

Unit 4: Earth's Resources

Content Area: **Science**
Course(s): **Environmental & Earth Science**
Time Period: **Third Marking Period**
Length: **7 Week**
Status: **Published**

Unit Overview

Unit four covers major natural resources: forests, soil and agriculture, minerals, water, and the atmosphere. As human population is increasing, demands and supplies put severe impacts on natural resources, especially the non-renewable. The unit addresses the problem of pollution, which is pervasive in almost all natural resources from land to the oceans. With the role of technology and engineering is taking a great part in our management and harvesting of natural resources, governments and societies have to find collective solutions to persistent environmental problems.

STAGE 1- DESIRED RESULTS

Standards

SCI.9-12.HS-ESS1-1	Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation.
SCI.9-12.HS-ESS1-2	Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.
SCI.9-12.HS-ESS1-3	Communicate scientific ideas about the way stars, over their life cycle, produce elements.
SCI.9-12.HS-ESS1-6	Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
SCI.9-12.HS-ETS1-3	Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts.

Science and Engineering Practices

- Analyzing and Interpreting Data
- Asking Questions and Defining Problems
- Constructing Explanations and Designing Solutions
- Developing and Using Models
- Engaging in Argument from Evidence

- Obtaining, Evaluating, and Communicating Information
- Planning and Carrying Out Information
- Using Mathematics and Computational Thinking

Cross Cutting Concepts

- Cause and Effect
- Energy and Matter
- Influence of Engineering, Technology, and Science on Society and the Natural World
- Interdependence of Science, Engineering, and Technology
- Patterns
- Scale, Proportion, and Quantity
- Stability and Change
- Structure and Functions
- Systems and System Models

Disciplinary Core Ideas

Physical Sciences

- PS1A: Structure and Properties of Matter
- PS1B: Chemical Reactions
- PS1C: Nuclear Processes
- PS2A: Forces and Motion
- PS2B: Types of Interaction
- PS3A: Definitions of Energy
- PS3B: Conservation of Energy and Energy Transfer
- PS3C: Relationship Between Energy and Forces
- PS3D: Energy in Chemical Processes and Everyday Life
- PS4A: Wave Properties
- PS4B: Electromagnetic Radiation
- PS4C: Information Technologies and Instrumentation

Life Sciences

- LS1A: Structure and Functions
- LS1B: Growth and Development of Organisms

- LS1C: Organization for Matter and Energy Flow in Organisms
- LS1D: Information Processing
- LS2A: Interdependent Relationships in Ecosystems
- LS2B: Cycles of Matter and Energy Transfer in Ecosystems
- LS2C: Ecosystems Dynamics, Functioning, and Resilience
- LS2D: Social Interactions and Group Behavior
- LS3A: Inheritance of Traits
- LS3B: Variation of traits
- LS4A: Evidence of Common Ancestry and Diversity
- LS4B: Natural Selection
- LS4C: Adaptation
- LS4D: Biodiversity and Humans

Earth and Space Sciences

- ESS1A: The Universe and its Stars
- ESS1B: Earth and the Solar System
- ESS1C: The History of Planet Earth
- ESS2A: Earth Materials and Systems
- ESS2B: Plate Tectonics and Large-Scale Systems
- ESS2C: The Role of Water in Earth's Surface Processes
- ESS2D: Weather and Climate
- ESS2E: Biogeology
- ESS3A: Natural Resources
- ESS3B: Natural Hazards
- ESS3C: Human Impacts on Earth Systems
- ESS3D: Global Climate Change

Engineering. Technology. and Applications of Science

- ETS1A: Defining and Delimiting an Engineering Problem
- ETS1B: Developing Possible Solutions
- ETS1C: Optimizing the Design Solution

Essential Questions

- How can we use Earth's resources sustainably?
- How can we manage renewable resources for sustainable use?
- How can resource managers strike a balance between the ecological and economic value of forest resources?
- What steps toward sustainable forestry have been taken in the last 100 years?

