

Lakewood School District Curriculum Guide

Grade: 9 - 12

Content Area: Science - Environmental

Original Adoption: 2023 NJSLs English Language Arts and English as a Second Language (8-21-24); Math NJSLs Mathematics (8-21-24); 2020 NJSLs Science, Social Studies, Career Readiness, Life Literacies & Key Skills, Computer Design & Thinking, Visual & Performing Arts, World Language, Comprehensive Health and Physical Education (5-11-22)

Created By:

Recommended Pacing Guide

Unit 1: Introduction to Environmental Science	20 days
Unit 2: Ecology	75 days
Unit 3: Populations	30 days
Unit 4: Energy Resources and Consumption	25 days
Unit 5: Water, Air, and Land	20 days
Unit 6: Our Health and Our Future	20 days

Alignment with State Mandates

The following colors are used throughout this document to indicate areas in which the curriculum is aligned with the following NJSA requirements:

- **Holocaust and genocides** ([N.J.S.A. 18A:35-28](#))
- **History and contributions of African-Americans** (Amistad Law) ([N.J.S.A. 18A:35-4.43](#))
- **Highlight and promote diversity and inclusion** (Diversity & Inclusion Law) ([N.J.S.A. 18A:35-4.36a](#))
- **History of disabled and LGBT persons** included in middle and high school curriculum ([Section 18A:35-4.35](#))
- **Climate Change** - to prepare students to understand how and why climate change happens, the impact it has on our local and global communities and to act in informed and sustainable ways. Please [click here](#) for specific examples (by subject).

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Unit 1: Introduction to Environmental Science	20 days
<u>New Jersey Learning Standards-Science</u>	
HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth’s surface can create feedback that causes changes to other Earth systems.
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-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth’s systems and life on Earth.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Developing and Using Models: Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s). Develop a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-ESS2-1) , (HS-ESS2- 3), (HS-ESS2-6) Use a model to provide mechanistic accounts of phenomena. (HS-ESS2-4)</p> <p>Planning and Carrying Out Investigations Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for, and test conceptual, mathematical,</p>	<p>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. (HS-ESS2-1),(HS-ESS2-2)</p> <p>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</p>	<p>Cause and Effect Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS2-4)</p> <p>Energy and Matter The total amount of energy and matter in closed systems is conserved. (HS-ESS2-6)</p> <p>Energy drives the cycling of matter within and between systems. (HS-ESS2-3)</p> <p>Structure and Function The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their components are shaped and used, and the molecular substructures of its various materials. (HS-ESS2-5)</p> <p>Stability and Change Much of science deals with constructing explanations of how things change and how they remain stable. (HS-ESS2-7) Change and rates of change can be</p>

physical, and empirical models. Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-ESS2-5)

Analyzing and Interpreting Data

Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.

Analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to make valid and reliable scientific claims or de-engaging

Argument from Evidence

Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s).

Arguments may also come from current scientific or historical episodes in science.

Construct an oral and written argument or counter arguments based on data and evidence. (HS-ESS2-7)

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. (HS-ESS2-3)

Plate Tectonics and Large-Scale System Interactions

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.

(HS-ESS2-4) ESS2.B(HS-ESS-2)

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. Plate movements are responsible for most continental and ocean-floor features and for the distribution of most rocks and minerals within Earth’s crust. (ESS2.B Grade 8 GBE) (HS-ESS2-1)

ESS2.C: The Roles of Water in Earth’s Surface

Processes The abundance of liquid water on Earth’s surface and its unique combination of physical and chemical properties are central to the planet’s dynamics. These properties include water’s exceptional capacity to absorb, store, and release large amounts of energy, transmit sunlight, expand upon freezing,

quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS2-1)

Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS2- 2)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology 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. (HSESS2-3)

Influence of Engineering, Technology, and Science on Society and the Natural World

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. (HS-ESS2-2)

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<p>Connections to Nature of Science Scientific Knowledge is Based on Empirical Evidence Science knowledge is based on empirical evidence. (HS-ESS2-3) Science disciplines share common rules of evidence used to evaluate explanations about natural systems. (HS-ESS2-3) Science includes the process of coordinating patterns of evidence with current theory. (HS-ESS2-3) Science arguments are strengthened by multiple lines of evidence supporting a single explanation. (HS-ESS2-4)</p>	<p>dissolve and transport materials, and lower the viscosities and melting points of rocks. (HS-ESS2-5)</p> <p>ESS2.D: Weather and Climate 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. (HS-ESS2-2),(HS-ESS2-4)</p> <p>Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen. (HS-ESS2-6),(HS-ESS2-7)</p> <p>Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate. (HS-ESS2-6),(HS-ESS2-4) ESS2.E</p>	
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Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> Recognize one’s personal traits, strengths, and limitations Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> Recognize the skills needed to establish and achieve personal and educational goals Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections

ELA Standards	
<ul style="list-style-type: none"> L.SS.9–10.1 	Demonstrate command of the system and structure of the English language when writing or speaking.

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<ul style="list-style-type: none"> ● RI.CI.9–10.2 	Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text.
<ul style="list-style-type: none"> ● RL.CR.9–10.1 	Cite a range of thorough textual evidence and make relevant connections to strongly support analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as including determining where the text leaves matters uncertain.
<ul style="list-style-type: none"> ● SL.II.9–10.2 	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.
<ul style="list-style-type: none"> ● SL.PI.9–10.4 	Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
<ul style="list-style-type: none"> ● W.WR.9–10.5 	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.
<ul style="list-style-type: none"> ● L.SS.9–10.1 	Demonstrate command of the system and structure of the English language when writing or speaking.
Math Standards	
<ul style="list-style-type: none"> ● HSA-CED.A.1 	Create equations and inequalities in one variable and use them to solve problems.
<ul style="list-style-type: none"> ● HSF-IF.C.7 	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

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9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.khanacademy.org/>
- Completion of webquests
- On-Line Laboratory activities
- Online assessment activities example:
 - Kahoot
 - Quizizz

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Earth is a system that is composed of many components acting together.
- Many disciplines of science are necessary to successfully study and manage our environment.
- Earth's resources are being degraded due to human interactions with the environment.
- Humans have altered Earth's environment in several ways throughout human history.

