Unit 01: Introduction to Earth and its Environment (Weeks 1-6)

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale

Unit Rationale

The purpose of this unit…

The purpose of this unit is to understand the structure of Earth and how its environment has changed over time due to human impact resulting in serious environmental issues

Meaning

Essential Questions

Essential Questions

- How has human civilization caused the environment to change over time?
- What are Earth's main environmental problems?
- What are the main components of the planet Earth and how are they organized?
- How does the structure of Earth contribute to natural disasters and environmental issues?

Enduring Understanding/Indicators of Understanding

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Students will understand that:

- Human civilization has developed successful methods of agriculture and division of labor which has resulted in a major increase of population and has negatively impacted the environment
- Earth's major environmental issues can be grouped into three categories: resource depletion, pollution and loss of biodiversity
- Earth's exterior and interior are divided into layers based on both composition and physical characteristics
- Earth's composition and structure are unique to our solar system and allow for the planet to maintain life
- Earth's composition can explain the main cause of earthquakes, tsunamis, volcanoes, natural formations, erosion and continental drift

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

- Environmental science is the study of the impact of humans on the environment
- In cases in which experiments are impossible, scientists look for correlation between different phenomena
- Scientists use statistics to classify, organize, and interpret data
- Measures such as means and probabilities are used to describe populations and events
- Statistics provides a powerful tool for evaluating information about the environment
- Scientists use models to understand the systems they study
- The goal of environmental science is to understand and solve environmental problems
- Wherever humans have hunted, grown food, or settled, they have impacted and changed the environment
- Humans began as hunters and gatherers, which are people that who obtain food by collecting plants and hunting wild animals
- Hunters and gatherers impacted the environment by overhunting species(bison, Mastodons, cave bears, saber-toothed tigers, giant sloths) and burning land so they could see bison in the distance
- Hunters and gatherers began collecting seeds and domesticating animals and created agriculture
- The agricultural revolution created the division of labor and a huge increase in the population
- Humans began artificially selecting for desired traits in both animals and plants, which forever changed the food today from its wild ancestors
- Land was burned and habitats were destroyed in order to turn forests into farmlands, which resulted in soil loss, floods and water shortages
- During the 1700’s, there was a shift from energy sources like animal muscle and running water to fossil fuels like coal and oil, known as the industrial revolution
- During the industrial revolution, inventions, machines and factories greatly increased the efficiency of agriculture, industry and transportation, which helped to drastically increase the population
- The introduction of plastic and burning of fossil fuels presented new environmental issues
- Earth is essentially a closed system, the only thing that enters in large amounts is energy from the sun and the only thing that leaves in large amounts is heat, which makes our resources limited
- Natural resources are either renewable (replaceable) or nonrenewable (not replaceable)
- Pollution, a result of the industrial revolution, is an undesired change in air, water or soil that adversely affects the health, survival or activities of organisms.

- Human activities are producing large amounts of pollutants
- Biodiversity refers to the number and variety of species that live in an area
- Unusually high extinction rates, due to human activities like poaching and overproduction of carbon dioxide, are causing a loss of biodiversity on Earth
- Earth's exterior can be divided into 4 parts: the geosphere (rock), the hydrosphere (water), atmosphere (air) and the biosphere (living things)
- Earth's interior is divided into three parts based on composition: the crust (solid outer layer 5-70 km thick), the mantle (dense iron-rich materials under the crust 2900 km thick) and the core (hot dense nickel and iron in the center of the Earth 3428 km thick)
- Earth's interior is divided into five parts based on physical properties: the lithosphere (crust and upper mantle, cool and rigid, contains tectonic plates), the asthenosphere (solid plastic layer of the mantle that allows tectonic plates to float on it), the mesosphere (solid plastic lower mantle), the outer core (dense liquid layer of iron and nickel) and the inner core (solid iron and nickel due to heat and pressure)
- The tectonic plates that float on the asthenosphere explain the theory of continental drift developed by Alfred Wegener
- Pangea was the supercontinent that formed 335 mya; supported by fossils and shape of continents
- Tectonic plates are responsible for natural formations such as mountains and natural disasters such as earthquakes, tsunamis, erosion and volcanoes
- The atmosphere is divided into the troposphere(closest), stratosphere, mesosphere and thermosphere (furthest)
- Rocks in the geosphere are either metamorphic, sedimentary or igneous
- 97% of the water in the hydrosphere is salt water, only 3% of all water is fresh water in which we all depend on