- How can we balance our growing demand for food with our need to protect the environment?
- What is soil?
- How do erosion, desertification, and soil pollution affect the productivity of soil?
- How has agriculture evolved?
- How can we produce enough food for a rapidly growing population while sustaining our ability to produce it?
- At what point do the costs of mining outweigh the benefits?
- Where do minerals come from?
- How are mineral resources accessed?
- How can we reduce the negative impacts of mining and manage mined resources?
- Why are we running out of water?
- Where is all of our water?
- How can we change the way we use water?
- How does water pollution affect humans and ecosystems?
- How can we ensure everyone has clean air to breathe?
- How can we describe Earth's atmosphere?
- What are the sources of air pollution?
- What measures can limit and prevent pollution of the atmosphere?

Enduring Understanding

- We need to use Earth's finite resources in a sustainable way.
- Most logging in the U.S. takes place on private land.
- About 38% of Earth's land surface is used for agriculture.
- Some estimates predict that 50 million people could be displaced in the next 10 years due to desertification, a form of soil degradation.
- Humans have been practicing agriculture for about 10,000 years.
- Each year, Earth gains 75 million people and loses 5–7 million hectares of productive cropland.
- More than a ton of waste may remain after extracting just a few hundredths of an ounce of gold.
- Although the vast majority of Earth is covered in water, one in eight people lacks access to clean freshwater.
- 3,800 children die every day from diseases associated with unsafe drinking water.
- The air we breathe and all the weather we see is contained in the lowest 1% of the Earth's atmosphere.
- Air pollution is estimated to cause 2 million premature deaths worldwide every year.

Students will know...Students will do...Suggested Activities /Strategies

Standards	Students will know	Students will
-----------	--------------------	---------------

HS-ESS3-1	<ul style="list-style-type: none"> • People need to manage the harvesting of renewable resources in order to ensure their availability. 	<ul style="list-style-type: none"> • Explain the importance of managing specific renewable resources.
HS-ESS3-2	<ul style="list-style-type: none"> • Maximum sustainable yield, ecosystem-based management, and adaptive management are three approaches to resource management. 	<ul style="list-style-type: none"> • Describe three resource management approaches.
HS-ESS3-2	<ul style="list-style-type: none"> • Forest resources have great ecological and economic value. 	<ul style="list-style-type: none"> • List some of the ecological and values of forest resources.
HS-ESS3-2	<ul style="list-style-type: none"> • There are costs and benefits to every method of timber harvesting. 	<ul style="list-style-type: none"> • Describe the costs and benefits of different methods of timber harvesting.
HS-ESS3-3	<ul style="list-style-type: none"> • Deforestation may help nations develop, but it can be ecologically destructive in the long run. 	<ul style="list-style-type: none"> • Discuss the current levels of deforestation in the United States and in developing nations.

HS-ESS3-3	<ul style="list-style-type: none"> • Logging in national forests is managed by the Forest Service, but profits go to timber companies. 	<ul style="list-style-type: none"> • Explain how logging is managed in national forests.
HS-ESS3-3	<ul style="list-style-type: none"> • Most logging in the United States today takes place on tree plantations owned by timber companies. 	<ul style="list-style-type: none"> • Describe where most logging in the United States takes place.
HS-ESS3-3	<ul style="list-style-type: none"> • Suppression of all wildfires can endanger ecosystems, property, and people. 	<ul style="list-style-type: none"> • Discuss the potential effects of wildfire suppression on an ecosystem and future fires.
HS-ESS3-3	<ul style="list-style-type: none"> • The response of timber companies to consumer demand is helping to promote sustainable forestry. 	<ul style="list-style-type: none"> • Describe how consumer demand for wood products is important to sustainable forestry.
HS-ESS3-1	<ul style="list-style-type: none"> • Soil is a complex substance that forms through weathering, deposition, and decomposition. 	<ul style="list-style-type: none"> • Explain three processes by which soil forms.
HS-ESS3-1	<ul style="list-style-type: none"> • A soil profile consists of layers known as horizons. 	<ul style="list-style-type: none"> • Describe the horizons that make up a soil profile.
HS-ESS3-1	<ul style="list-style-type: none"> • Soils can be classified by their color, texture, structure, and pH. 	<ul style="list-style-type: none"> • List the four characteristics used to classify soil.

