ul style="list-style-type: none"> Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species. Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost. <p>LS4.D: Biodiversity and Humans</p> <ul style="list-style-type: none"> Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). <i>(secondary)</i> Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. <i>(secondary) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)</i> <p>ETS1.B: Developing Possible Solutions</p> <ul style="list-style-type: none"> 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. <i>(secondary)</i> <p>ETS1.C: Optimizing the Design Solution</p> <ul style="list-style-type: none"> 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. 	<p>the scale, proportion, and quantity at which it occurs.</p> <p>-----</p> <p><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> Modern civilization depends on major technological systems. New technologies can have deep impacts on society and the environment, including some that were not anticipated. <p>-----</p> <p><i>Connections to Nature of Science</i></p> <p>Science is a Human Endeavor</p> <ul style="list-style-type: none"> Science is a result of human endeavors, imagination, and creativity.
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> What effect do human actions have on the emergence and proliferation of pandemics? What can humans do to mitigate the spread of a future virus? How has Covid-19 changed the world? 	<ul style="list-style-type: none"> Distinguish between plagues, pandemics, and epidemics Identify invasive species Understand the impacts of an invasive species on their respective ecosystems. Describe how the human immune system protects against and fights infections. 	<ul style="list-style-type: none"> Hands on Laboratory Activities <ul style="list-style-type: none"> Computer analysis of CDC and WHO pandemic spread data. Develop an action plan to stop the spread of Covid-19 and/or similar contagious illnesses. Pandemic board game Research global pandemics of 	<ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary. Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted

	<ul style="list-style-type: none"> - Describe how new antibiotics and antivirals are developed - Relate continued use of antibiotics to decreases in their efficacy. - Identify causes for the emergence of “superbugs” - Identify methods of protecting against the spread of Covid-19. - Research global pandemics of the past. - Create an action plan to stop the spread of contagion. - Analyze data - Identify the features of our society and the virus itself that makes Covid-19 so deadly. 	the past.	<ul style="list-style-type: none"> - Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.
Resources/Materials	<ul style="list-style-type: none"> - https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf - https://www.who.int/health-topics/coronavirus#tab=tab_1 - https://www.cdc.gov/flu/pandemic-resources/basics/past-pandemics.html - https://www.cdc.gov/ - https://www.visualcapitalist.com/history-of-pandemics-deadliest/ - https://www.who.int/emergencies/diseases/en/ - https://www.history.com/news/pandemics-end-plague-cholera-black-death-smallpox 		
ELA Companion Standards	<p>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> <p>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> <p>WHST.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>		

	WHST.9-12.1 - Write arguments focused on discipline-specific content.
Interdisciplinary Connections	<p><i>ELA/Literacy</i></p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><i>Mathematics</i></p> <p>HSN-Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p> <p>HSN-Q.A.2 - Define appropriate quantities for the purpose of descriptive modeling.</p> <p>HSN-Q.A.3 - Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <p>MP.2 - Reason abstractly and quantitatively.</p> <p>MP.4 - Model with mathematics.</p>
Career Readiness, Life Literacies, and Key Skills	<p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas</p> <p>9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.</p> <p>9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.</p> <p>9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions.</p> <p>9.1.12.CFR.3: Research companies with corporate governance policies supporting the common good and human rights.</p> <p>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</p> <p>Act as a responsible and contributing community member and employee</p> <p>Consider the environmental, social, and economic impacts of decisions.</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Work productively in teams while using cultural/global competence.</p>
Computer Science and Design Thinking	<p>8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).</p> <p>8.2.12.ETW.4: Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints</p>

Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> ● Provide a template for documenting the design process. ● When possible, modify assignments so the ELL student writes less, has simpler questions to answer, fewer spelling words, etc. ● Provide models of completed homework assignments, projects, etc. ● Assign a native language partner. ● Provide extended time for written responses and reports. 	<ul style="list-style-type: none"> ● Provide additional time for project development. ● Work with a peer to develop a simpler design. ● Utilize graphics to support learning. ● Provide an outline of lessons ● Get a written list of instructions ● Receive large project as smaller tasks with individual deadlines ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management 	<ul style="list-style-type: none"> ● Invite parents, neighbors, friends, the school principal and other community members to attend class performances. ● Break the design process into smaller pieces. ● Conference with teacher during the design planning process. ● Provide a detailed framework for the project design. ● Incorporate student choice ● Provide peer mentoring to improve techniques ● Use effort and achievement rubrics ● Assure students they can be successful ● Promote mastery or challenging tasks ● Allow students many opportunities for practice and learning ● Use scaffolding for complex tasks ● Evaluate students on the basis of mastery and not one another. Classroom activities should be noncompetitive 	<ul style="list-style-type: none"> ● Offer choices, once finished with basic tasks, with personal interest being the key. ● Develop more complex designs based on extensive research both individually and in collaboration with peers.

Additional Resources to promote DEI:

- [Structure Matters: Twenty-One Teaching Strategies to Promote Student Engagement and Cultivate Classroom Equity](#)
- [Race Matters](#)
- [Inclusive Teaching](#)