Essential Questions:

- How do the major fields of environmental science work together to help us understand Earth as a complex system?
- In what ways are Earth's geosphere, atmosphere, hydrosphere, and biosphere similar to interacting systems within the human body?
- How does matter and energy move through Earth's systems, and why are these movements essential for sustaining life?.
- Why does a change in one Earth system often lead to feedback effects in other systems?
- How do human activities modify relationships among Earth systems, and what evidence shows these changes?
- What factors determine whether a natural resource is renewable or nonrenewable, and how does this classification affect sustainability?

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	<ul style="list-style-type: none"> • How are natural hazards and resource availability connected to human decision-making and land-use practices? • How can scientific and engineering innovations reduce pollution and waste while protecting Earth's systems and biodiversity?
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> • Vocabulary and key terms • The major fields of study that contribute to environmental science. • The earth has components and systems similar to that of a human. • That Earth's systems are interdependent and all life depends on and contributes to them. • The environment is comprised of interdependent systems: geosphere, atmosphere, hydrosphere, and biosphere • The sustainability of human societies and the biodiversity that supports them requires responsible management of natural resources. • Scientists and engineers can make major contributions by developing technologies that produce less pollution and waste and that preclude ecosystem degradation. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> • Identify the elements that are essential to life. • Distinguish between renewable and nonrenewable resources. • Construct an explanation based on evidence for how the availability of natural resources, and how the presence of natural hazards are connected to human activity. • Use a computational representation to illustrate the relationship among Earth systems and how those relationships are being modified due to human activity. • Illustrate how Earth's interacting systems cause feedback effects on other Earth systems.

Core Instructional & Supplemental Materials	
<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> • Students will identify physical models such as maps and globes , for use in study of the environment • Students will become familiar with programs such as NPR's PBS learning Media.com as well as podcasts streaming science news events. • Ted talks ; discussion and debates to follow. • Students will become familiar with newspapers depicting environmental news. • Students will demonstrate an understanding of the value of our natural resources, and a willingness to preserve them for future generations. • Meteorology - students will read a complete meteorology report (daily NY Times) and answer a questionnaire about weather and climate 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> • Holt Environmental Science • ISBN-13: 978-0-03-078137-7 • ISBN-10: 0-03-078137-X • Race & Social Justice Teacher Resources • Climate Change

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conditions on a particular day.

- Students will become familiar with school grounds (plantings etc) and greenhouse.
- Students will learn about Rachel Carson's contributions to the field of Environmental Science.
- Chapter 1 and 2 Hunters/Gatherers, Agricultural revolution, Industrial Revolution - a historical perspective - video segment + photos of Rachel Carson's refuge in Maine.
- Students will understand about the many disciplines inherent in the study of Environmental science (Biology, Physics, Chemistry, Social Sciences, Geology etc.)
- ● Students will categorize Natural resources into Renewable and Nonrenewable forms - how fossil fuels are contributing to climate change (global warming).

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed

- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction

- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

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Unit 2: Ecology	75 days
<u>New Jersey Learning Standards-Science</u>	
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-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems
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)

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>HS-ESS3 Earth and Human Activity Students who demonstrate understanding can:</p> <p>HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. can be raised.]</p> <p>HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.*</p> <p>HS-ESS3-3. Create a Computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and Biodiversity. multi-parameter</p>	<p>ESS3.A: Natural Resources Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)</p> <p>ESS3.B: Natural Hazards Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)</p> <p>ESS3.C: Human Impacts on Earth Systems Human activities have</p>	<p>Patterns Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)</p> <p>Cause and Effect Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3)</p> <p>Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1),(MS-ESS3-4)</p> <p>Stability and Change Stability might be disturbed either by sudden events or gradual changes that accumulate Over time. (MS-ESS3-5)</p> <p>Connections to Engineering, Technology, and Applications of Science Influence of Science, Engineering, and Technology on Society and the Natural World All human activity draws on natural resources and has both short and long-term consequences, positive as well as</p>

<p>programs or constructing simplified spreadsheet calculations.]</p> <p>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]</p> <p>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.</p> <p>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. A phenomenon, designed device, process, or system.</p> <p>Engaging in Argument from Evidence Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument</p>	<p>significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)</p> <p>Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3), (MS-ESS3-4)</p> <p>ESS3.D: Global Climate Change Human activities, such as the release of greenhouse gases from burning fossil fuels, are major factors in the current rise in</p> <p>Earth’s Crosscutting Concepts Patterns Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)</p> <p>Cause and Effect Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3)</p> <p>Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1),(MS-ESS3-4)</p> <p>Stability and Change Stability might be disturbed either by sudden events or</p>	<p>negative, for the health of people and the natural environment. (MS-ESS3-1), (MS-ESS3-4)</p> <p>The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time. (MS-ESS3-4)</p> <p>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. (MS-ESS-5)</p>
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<p>That supports or refutes claims for either explanations or solutions about the natural and designed world(s). Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-ESS3-4)</p>	<p>gradual changes that accumulate over time. (MS-ESS3-5)</p>	
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Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections

ELA Standards	
● RI.CI.9–10.2	Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text.
● RL.CR.9–10.1	Cite a range of thorough textual evidence and make relevant connections to strongly support analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as including determining where the text leaves matters uncertain.
● SL.II.9–10.2	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.
● SL.PI.9–10.4	Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
● W.WR.9–10.5	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.
● L.SS.9–10.1	Demonstrate command of the system and structure of the English language when writing or speaking.
Math Standards	

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| <ul style="list-style-type: none"> ● HSN-Q.A.2 | Define appropriate quantities for the purpose of descriptive modeling. |
| <ul style="list-style-type: none"> ● HSA-CED.A.1 | Create equations and inequalities in one variable and use them to solve problems. |

Computer Science & Design Thinking

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.khanacademy.org/>
- Completion of webquests
- On-Line Laboratory activities
- Online assessment activities example:
 - Kahoot
 - Quizizz

Summative Assessments:

Benchmark Assessments:

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<ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	<ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment
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Knowledge & Skills