HS-ESS3-3	<ul style="list-style-type: none"> • Certain farming, ranching, and forestry practices can erode soil, but other practices can protect it. 	<ul style="list-style-type: none"> • Describe some practices that can reduce soil erosion and some that can increase it.
HS-ESS3-1	<ul style="list-style-type: none"> • Desertification reduces the productivity of arid lands. 	<ul style="list-style-type: none"> • Identify the causes and effects of desertification.
HS-ESS3-3	<ul style="list-style-type: none"> • U.S. and international agricultural organizations promote soil conservation. 	<ul style="list-style-type: none"> • Discuss the activities of U.S. and international agricultural organizations.
HS-ESS3-4	<ul style="list-style-type: none"> • Irrigation and pesticide use can improve soil productivity in the short term, but they can pollute soil in the long term. 	<ul style="list-style-type: none"> • Explain how irrigation and pesticides can cause soil pollution.
HS-ESS3-4	<ul style="list-style-type: none"> • Agriculture began about 10,000 years ago when a warmer climate enabled humans to plant seeds and raise livestock. 	<ul style="list-style-type: none"> • Discuss the beginnings of agriculture.
HS-ESS3-4	<ul style="list-style-type: none"> • Industrial agriculture and the green revolution have saved millions of people from starvation. 	<ul style="list-style-type: none"> • Explain the importance of industrial agriculture and the green revolution.
HS-ESS3-4	<ul style="list-style-type: none"> • Chemical pesticides, biological pest control, 	<ul style="list-style-type: none"> • Identify different types of pest control.

	and integrated pest management can all effectively protect crops from pests.	
HS-ESS3-3	<ul style="list-style-type: none"> • Insects and other animals are essential to the reproduction of many crops. 	<ul style="list-style-type: none"> • Explain the importance of pollinators in agriculture.
HS-ESS3-3	<ul style="list-style-type: none"> • Because hunger continues and the population is growing, we need to find a way to increase food production sustainably. 	<ul style="list-style-type: none"> • Explain why the world needs to produce more food and to grow it sustainably.
HS-ESS3-4	<ul style="list-style-type: none"> • Genetically modified food is a promising way to increase food production; we need to do more research into potential risks. 	<ul style="list-style-type: none"> • Discuss genetically modified food.
HS-ESS3-4	<ul style="list-style-type: none"> • Feedlots, aquaculture, and other methods of industrial food production are efficient, but they have disadvantages. 	<ul style="list-style-type: none"> • Describe the advantages and disadvantages of industrial food production.
HS-ESS3-1	<ul style="list-style-type: none"> • Sustainable alternatives to industrial agriculture include organic agriculture and locally supported agriculture. 	<ul style="list-style-type: none"> • Discuss sustainable agriculture.
HS-ESS3-2	<ul style="list-style-type: none"> • A mineral is a naturally occurring, inorganic solid that has an orderly crystalline structure and a definite chemical composition. 	<ul style="list-style-type: none"> • *Explain what a mineral is.

HS-ESS3-2	<ul style="list-style-type: none"> Minerals can form by crystallization from magma or lava, from precipitation related to evaporation or hydrothermal solutions, from exposure to high pressure and temperature, or can be produced by organisms. 	<ul style="list-style-type: none"> Describe how minerals form.
HS-ESS2-3	<ul style="list-style-type: none"> Forces deep inside and at the surface of Earth produce changes in rock that cause the same material to cycle between igneous, sedimentary, and metamorphic rock stages. 	<ul style="list-style-type: none"> Identify types of rocks and the s rock cycle.
HS-ESS3-3	<ul style="list-style-type: none"> Mining companies seek and gather valuable resources such as metals, nonmetallic minerals, and fuel sources. 	<ul style="list-style-type: none"> Identify the types of resources t mined.
HS-ESS3-4	<ul style="list-style-type: none"> Mining companies have developed many techniques to access resources close to the surface of Earth, deep underground, and even underwater. 	<ul style="list-style-type: none"> Describe different methods use mining.
HS-ESS3-1	<ul style="list-style-type: none"> After mining, ores and other extracted 	<ul style="list-style-type: none"> Explain how metals are process