Skills

Skills

Student will be skilled at …

- Identify the importance of Environmental Science and the impact of humans on the environment
- Describe how scientists study subjects in which experiments are not possible
- Explain how scientists use statistics Identify why the size of a statistical sample is important
- Describe some types of models environmental scientists use to make assessments on the environment
- Describe the major environmental effects of hunter-gatherers, the agricultural revolution and the the industrial revolution
- Compare/Contrast differences in human civilization during the eras of hunter-gatherers, the agricultural revolution and the the industrial revolution
- Analyze the current environmental issues we face with our planet
- Evaluate the differences between renewable and non-renewable resources and identify examples of each
- Analyze how human activities are producing large amounts of pollutants and decreasing biodiversity in the ecosystem
- Differentiate between the 4 parts of Earth's exterior: the geosphere (rock), the hydrosphere (water), atmosphere (air) and the biosphere (living things)
- Distinguish the difference in organizing Earth's interior by either composition (crust, mantle, core) or by physical properties (lithosphere, asthenosphere, mesosphere, outer core, inner core)
- Explain the theory of continental drift developed by Alfred Wegener
- Describe the formation of mountains, volcanoes, earthquakes and tsunamis in relation to movement of the tectonic plates
- Summarize the position of the continents today compared to the supercontinent of Pangea formed 335 mya
- Support the theory of Pangea with evidence from fossils and shapes of the continents

- Identify the layers of the atmosphere into the troposphere(closest), stratosphere, mesosphere and thermosphere (furthest) and explain the properties of each layer
- Distinguish the difference between the rocks in the geosphere as either metamorphic, sedimentary or igneous
- Evaluate the importance of water in the hydrosphere, only 3% of all water is fresh, and within that 3%, most of it is locked away in glaciers and ice caps

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- **Powerpoint presentations**
- **Textbook Environmental Science (Holt)**
- **Scienceworld Magazines**
- **Articles related to topics**
- **Youtube videos**
- **Interactive website http://www.harcourtschool.com/activity/science_up_close/606/deploy/interface.html**
- **Materials for labs**

Formative Assessment Strategies

Formative Assessment Strategies

- **Graphic Organizers**
- **Quick Thoughts**
- **Exit Slips**
- **Kahoot**
- **Bingo**
- **White Board Participation**
- **Homework**
- **Teacher Check**

- **Thumbs up/thumbs down**
- **Create a Test/Take a Test**
- **Whole class questioning and answering**

Learning Activities/Unit of Study

Learning Activities/Unit of Study

- **Environmental Biologist career report**
- **Lecture on Changes in the Environment and the Dynamic Earth/Student Notes**
- **Create an Assembly Line**
- **Lecture on The Dynamic Earth/Student Notes**
- **Layers of the Earth Paper Model**
- **Draw and Label Earth**
- **Hydrosphere/Geosphere/Atmosphere foldable**
- **Whats New in Science - Read an article from scienceworld magazine**

Standards Alignment

New Jersey Student Learning Standards

SCI.HS-ESS2	Earth's Systems
SCI.HS-ESS2-1	Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features.
SCI.HS-ESS2-2	Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.
SCI.HS-ESS2-3	Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection.
SCI.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.
SCI.HS-ESS2-5	Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.

SCI.HS-ESS2-6	Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
SCI.HS-ESS2-7	Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.
SCI.HS-ESS3	Earth and Human Activity
SCI.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.
SCI.HS-ESS3-3	Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.
SCI.HS-ESS3-4	Evaluate or refine a technological solution that reduces impacts of human activities on climate change and other natural systems.
SCI.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).

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.12	Educational Technology: 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	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
TECH.8.2.12	Technology Education, Engineering, Design, and Computational Thinking - Programming: 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.B	Technology and Society: 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.B.2	Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation and maintenance of a chosen product.
TECH.8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

	Key Ideas and Details
LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
	Integration of Knowledge and Ideas
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
LA.RI.11-12	Reading Informational Text
	Key Ideas and Details
LA.RI.11-12.1	Accurately cite strong and thorough textual evidence, (e.g., via discussion, written response, etc.), to support analysis of what the text says explicitly as well as inferentially, including determining where the text leaves matters uncertain.
LA.K-12.NJSLSA.W	Writing
	Text Types and Purposes
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.K-12.NJSLSA.W2	Write informative/explanatory texts to examine and convey complex ideas and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.RI.11-12.7	Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.
LA.K-12.NJSLSA.W9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.W.11-12.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.K-12.NJSLSA.SL	Speaking and Listening
	Comprehension and Collaboration
LA.W.11-12.1.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.
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.W.11-12.1.E	Provide a concluding paragraph or section that supports the argument presented (e.g.,

	articulating implications or the significance of the topic).
LA.W.11-12.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.11-12.9	Draw evidence from literary or informational texts to support analysis, reflection, and research.
LA.SL.11-12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily

overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.