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Ecosystems are complex, dynamic systems in which organisms interact with each other and with living and nonliving components to obtain matter and energy. ● Energy flows and matter cycles through ecosystems in predictable patterns that limit population size, shape community structure, and influence ecosystem stability. ● Changes in environmental conditions, whether natural or human-caused, can disrupt ecological interactions and lead to short-term and long-term changes in ecosystems. ● Scientific explanations of ecological systems are based on evidence, and these explanations can be used to model interactions, evaluate efficiency, and predict ecosystem responses to change. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How do interactions between organisms and their environment shape the structure and function of ecosystems? ● How does energy flow through an ecosystem, and why is energy transfer between trophic levels inefficient? ● How do matter and energy move through living and nonliving components of an ecosystem, and why are these processes essential for sustaining life? ● In what ways do changes in environmental conditions affect relationships among organisms and ecosystem stability? ● How can scientific evidence be used to explain, model, and predict changes in ecosystems over time? ● Why are ecosystems considered dynamic rather than static, and how do feedback mechanisms influence ecological balance? ● How do human activities alter energy flow and matter cycling within ecosystems, and what evidence supports these impacts?
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<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● How and why organisms interact with their environment and what are the effects of <ul style="list-style-type: none"> ● these interactions. ● How organisms interact with the living and nonliving environments to obtain matter <ul style="list-style-type: none"> ● and energy ● How matter and energy move through an ecosystem <ul style="list-style-type: none"> ● Why and how ecosystems when the environment changes 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Explain that the process of science attempts to find explanations using evidence for events in the natural world, and to use those explanations to make useful predictions. <ul style="list-style-type: none"> ● Trace the flow of energy through living systems and evaluate the efficiency of energy transfer among organisms in an ecosystem.
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Core Instructional & Supplemental Materials

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Suggested Activities/Resources:

- Vocabulary - Define key terms from chapter 4 (The organization of Life”
- Create a layered book (p98) Label tabs with ecosystem, population, community and habitat. Write info on each under appropriate flap. See appendix p613 for more info. Use drawings, labels and definitions.
- View video segment on habitats and niches
- Use World Wildlife Cards to describe adaptations of particular organisms to their habitats.
- Review photosynthesis and respiration , carbon and nitrogen cycles
- Sketch the carbon and nitrogen cycles
- View video segment following the exploits of a giant pumpkin grower.
- Lab Activity - measure the growth of vine fruits (melons, squash, pumpkins) in a greenhouse.

Supplemental resources:

- Envi Sci text ch 4, 5 Study aid, graphic organizers, video segments .
- Greenhouse trips (meet with horticulture classes)
- “World Wildlife” cards - collection of organisms from the animal and plant kingdoms worldwide.
- Cards contain detailed descriptions including pictures, diet and habitat information, locations on earth, reproductive habits, and other information peculiar to the organism.
- [Race & Social Justice Teacher Resources](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery

- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

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- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
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- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

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Unit 3: Populations	20 days
<u>New Jersey Learning Standards-Science</u>	
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-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems
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)

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Asking Questions and Defining Problems Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, and clarifying arguments and Models.</p> <p>Ask questions to identify and clarify evidence of an argument. (MS-ESS3-5)</p> <p>Analyzing and Interpreting Data Analyzing data in 6–8 builds on K–5 and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.</p>	<p>ESS3.A: Natural Resources Humans depend on Earth’s land, ocean, atmosphere, and biosphere for many different Resources. Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes. These resources are distributed unevenly around the planet as a result of past geologic processes. (MS-ESS3-1)</p> <p>ESS3.B: Natural Hazards Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)</p> <p>ESS3.C: Human Impacts on Earth Systems Human activities have significantly altered the biosphere, sometimes</p>	<p>Patterns Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)</p> <p>Cause and Effect Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. (MS-ESS3-3)</p> <p>Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS3-1), (MS-ESS3-4)</p> <p>Stability and Change Stability might be disturbed either by sudden events or gradual changes that accumulate over time. (MS-ESS3-5)</p> <p>Connections to Engineering, Technology, and Applications of</p>

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<p>Analyze and interpret data to determine similarities and differences in findings. (MS-ESS3-2) Constructing Explanations and Designing</p>	<p>damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)</p> <p>Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3-3), (MS-ESS3-4)</p>	<p>Science Influence of Science, Engineering, and Technology on Society and the Natural World. All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-1),(MS-ESS3-4)</p>
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Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s personal traits, strengths, and limitations Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> Recognize the skills needed to establish and achieve personal and educational goals Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
<ul style="list-style-type: none"> RI.CI.9–10.2 	Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text.
<ul style="list-style-type: none"> RL.CR.9–10.1 	Cite a range of thorough textual evidence and make relevant connections to strongly support analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as including determining where the text leaves matters uncertain.
<ul style="list-style-type: none"> SL.II.9–10.2 	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.
<ul style="list-style-type: none"> SL.PI.9–10.4 	Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

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<ul style="list-style-type: none"> ● W.WR.9–10.5 	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.
<ul style="list-style-type: none"> ● L.SS.9–10.1 	Demonstrate command of the system and structure of the English language when writing or speaking.
Math Standards	
<ul style="list-style-type: none"> ● MP.2 	Reason abstractly and quantitatively.
<ul style="list-style-type: none"> ● MP.4 	Model with mathematics.

Computer Science & Design Thinking

<u>8.1 Computer Science</u>
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
<u>8.2 Design Thinking</u>
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. ● 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

<u>9.1 Personal Financial Literacy</u>
<ul style="list-style-type: none"> ● 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.” ● 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products. ● 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.
<u>9.4 Life Literacies & Key Skills</u>
<ul style="list-style-type: none"> ● 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. ● 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks: <ul style="list-style-type: none"> ● Oral Questioning ● Student Conference ● Self-Assessment ● Hand Signals ● Communicators ● Graphic Organizers 	Alternative Assessments: <ul style="list-style-type: none"> ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests ● On-Line Laboratory activities ● Online assessment activities example:
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<ul style="list-style-type: none"> ● Teacher Observation ● DOL ● Quiz Classwork ● NJSLA Released questions ● Problem of the Day 	<ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment

Knowledge & Skills	
<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Population growth varies among species and is limited by environmental factors, including resource availability, competition, and carrying capacity. ● Organisms within ecosystems interact in complex, interdependent ways that involve both cooperation and competition, shaping population size and ecosystem structure. ● Human population growth places increasing stress on natural systems, affecting resource availability, habitat quality, and ecosystem stability. ● Biodiversity contributes to ecosystem resilience and stability, and its loss can increase vulnerability to environmental change and disruption. ● Protecting ecosystems as whole systems is often more effective than focusing on individual species, because species survival depends on interconnected ecological relationships. ● Human decisions about land use, resource management, and development often conflict with efforts to preserve biodiversity, requiring trade-offs informed by scientific evidence. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● Why do populations grow at different rates, and what factors limit population growth in natural ecosystems? ● How do carrying capacity and resource availability influence the size and stability of populations? ● How do cooperative and competitive interactions among organisms shape ecosystems and population dynamics? ● How has human population growth contributed to environmental stress and changes in ecosystem stability? ● Why is biodiversity essential to the health and resilience of ecosystems? ● How does habitat destruction contribute to species extinction, and why is it the leading cause of biodiversity loss today? ● Why can protecting entire ecosystems be more effective than protecting individual species? ● How do demographic transitions differ across countries, and why do these differences matter for global environmental sustainability? ● What trade-offs arise when efforts to protect biodiversity conflict with human economic, social, or developmental interests?
<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Populations can grow at different rates. ● There are natural limits to population growth. ● The interactions and interdependence of organisms in ecosystems are both cooperative and competitive. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Discuss the factors that limit population size, such as availability of food, light, space, populations, predators and prey, competitors, disease. ● Investigate and communicate findings about factors that may affect the size and rate of human

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- Increased human population growth has resulted in environmental stress on the environment.
- Population and carrying capacity of all species will be an important factor in preserving the environmental integrity of our Earth.
- Different countries are at different stages of demographic transition.
- Loss of biodiversity on Earth will result in a loss of ecosystem stability and in turn will cause increased environmental stress.
- Protecting entire ecosystems can be a more effective way of protecting individual species.
- The most common cause of extinction today is the destruction of habitats by humans.
- The desire to protect biodiversity often conflicts with other human interests.

population growth

- Describe how the reproductive behavior of individuals can affect the growth rate of their population.
- Demonstrate that competition between two species may lead to the elimination of one species or to the partitioning of resources.
- Describe the four stages of demographic transition.
- Describe worldwide population projections into the next century
- Define and give examples of endangered and threatened species.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- This unit explores how populations of different species interact. Chapter 8 explores population of species in general, while chapter 9 differentiates human population issues with those of other animal species.
- Write the Population Growth Equation (Changes = Births - Deaths)
- Distinguish between population density and population dispersion by having students arrange themselves in a random, uniform and clumped manner in the classroom. Define these words using pictures of any particular animal species.
- Model the changes in size of a population by doing the quick lab p212 (use beans and make a graph of the data on p212.
- Draw and explain an exponential growth curve ((ie-bacterial colony growth) beside a normal growth curve with natural checks on growth such as carrying capacity.
- Complete Math practice problem p215, which depicts “growth rate” as a function of change in population divided by time
- Activity -Random count of sunflowers in a grid describes how sample size influences accuracy.

Supplemental resources:

- Holt Environmental science by Karen Arms (Author)
- ISBN-13: 978-0-03-078137-7
- ISBN-10: 0-03-078137-X
- Text Ch 8 and 9
- Population (Google) slides with accompanying questions and graphs.
- Wolf and Deer Predation Activity
- World Wildlife cards with population information on species of mammals, birds, amphibians and reptiles represented.
- “Science Girls” - PBS Learning media video clip on the importance of sample size in counting and categorizing flowers in a schoolyard community.
- [Race & Social Justice Teacher Resources](#)

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504 Plans:

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- Assistive Technology
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- Graphic organizers
- Highlight key words
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- Prompting and cueing
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Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background

Unit 4: Energy Resources and Consumption		20 days
<u>New Jersey Learning Standards-Science</u>		
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-ESS3-2	Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.	
HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.	
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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.	
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Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show how relationships among variables between systems and their components in the natural and designed worlds.</p> <p>Develop a model based on evidence to illustrate the relationships between systems or components of a system. (HS-LS2-5)</p> <p>Using Mathematics and Computational Thinking Mathematical and computational thinking in 9-12 builds on K-8 experiences and progresses to using algebraic thinking and analysis, a range of linear and nonlinear functions including trigonometric functions, exponentials and logarithms, and computational tools for statistical analysis to analyze, represent, and model data. Simple computational simulations are created and used based on mathematical models of basic assumptions. Use mathematical and/or computational representations of phenomena or design solutions to support explanations. (HS-LS2-1)</p>	<p>LS2.A: Interdependent Relationships in Ecosystems Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support.</p> <p>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. (HS-LS2-1),(HS-LS2-2)</p> <p>LS2.B: Cycles of Matter and Energy. Transfer in Ecosystems Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3)</p> <p>Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly</p>	<p>Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 9– 12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories. Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students’ own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past. elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)</p> <p>LS2.C: Ecosystem Dynamics, Functioning, and Resilience A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (PS-LS2-1 & 2-5)</p>

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	<p>made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)</p> <p>Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5)</p>	
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Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> Recognize one’s personal traits, strengths, and limitations Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> Recognize the skills needed to establish and achieve personal and educational goals Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
ELA Standards	
<ul style="list-style-type: none"> RI.CI.9–10.2 	Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text.
<ul style="list-style-type: none"> RL.CR.9–10.1 	Cite a range of thorough textual evidence and make relevant connections to strongly support analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as including determining where the text leaves matters uncertain.
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<ul style="list-style-type: none"> ● W.WR.9–10.5 	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.
<ul style="list-style-type: none"> ● L.SS.9–10.1 	Demonstrate command of the system and structure of the English language when writing or speaking.
Math Standards	
<ul style="list-style-type: none"> ● HSN-Q.A.3 	Define appropriate quantities for the purpose of descriptive modeling.
<ul style="list-style-type: none"> ● MP.4 	Model with mathematics

Computer Science & Design Thinking

<u>8.1 Computer Science</u>	
<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim. 	
<u>8.2 Design Thinking</u>	
<ul style="list-style-type: none"> ● 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models. ● 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task. ● 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch). 	