	materials are processed to separate the desired materials, combine them with other materials, or alter their properties.	
HS-ESS3-3	<ul style="list-style-type: none"> Environmental impacts of mining include increased erosion, increased sediment and debris, and pollution of water, land, and air. Mining can also have negative impacts on society. 	<ul style="list-style-type: none"> Describe the negative impacts of mining on the environment and society.
HS-ESS3-2	<ul style="list-style-type: none"> Regulations that govern mining consider the environmental and safety impacts of mining along with the economic costs to the industry. 	<ul style="list-style-type: none"> Explain how mining is regulated.
HS-ESS3-1	<ul style="list-style-type: none"> Because minerals are a nonrenewable resource, we need to be concerned about finite supplies and ways to use them more responsibly, such as reusing and recycling. 	<ul style="list-style-type: none"> Describe ways that mineral use can be more responsible.
HS-ESS3-1	<ul style="list-style-type: none"> As a natural resource, freshwater is renewable. However, quantities of fresh water on Earth are limited. 	<ul style="list-style-type: none"> Discuss how fresh water can be both renewable and limited.
HS-ESS3-1	<ul style="list-style-type: none"> Surface water is contained within watersheds. 	<ul style="list-style-type: none"> Explain the significance of a watershed.

HS-ESS3-1	<ul style="list-style-type: none"> Groundwater can be accessed by wells. 	<ul style="list-style-type: none"> Explain how most groundwater
HS-ESS3-1	<ul style="list-style-type: none"> Fresh water is used for agriculture, industrial, and personal activities. 	<ul style="list-style-type: none"> List the three primary categories of freshwater use.
HS-ESS3-1	<ul style="list-style-type: none"> Because of overuse, surface water resources are being depleted. 	<ul style="list-style-type: none"> Relate the causes of surface water depletion to their effects.
HS-ESS3-1	<ul style="list-style-type: none"> Groundwater is being used, primarily for irrigation, faster than it can be replenished. 	<ul style="list-style-type: none"> Explain the major causes and effects of groundwater depletion.
HS-ESS3-1	<ul style="list-style-type: none"> Addressing freshwater depletion will largely depend on strategies that decrease water demand. 	<ul style="list-style-type: none"> Describe strategies for addressing freshwater depletion.
HS-ESS3-4	<ul style="list-style-type: none"> There are many different kinds of water pollution, each with their own sources and effects. 	<ul style="list-style-type: none"> Discuss the main categories of water pollution.
HS-ESS3-4	<ul style="list-style-type: none"> It can take decades to clean up groundwater pollution, so every effort should be made to prevent it from occurring. 	<ul style="list-style-type: none"> Explain why groundwater pollution is difficult to clean up.
HS-ESS3-4	<ul style="list-style-type: none"> Oceans are polluted with oil, toxic chemicals, and nutrients that run off the land. 	<ul style="list-style-type: none"> Discuss the sources and effects of pollutants found in the ocean.