Career Readiness, Life Literacies & Key Skills

<u>9.1 Personal Financial Literacy</u>	
<ul style="list-style-type: none"> ● 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.” ● 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products. ● 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising. 	
<u>9.4 Life Literacies & Key Skills</u>	
<ul style="list-style-type: none"> ● 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems. ● 9.4.8.TL.3: Select appropriate tools to organize and present information digitally. 	

Evidence of Student Learning

Formative Tasks: <ul style="list-style-type: none"> ● Oral Questioning ● Student Conference ● Self-Assessment 	Alternative Assessments: <ul style="list-style-type: none"> ● Teacher-Created Projects ● https://www.khanacademy.org/ ● Completion of webquests
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<ul style="list-style-type: none"> ● Hand Signals ● Communicators ● Graphic Organizers ● Teacher Observation ● DOL ● Quiz Classwork ● NJSLA Released questions ● Problem of the Day 	<ul style="list-style-type: none"> ● On-Line Laboratory activities ● Online assessment activities example: <ul style="list-style-type: none"> ○ Kahoot ○ Quizizz
<p>Summative Assessments:</p> <ul style="list-style-type: none"> ● Unit Tests ● Midterm Exam ● Final Exam 	<p>Benchmark Assessments:</p> <ul style="list-style-type: none"> ● Quarterly Benchmarks ● Beginning/End of Year Assessment ● Unit Common Assessment

Knowledge & Skills

<p>Enduring Understandings:</p> <ul style="list-style-type: none"> ● Human societies depend on energy resources, and the availability, distribution, and use of these resources strongly influence economic development, environmental quality, and human activity. ● Different energy resources involve trade-offs, including cost, efficiency, availability, environmental impact, and long-term sustainability. ● The extraction, production, and consumption of energy alter Earth systems, affecting the atmosphere, hydrosphere, geosphere, and biosphere in interconnected ways. ● Technological solutions can reduce the environmental impacts of energy use, but their effectiveness depends on scientific understanding, design constraints, and implementation. ● Climate change is influenced by patterns of energy consumption, and scientific models and data are essential for predicting future impacts and informing decisions. ● Sustainable energy management requires balancing human needs with the protection of ecosystems and biodiversity, using evidence-based reasoning and systems-level thinking. 	<p>Essential Questions:</p> <ul style="list-style-type: none"> ● How has the availability of energy resources influenced human activity and patterns of development across regions of the world? ● What factors should be considered when evaluating different energy resources, and how do cost-benefit analyses inform energy decisions? ● How do different energy choices impact Earth’s systems and contribute to climate change? ● How can computational models and simulations help explain relationships among energy use, population sustainability, and biodiversity? ● In what ways can technological innovations reduce the negative environmental impacts of energy production and consumption? ● How do scientists use geoscience data and climate models to forecast future climate conditions related to energy uses? ● Why do efforts to transition to sustainable energy systems often involve economic, social, and environmental trade-offs? ● How can evidence from scientific data guide responsible decision-making about energy resources at local, national, and global scales?
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<p>Content <i>Students will know...</i></p>	<p>Skills <i>Students will be able to ...</i></p>
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- Energy resources vary in availability, distribution, and renewability, and these differences influence patterns of human development and resource use.
- Energy production and consumption have direct and indirect impacts on Earth systems, including the atmosphere, hydrosphere, geosphere, and biosphere.
- Different energy sources involve trade-offs, including economic cost, efficiency, environmental impact, and long-term sustainability.
- Human reliance on fossil fuels has contributed to climate change, as shown through geoscience data and climate models.
- Technological innovations can reduce the environmental impacts of energy use, but no solution is without limitations or consequences.
- Managing energy resources sustainably is closely linked to population growth, biodiversity, and ecosystem stability.
- Scientific models and computational representations are essential tools for understanding how energy use modifies Earth systems over time.

- Construct evidence-based explanations describing how the availability of energy resources and climate change have influenced human activity.
- Evaluate and compare competing energy resource solutions using cost-benefit analysis that considers economic, environmental, and social factors.
- Analyze geoscience data and outputs from climate models to make informed predictions about future climate trends and their impacts on Earth systems.
- Develop and use computational models or simulations to illustrate relationships among energy use, population sustainability, and biodiversity.
- Use system models to explain how energy consumption modifies interactions among Earth's systems, including feedback effects.
- Evaluate or propose technological solutions designed to reduce the environmental impacts of energy production and consumption.
- Apply scientific evidence to support responsible decision-making about energy use at local, national, and global scales.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- Energy Resource Case Study Analysis
- Cost-Benefit Comparison of Energy Sources
- Energy Consumption and Carbon Footprint Investigation
- Climate Model Data Interpretation
- Energy Systems Simulation or Modeling Task
- Design Challenge: Reducing Energy Impacts
- **CER writing task:** Students construct a written claim supported by evidence and reasoning about the most sustainable energy strategy for a given community.

Supplemental resources:

- Holt Environmental science by Karen Arms (Author)
- ISBN-13: 978-0-03-078137-7
- ISBN-10: 0-03-078137-X
- [Race & Social Justice Teacher Resources](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction

- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
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- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers

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- Highlight key words
 - Sentence starters
 - Prompting and cueing
 - Activate schema
 - Build background knowledge
- Culturally Diverse:**
- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
 - Create an emotionally positive classroom climate.
 - Bring in guest speakers
 - Create effective communication
 - Model and teach cultural respect
 - Build relationships with students by interviewing students to understand their background

Unit 5: Water, Air, and Land	20 days
<u>New Jersey Learning Standards-Science</u>	
HS-ESS2-5.	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth’s systems and life on Earth.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Developing and Using Models Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed world(s).</p> <p>Develop a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-ESS2-1), (HS-ESS2-3), (HS-ESS2-6)</p>	<p>ESS1.B: Earth and the Solar System 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.</p> <p>These phenomena cause a cycle of ice ages and other gradual climate changes. (secondary to HS-ESS2-4)</p>	<p>Cause and Effect Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-ESS2-4)</p> <p>Energy and Matter The total amount of energy and matter in closed systems is conserved. (HS-ESS2-6)</p> <p>Energy drives the cycling of matter within and between systems. (HS-ESS2-3)</p> <p>Structure and Function The functions and properties of natural and designed objects and systems can be inferred from their overall structure, the way their</p>

<p>Use a model to provide mechanistic accounts of phenomena. (HS-ESS2-4)</p> <p>Planning and Carrying Out Investigations Planning and carrying out investigations in 9-12 builds on K-8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models. Plan and conduct an Investigation, Individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-ESS2-5)</p> <p>Analyzing and Interpreting Data Analyzing data in 9–12 builds on K–8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data. 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. (HS-ESS2-2)</p> <p>Engaging in Argument from Evidence Engaging in argument from</p>	<p>ESS2.A: Earth Materials and Systems Earth’s systems, being dynamic and interacting, cause feedback effects that can increase or decrease the original changes. (HS-ESS2-1), (HS-ESS2-2)</p> <p>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. (HS-ESS2-3)</p> <p>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. (HS-ESS2-4)</p> <p>ESS2.B: Plate Tectonics and Large-Scale System Interactions The radioactive decay of</p>	<p>components are shaped and used, and the molecular substructures of its various materials. (HS-ESS2-5)</p> <p>Stability and Change Much of science deals with constructing explanations of how things change and how they remain stable. (HS-ESS2-7)</p> <p>Change and rates of change can be quantified and modeled over very short or very long periods of time. Some system changes are irreversible. (HS-ESS2-1)</p> <p>Feedback (negative or positive) can stabilize or destabilize a system. (HS-ESS2- 2)</p> <p>Connections to Engineering, Technology, and Applications of Science</p>
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evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.

Construct an oral and written argument or counter-arguments based on data and evidence. (HS-ESS2-7)

Connections to Nature of Science

Scientific knowledge is Based on Empirical Evidence Science knowledge is based on empirical evidence. (HS-ESS2-3)

Science disciplines share common rules of evidence used to evaluate explanations about natural systems. (HS-ESS2-3)

Science includes the process of coordinating patterns of evidence with current theory. (HS-ESS2-3)

Science arguments are strengthened by multiple lines of evidence supporting a single explanation. (HS-ESS2-4)

unstable isotopes continually generate 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. (HS-ESS2-3)

ESS2.C: The Roles of Water in Earth’s Surface Processes

The abundance of liquid water on Earth’s surface and its unique combination of physical and chemical properties are central to the planet’s dynamics. These properties include water’s exceptional capacity to absorb, store, and release large amounts of energy, transmit sunlight, expand upon freezing, dissolve and transport materials, and lower the viscosities and melting points of rocks. (HS-ESS2-5), (HS-ESS2.D)

Weather and Climate

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. (HS-ESS2-2), (HS-ESS2-4)

Gradual atmospheric changes were due to plants and other organisms that captured carbon dioxide and released oxygen. (HS-ESS2-6), (HS-ESS2-7)

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	<p>Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect Climate. (HS-ESS2)</p>	
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Social and Emotional Learning Standards

Self-Awareness	<ul style="list-style-type: none"> Recognize one’s personal traits, strengths, and limitations Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> Recognize the skills needed to establish and achieve personal and educational goals Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections

ELA Standards	
<ul style="list-style-type: none"> RI.CI.9–10.2 	Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text.
<ul style="list-style-type: none"> RL.CR.9–10.1 	Cite a range of thorough textual evidence and make relevant connections to strongly support analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as including determining where the text leaves matters uncertain.
<ul style="list-style-type: none"> SL.II.9–10.2 	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.
<ul style="list-style-type: none"> SL.PI.9–10.4 	Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
<ul style="list-style-type: none"> W.WR.9–10.5 	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.
<ul style="list-style-type: none"> L.SS.9–10.1 	Demonstrate command of the system and structure of the English language when writing or speaking.
Math Standards	
<ul style="list-style-type: none"> MP.2 	Reason abstractly and quantitatively.
<ul style="list-style-type: none"> HSN-Q.A.2 	Define appropriate quantities for the purpose of descriptive modeling.

Computer Science & Design Thinking

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Content Area: Science - Environmental

8.1 Computer Science

- 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.

8.2 Design Thinking

- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.khanacademy.org/>
- Completion of webquests
- On-Line Laboratory activities
- Online assessment activities example:
 - Kahoot
 - Quizizz

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

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Enduring Understandings:

- Earth functions as a complex system of interacting components, and changes in one part of the system can produce feedback effects throughout the entire system.
- Understanding and managing environmental challenges requires integrating knowledge from multiple scientific disciplines, including Earth science, biology, chemistry, and physics.
- Human activities have significantly altered Earth's systems over time, affecting the availability of natural resources and increasing the frequency and impact of environmental hazards.
- The sustainability of Earth's resources depends on informed human decision-making, grounded in scientific evidence, modeling, and an understanding of system interactions.
- Scientific models and computational representations are essential tools for analyzing relationships among Earth systems and predicting the consequences of human actions.

Essential Questions:

- How do Earth's interacting systems work together to support life on our planet?
- Why is Earth best understood as a system rather than a collection of separate components?
- How have human activities altered Earth's systems and affected the availability of natural resources?
- How are natural hazards and resource availability connected to human decision-making and land-use practices?
- How can scientific evidence and computational models be used to explain and predict changes in Earth systems?
- What feedback effects occur when one Earth system is altered, and how do these feedbacks influence other systems?
- How can understanding Earth system interactions help humans manage resources more sustainably?

Content

Students will know...

- Earth is a system that is composed of many components acting together.
- Many disciplines of science are necessary to successfully study and manage our environment.
- Earth's resources are being degraded due to human interactions with the environment.
- Humans have altered Earth's environment in several ways throughout human history.

Skills

Students will be able to ...

- Identify the elements that are essential to life.
- Distinguish between renewable and nonrenewable resources.
- Construct an explanation based on evidence for how the availability of natural resources, and how the occurrence of natural hazards are connected to human activity.
- Use a computational representation to illustrate the relationship among Earth systems and how those relationships are being modified due to human activity.
- Illustrate how Earth's interacting systems cause feedback effects on other Earth systems.