HS-ESS3-4	<ul style="list-style-type: none"> Government regulation and water treatment are two ways of decreasing the effects of water pollution. 	<ul style="list-style-type: none"> Describe how water is regulated and treated.
HS-ESS3-6	<ul style="list-style-type: none"> Properties of the atmosphere include its composition, relative humidity, temperature, and air pressure. 	<ul style="list-style-type: none"> Describe the properties of the atmosphere.
HS-ESS3-6	<ul style="list-style-type: none"> The main layers of the atmosphere are the troposphere, the stratosphere, mesosphere, and thermosphere. 	<ul style="list-style-type: none"> Identify the four main layers of the atmosphere.
HS-ESS3-6	<ul style="list-style-type: none"> Processes that affect weather in the troposphere include heat transfer and the interaction of air masses. 	<ul style="list-style-type: none"> Explain heat transfer and the interaction of air masses in the troposphere.
HS-ESS3-4	<ul style="list-style-type: none"> Air pollution can be caused by natural processes and human activities. 	<ul style="list-style-type: none"> Explain how both natural processes and human activities can cause air pollution.
HS-ESS3-4	<ul style="list-style-type: none"> Air pollutants can damage the respiratory system, interfere with the body's uptake of oxygen, and cause cancer. 	<ul style="list-style-type: none"> Describe how air pollutants affect human health.
HS-ESS3-4	<ul style="list-style-type: none"> Temperature inversions may trap smog close to the surface of Earth, preventing the pollutants from dispersing. 	<ul style="list-style-type: none"> Explain what causes smog and how temperature inversions affect different forms of air pollution.

HS-ESS3-4	<ul style="list-style-type: none"> • Acid deposition results when products of combustion combine with water in the atmosphere. 	<ul style="list-style-type: none"> • Explain how acid deposition occurs and describe its effects.
HS-ESS3-4	<ul style="list-style-type: none"> • The Clean Air Act has provisions that have reduced air pollution in the United States. 	<ul style="list-style-type: none"> • Explain how the provisions of the Clean Air Act have reduced air pollution in the United States.
HS-ESS3-4	<ul style="list-style-type: none"> • Nations have taken steps to deal with the problem of ozone loss in the stratosphere. 	<ul style="list-style-type: none"> • Describe international efforts to address the ozone hole.

Predictable Misconceptions

- Wildfires are bad for wildlife.
- Pine forests are biological deserts and there is nothing there for wildlife.
- All hardwoods are good for wildlife.
- Cutting only big trees leaves the younger trees room to become more valuable.
- We can't manage timber and wildlife on the same acreage.
- Organic food production does not use pesticides or synthetic fertilizers.
- Eating a genetically modified fruit or vegetable change a person's genes.
- Organic food production has less impact on the environment than traditional food production.
- The soil is just dirt.
- All soils are the same.
- Global warming, greenhouse effects, and climate change are all the same thing.

Modification
<ul style="list-style-type: none"> • IEP guideline and modification for classified students. • Extended time for struggling students. • When available, assignments are to be sent electronically to online accounts and MacBook Air. • Special accommodations for students with physical or visual impairments. • Differentiated instruction.
Unit 4 Suggested Case Studies
<ul style="list-style-type: none"> • When is Clean--Clean Enough? Charles River Cleaning Act. • Battling over Clayoquot's Big Tree. • Possible Transgenic Maize in Oaxaca Mexico. • Mining for Cell Phones? • Looking for Water in the Desert. • Charging Toward Cleaner Air in London.

STAGE 2- EVIDENCE OF LEARNING

Formative Assessment

- Debriefing
- Hand Signals
- Idea Spinner
- Journal Entry
- Misconception Check

- Observation
- Questions & Answers
- Quiz
- Self-Assessment
- Student Conference
- Think-Pair-Share
- Web or Concept Map

Authentic Assessments

- Chapter 11 Assessment, (*Pearson Environmental Science: Your World, Your Turn*, 2011, p.346-349).
- Chapter 12 Assessment, (*Pearson Environmental Science: Your World, Your Turn*, 2011, p.384-389).
- Chapter 13 Assessment, (*Pearson Environmental Science: Your World, Your Turn*, 2011, p. 412-415).
- Chapter 14 Assessment, (*Pearson Environmental Science: Your World, Your Turn*, 2011, p. 444-449).
- Chapter 15 Assessment, (*Pearson Environmental Science: Your World, Your Turn*, 2011, p. 474-479).
- E-Text: Chapter 11,12, 1, 14, 15 Test A,B.
- Unit 4: Self-test Assessment.
- Teacher–prepared project assessment.
- Students Workbook: Chapter, 11,12, 1, 14, 15.