Core Instructional & Supplemental Materials

Suggested Activities/Resources:

- Vocabulary key terms - Pgs 289, 296, 304
- Students begin with an understanding of the fact that all water on earth is recycled.

Supplemental resources:

- Holt Environmental science text Unit 4 Chapters 11,12, 13, 14
- Enviroscope model

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- Students draw a pie chart depicting types of water on earth ie- most of the water on earth is salt water, polluted fresh water, or water frozen in glaciers; therefore not potable for drinking. (video segment of how the Dead Sea is “shrinking” due to climate change)
- Video segments (PBS) learning Media.com - Desalinization plants - problems and possibilities.
- Video segments - Ice Cores taken in Antarctica depict climate change (aligns with ice Core case study text pgs 354-355)
- Students will understand that most of the world’s inhabitants lack access to fresh drinking water.
- Labs - 1. Enviroscape - students set up a community with different water needs, and mitigate disasters such as flooding, pollution and other events. (Enviroscape kit contains model houses, roads, bridges, sewerage plants, farms, construction sites, trees, drainage ditches and berms) Students visualize the effects of point source and nonpoint source pollution of different areas of the enviroscape after making it “rain” on the community.
- Questionnaire supplied with kit for critical answers to water related issues.
- Lab - Climate change using slides on sea-level rise (Barnegat bay partnership)
- Climate change video segments from NOAA.
- Lab - How do hurricanes begin? Aquarium with warm water, ice cubes, blue food coloring, salt and fresh water - how temperature affects waves, upwelling, and, air currents

- [Race & Social Justice Teacher Resources](#)
- [Sustainable Agriculture](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model

- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

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- Small group instruction as needed
- Instructional technology as needed/required

- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
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- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Lakewood School District Curriculum Guide

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<p>Culturally Diverse:</p> <ul style="list-style-type: none"> ● Create pictures, posters, art, books, maps, flags, etc to hang in the classroom. ● Create an emotionally positive classroom climate. ● Bring in guest speakers ● Create effective communication ● Model and teach cultural respect ● Build relationships with students by interviewing students to understand their background

Unit 6: Our Health and Our Future	20 days
<u>New Jersey Learning Standards-Science</u>	
HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
HS-LS3-2	Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

Science and Engineering Practices	Discipline Core Ideas/Unit Enduring Understandings	Crosscutting Concepts
<p>Asking Questions and Defining Problems Asking questions and defining problems in 9-12 builds on K-8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. Ask questions that arise from examining models or a theory to clarify relationships. (HS-LS3-1)</p> <p>Analyzing and Interpreting Data Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of</p>	<p>LS1.A: Structure and Function All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins. (secondary to HS-LS3-1) (Note: This Disciplinary Core Idea is also addressed by HS-LS1-1.)</p> <p>LS3.A: Inheritance of Traits Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The</p>	<p>Cause and Effect</p> <p>Connections to Nature of Science Science is a Human Endeavor Technological advances have influenced the progress of science and science has influenced advances in technology. (HSLS3-3)</p> <p>Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)</p> <p>Connections to Nature of Science Scientific Knowledge Assumes an Order and Consistency in Natural Systems Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through</p>

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models to generate and analyze data.
(HS-LS3-3)

Engaging in Argument from Evidence

Engaging in argument from evidence in 9-12 builds on K-8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science. Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.
(HS-LS3-2)

instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function.
(HS-LS3-1)

LS3.B: Variation of Traits

In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation.

Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation.

Environmental factors can also cause mutations in genes, and viable mutations are inherited.
(HS-LS3-2)

Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population.

Thus the variation and distribution of traits observed depends on both genetic and environmental factors.
(HS-LS3-2), (HS-LS3-3)

measurement and observation.
(HS-LS4-1),(HS-LS4-2)

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. (HS-LS4-5)

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Social and Emotional Learning Standards	
Self-Awareness	<ul style="list-style-type: none"> ● Recognize one’s personal traits, strengths, and limitations ● Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	<ul style="list-style-type: none"> ● Recognize the skills needed to establish and achieve personal and educational goals ● Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one’s goals
Social Awareness	<ul style="list-style-type: none"> ● Demonstrate an understanding of the need for mutual respect when viewpoints differ
Responsible Decision-Making	<ul style="list-style-type: none"> ● Develop, implement and model effective problem solving and critical thinking skills

Interdisciplinary Connections	
	ELA Standards
● RI.CI.9–10.2	Determine one or more central ideas of an informational text and analyze how it is developed and refined over the course of a text, including how it emerges and is shaped by specific details; provide an objective summary of the text.
● RL.CR.9–10.1	Cite a range of thorough textual evidence and make relevant connections to strongly support analysis of multiple aspects of what a literary text says explicitly and inferentially, as well as including determining where the text leaves matters uncertain.
● SL.II.9–10.2	Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.
● SL.PI.9–10.4	Present information, findings, and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
● W.WR.9–10.5	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.
● L.SS.9–10.1	Demonstrate command of the system and structure of the English language when writing or speaking.
	Math Standards
● MP.2	Reason abstractly and quantitatively.
● MP.4	Model with mathematics.

Computer Science & Design Thinking	
8.1 Computer Science	<ul style="list-style-type: none"> ● 8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.2 Design Thinking	

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- 8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
- 8.2.5.ED.3: Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
- 8.2.8.ED.3: Develop a proposal for a solution to a real-world problem that includes a model (e.g., physical prototype, graphical/technical sketch).

Career Readiness, Life Literacies & Key Skills

9.1 Personal Financial Literacy

- 9.1.5.EG.1: Explain and give examples of what is meant by the term “tax.”
- 9.1.8.FI.4: Analyze the interest rates and fees associated with financial products.
- 9.1.8.FP.7: Identify the techniques and effects of deceptive advertising.

9.4 Life Literacies & Key Skills

- 9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.
- 9.4.8.TL.3: Select appropriate tools to organize and present information digitally.