Benchmark Assessments

- Unit One: Final Test
- Unit One: Project Assessment
- Final Exam

STAGE 3- LEARNING PLAN

Instructional Map

Unit	Time Frame	Date
4	7 Weeks <ul style="list-style-type: none"> • 5 weeks instruction • 2 weeks Formative and Summative Assessment 	February, March, and April.

- Assess students' prior knowledge of the related topics in the unit, (Pre-Assessment).
- Unit Case Study:
 - Preview the case study.
 - Read the case study.
 - Assimilate the facts.
 - Gather additional information.
 - Map the contents.
 - Make local connection.
 - Create a project.
- Teacher to use formative assessment and feedback to improve students' learning.
- Students to use the textbook, or E-text, for reading and definitions.
- Teacher to use PowerPoint and multi-sensory media to introduce concepts and main points.
- Teacher to use the suggested activities, in the table above, for teaching each concept in the unit.
- Students to connect and relate unit topics to their local communities and environment, when possible.
- Students to use study guides, homework, and students' workbook for reference and feedback.
- Apply labs and outside activities as indicated in the table above.
- Teacher to guide students through authentic resources during their conduction of research and inquiries.
- Students to use graphs, charts, data table, and maps throughout the unit as indicated in the table above.
- At the end of the unit, students should present scientifically sound projects supported by evidence, data, charts, and maps.
- Unit summative assessment.

Modification/Differentiation of Instruction

Differentiation Strategies for Special Education Students

- Remove unnecessary material, words, etc., that can distract from the content
- Use of off-grade level materials
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Time allowed
- Level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in "chunks"
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Varied homework and products
- Varied questioning strategies

- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Ability to work at their own pace
- Present ideas using auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment
- Differentiated checklists and rubrics, if available and appropriate

Differentiation Strategies for Gifted and Talented Students

- Increase the level of complexity
- Decrease scaffolding
- Variety of finished products
- Allow for greater independence
- Learning stations, interest groups
- Varied texts and supplementary materials
- Use of technology
- Flexibility in assignments
- Varied questioning strategies
- Encourage research
- Strategy and flexible groups based on formative assessment or student choice
- Acceleration within a unit of study
- Exposure to more advanced or complex concepts, abstractions, and materials
- Encourage students to move through content areas at their own pace
- After mastery of a unit, provide students with more advanced learning activities, not more of the same activity
- Present information using a thematic, broad-based, and integrative content, rather than just single-subject areas

Differentiated Strategies for ELL Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials, including visuals

- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language.
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Allow students to work at their own pace
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Role play
- Provide graphic organizers, highlighted materials
- Strategy and flexible groups based on formative assessment

Differentiation Strategies for At Risk Students

- Remove unnecessary materials, words, etc., that can distract from the content
- Provide appropriate scaffolding
- Limit the number of steps required for completion
- Gradually increase the level of independence required
- Tiered centers, assignments, lessons, or products
- Provide appropriate leveled reading materials
- Deliver the content in “chunks”
- Varied texts and supplementary materials
- Use technology, if available and appropriate
- Differentiate homework and products
- Varied questioning strategies
- Provide background knowledge
- Define key vocabulary, multiple-meaning words, and figurative language
- Use audio and visual supports, if available and appropriate
- Provide multiple learning opportunities to reinforce key concepts and vocabulary
- Meet with small groups to reteach idea/skill
- Provide cross-content application of concepts
- Presenting ideas through auditory, visual, kinesthetic, & tactile means
- Provide graphic organizers and/or highlighted materials
- Strategy and flexible groups based on formative assessment

504 Plans

Students can qualify for 504 plans if they have physical or mental impairments that affect or limit any of their abilities to:

- walk, breathe, eat, or sleep
- communicate, see, hear, or speak
- read, concentrate, think, or learn
- stand, bend, lift, or work

Examples of accommodations in 504 plans include:

- preferential seating
- extended time on tests and assignments
- reduced homework or classwork
- verbal, visual, or technology aids
- modified textbooks or audio-video materials
- behavior management support
- adjusted class schedules or grading
- verbal testing
- excused lateness, absence, or missed classwork
- pre-approved nurse's office visits and accompaniment to visits
- occupational or physical therapy

Modification Strategies

- Cooperative Grouping
- Extended Time
- Frequent Breaks
- Highlighted Text
- Interactive Notebook
- Modified Test
- Oral Directions
- Peer Tutoring
- Preferential Seating
- Re-direct
- Repeated Drill and Practice
- Shortened Assignment
- Teacher Notes
- Tutorials
- Use of Additional Reference Materials
- Use of Audio Resources

Horizontal Intergration- Interdisciplinary Connections

New Jersey Student Learning Standards for Mathematics

N-Q.A.Reason quantitatively and use units to solve problems.

1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; chose and interpret the scale and the origin in graphs and data displays
2. Define appropriate quantities for the purpose of descriptive modeling.
3. Choose the level of accuracy appropriate to limitations on measurement when reporting quantities.

N-CN.A. Perform arithmetic operations with complex numbers.

1. Know there is a complex number.
2. Use the commutative, associative, and distributive properties.

A-SSE.A. Interpret the structure of expressions

1. Interpret expressions that represent a quantity in terms of its context.

A-SSE.B. Write expressions in equivalent forms to solve problems.

1. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

F-IF.A. Understand the concept of a function and use functional notation.

1. Understand that a function from one set to another set.

F-IF.B Interpret functions that arise in applications in terms of the context.

F-IF.C. Analyze functions using different representations

S-ID.A. Summarize, represent, and interpret data on a single count or measurement variable

1. Represent data with plots on a real number line.

S-ID.B. Summarize, represent, and interpret data on two categorical and quantitative variables.

S-ID.C. Interpret linear models.

S-IC.A. Understand and evaluate random processes underlying statistical experiments.

S-IC.B. Make inferences and justify conclusions from surveys, experiments, and observational studies.

Reading Science and Technical Subjects

RST.11-12.1. Accurately cite strong and thorough evidence from the text to support analysis of science and technical texts, attending to precise details for explanations or descriptions.

RST.11-12.2. Determine the central ideas, themes, or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11-12.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

RST.11-12.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11-12 texts and topics*.

RST.11-12.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

RST.11-12.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

RST.11-12.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11-12.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.11-12.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

RST.11-12.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11-CCR text complexity band independently and proficiently.

Writing History, Science and Technical Subjects

WHST.11-12.1. Write arguments focused on discipline-specific content.

A. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

B. Develop claim(s) and counterclaims using sound reasoning and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

C. Use transitions (e.g. words, phrases, clauses) to link the major sections of the text, create cohesion, and

clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

D.Establish and maintain a style and tone appropriate to the audience and purpose (e.g. formal and objective for academic writing) while attending to the norms and conventions of the discipline in which they are writing.

E.Provide a concluding paragraph or section that supports the argument presented.

WHST.11-12.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

A.Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

B.Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

C.Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

D.Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

E.Provide a concluding paragraph or section that supports the argument presented.

WHST.11-12.3

(See note; not applicable as a separate requirement)

WHST.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11-12.6. Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.

WHST.11-12.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

WHST.11-12.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.11-12.9. Draw evidence from informational texts to support analysis, reflection, and research.

WHST.11-12.10. Write routinely over extended time frames (time for reflection and revision) and shorter time

frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

2016 New Jersey Student Learning Standards- Technology

TECH.8.1.12 All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

TECH.8.1.12.A Students demonstrate a sound understanding of technology concepts, systems and operations.

TECH.8.1.12.B Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.

TECH.8.1.12.C Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.

TECH.8.1.12.D Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

TECH.8.1.12.E Students apply digital tools to gather, evaluate, and use information.

TECH.8.1.12.F Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

TECH.8.2.12 All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

TECH.8.2.12.A Technology systems impact every aspect of the world in which we live.