Evidence of Student Learning

Formative Tasks:

- Oral Questioning
- Student Conference
- Self-Assessment
- Hand Signals
- Communicators
- Graphic Organizers
- Teacher Observation
- DOL
- Quiz Classwork
- NJSLA Released questions
- Problem of the Day

Alternative Assessments:

- Teacher-Created Projects
- <https://www.khanacademy.org/>
- Completion of webquests
- On-Line Laboratory activities
- Online assessment activities example:
 - Kahoot
 - Quizizz

Summative Assessments:

- Unit Tests
- Midterm Exam
- Final Exam

Benchmark Assessments:

- Quarterly Benchmarks
- Beginning/End of Year Assessment
- Unit Common Assessment

Knowledge & Skills

Enduring Understandings:

- Environmental conditions influence human health, including the emergence and spread of infectious diseases.

Essential Questions:

- How do changes in the environment contribute to the emergence and spread of infectious diseases?

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<ul style="list-style-type: none"> ● Changes to ecosystems can create new pathways for disease transmission, including the transfer of pathogens from animals to humans. ● Pollution from both natural and human sources affects environmental quality and public health, often in interconnected and cumulative ways. ● Scientific fields such as toxicology and epidemiology provide essential tools for identifying, monitoring, and reducing environmental health risks. ● Sustainability is critical to protecting environmental systems and the organisms that depend on them, including human populations. ● Individuals, communities, and governments all play a role in addressing environmental challenges, through education, leadership, and coordinated action. 	<ul style="list-style-type: none"> ● Why are many emerging diseases linked to environmental change and interactions between humans and animals? ● How do toxicology and epidemiology help scientists understand the relationship between environmental factors and human health? ● In what ways do waste and pollution impact ecosystems and human health? ● How have major events and international agreements shaped global responses to environmental and health challenges? ● What roles do individuals, communities, and governments play in protecting environmental and public health? ● Why is sustainability essential for ensuring a healthy environment for future generations? ● How can education and leadership influence environmental interactions and health outcomes at local and global scales?
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<p>Content <i>Students will know...</i></p> <ul style="list-style-type: none"> ● Changes in the environment can lead to the spread of infectious diseases. ● Emergent Pathogens are representations of new reservoirs of disease. ● Sustainability will be a key factor in preserving the future environment and its relevant organisms. ● Pollution can come from both human and naturally occurring sources. ● Most human diseases that have an environmental component are caused by pathogens. ● Many emerging diseases are caused by pathogens and changes to the environment, and have made cross-species transfers from animals to humans. ● Individuals can have an effect on environmental interactions through leadership and education. 	<p>Skills <i>Students will be able to ...</i></p> <ul style="list-style-type: none"> ● Explain how scientists use toxicology and epidemiology. ● Describe the relationship between waste, pollution, and human health. ● Describe several major international meetings and agreements relating to the environment. ● Give examples of private, community, and government efforts to address environmental problems. ● Describe major events in environmental history.
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Core Instructional & Supplemental Materials

<p>Suggested Activities/Resources:</p> <ul style="list-style-type: none"> ● Chapter 20 “The Environment and Human Health” ● List 5 pollutants, their sources, and possible effects on human health. 	<p>Supplemental resources:</p> <ul style="list-style-type: none"> ● Holt Environmental science text. ● (Chapters 12, 20) ● “Science Friday” topics on epidemiology (PBS)
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- Define key terms pg 549
- View “Brain Pop” video segment on environmental sources of human disease .
- Discuss the distinctions between environmental sources of disease spread by water, air or land pollution and those spread by insects.
- Etiology of the word “disease” (“dis - ease”)
- Research topics on epidemiology and careers in epidemiology
- Pollution from natural sources vs pollution from human activities
- Low -level ozone - pulmonary health effects - students debate the role of schools and government in mitigating it’s effects on health.
- Disruption of the human endocrine system by pollutants -
- Case Study pg 554 - students read and answer critical thinking questions following.

- Ted Talks topics
- Case Studies in environmentally triggered diseases.
- [Race & Social Justice Teacher Resources](#)
- [Environmental Health & Ethics](#)

Suggested Accommodations

English Language Learners:

- Multi-Sensory Instruction
- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Gradual Release Model
- Visual Cues
- Visual Models
- Technology Integration
- Hands-On/Experiential Activities
- Native language support when possible
- Sheltered English Instructional Strategies
- Provide additional time

Special Education/Students with Disabilities:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed

- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

504 Plans:

- Extra help opportunities provided
- Credit Recovery
- Allow use of a calculator, when appropriate
- Modified length and time frame of assignments
- Alternate assessments with extended time
- Provide guided notes and study guides as needed
- Preferential Seating
- Extra Practice
- Directions repeated, clarified, and reworded
- Breakdown task into manageable units
- Differentiated instruction
- Use of manipulatives
- Math tool paper available
- Cooperative learning groups
- Supplemental books
- Repeat, reword or clarify directions
- Small group instruction as needed
- Instructional technology as needed/required
- Effective teacher questioning; ranging from fact recall to higher order critical thinking questions

Gifted and Talented:

- Cooperative Learning Groups
- Enriched Assignments
- Tiered Assignments
- Word Problems
- NJSLA questions
- Model Curriculum Questions
- Inquiry Based Project
- Interest Based/Choice Activities

Students at Risk of Failure:

- Extended Time
- Multi-Sensory Instruction

- Flexible Grouping
- Small Group Instruction
- Peer Buddies
- Graphic Organizers
- Chunking Information
- Scaffolded Questioning
- Tiered Activities
- Manipulatives/Concrete Models
- Build Background/Vocabulary
- Math Word Wall/Word Bank
- Modified Assignments
- Gradual Release Model
- Preferential Seating
- Brain Breaks
- Visual Cues
- Visual Models
- Technology Integration
- Assistive Technology
- Credit Recovery

Economically Disadvantaged:

- Pre-teach vocabulary using visuals and gestures
- Chunk texts
- Summarize as you go
- Preview lessons
- Graphic organizers
- Highlight key words
- Sentence starters
- Prompting and cueing
- Activate schema
- Build background knowledge

Culturally Diverse:

- Create pictures, posters, art, books, maps, flags, etc to hang in the classroom.
- Create an emotionally positive classroom climate.
- Bring in guest speakers
- Create effective communication
- Model and teach cultural respect
- Build relationships with students by interviewing students to understand their background