TECH.8.2.12.B Knowledge and understanding of human, cultural and society values are fundamental when designing technology systems and products in the global society.

TECH.8.2.12.C The design process is a systematic approach to solving problems.

TECH.8.2.12.D The designed world is the product of a design process that provides the means to convert resources into products and systems.

TECH.8.2.12.E Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

2016 New Jersey Student Learning Standards- 21st Century Learners

Career Awareness, Exploration, and Preparedness

- CAEP.9.2.12.C.3 Identify transferable career skills and design alternate career plans.
- CAEP.9.2.12.C.1 Review career goals and determine steps necessary for attainment.
- CAEP.9.2.12.C.2 Modify Personalized Student Learning Plans to support declared career goals.
- CAEP.9.2.12.C.7 Examine the professional, legal, and ethical responsibilities for both employers and employees in the global workplace.
- CAEP.9.2.12.C.5 Research career opportunities in the United States and abroad that require knowledge of world languages and diverse cultures.
- CAEP.9.2.12.C.4 Analyze how economic conditions and societal changes influence employment trends and future education.
- CAEP.9.2.12.C.9 Analyze the correlation between personal and financial behavior and employability.
- CAEP.9.2.12.C.6 Investigate entrepreneurship opportunities as options for career planning and identify the knowledge, skills, abilities, and resources required for owning and managing a business.
- CAEP.9.2.12.C.8 Assess the impact of litigation and court decisions on employment laws and practices.

Career Ready Practices

- CRP.K-12.CRP2 Apply appropriate academic and technical skills.
- CRP.K-12.CRP5 Consider the environmental, social and economic impacts of decisions.

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CRP.K-12.CRP3	Attend to personal health and financial well-being.

Vertical Integration- Discipline Mapping

• **Middle School**

- 6th Grade: Diversity of Life
- 7th Grade: Populations and Ecosystems
- 8th Grade: Earth History

• **High School**

- Biology
- Anatomy and Physiology
- Chemistry
- Physics
- Forensic Science
- Zoology
- Human Impact on the Environment

Additional Materials

- *Lab Manual and Equipment*
- *Safety Rules and Equipment*
- *Pearson: Environmental Science, Your World, Your Turn, 2011*
- *Textbook, Students' Workbook, and Lab Manual*
- *E-texts, Teacher Resources, and Students Resources*
- *Environmental Protection Agency* <http://www.epa.gov>
- *Food and Drug Administration*, <http://www.fda.gov>
- *National Oceanographic and Atmospheric Administration* (NOAA)
- *National Oceanographic and Atmospheric Administration* (NOAA)
- *National Environmental Satellite, Data and Information Service* (NESDIS)
- *National Marine Fisheries Service* (NMFS)
- *National Ocean Service* (NOS)
- *National Weather Service* (NWS)
- *Office of Oceanic and Atmospheric Research* (OAR)
- *Department of Health and Human Services* (HHS)
- *Agency for Toxic Substances and Disease Registry* (ATSDR)
- *Centers for Disease Control and Prevention* (CDCP)
- *National Institutes of Health* (NIH)
- *New Jersey Department of Environmental Protection*
- *New Jersey Division of Fish, Game and Wildlife*
- *US Fish and Wildlife Service Offices in New Jersey*
- *Nature*, <http://www.nature.com/nature/index.html>
- *Conservation Fund*, <http://www.conservationfund.org>
- *Conservation International*, <http://www.conservation.org>
- *Earth Justice*, <http://earthjustice.org>
- *Environmental Defense Fund*, <https://www.edf.org>
- *Natural Resources Defense Council*, <http://www.nrdc.org>
- *Oceana*, <http://oceana.org>
- *Rainforest Alliance*, <http://www.rainforest-alliance.org>
- *Sierra Club Foundation*, <http://www.sierraclubfoundation.org>
- *Union of Concerned Scientists*, <http://www.ucsusa.org>
- *World Resources Institute*, <http://www.wri.org>
- *Discovery*: <http://www.discovery.com>