



Grade 8 Science – Course 3
Unit 3 – Earth and Space Science
Topic 8 Climate – 15 Days

Unit Overview – The Earth and Space Science unit consists of five topics. In Topic 6 students investigate the history of Earth, Earth’s geologic features, and Earth’s living organisms. Topic 7 focuses on energy flow through Earth’s atmosphere and oceans. Students focus on the impact of natural and human factors on Earth’s climate in Topic 8. Topic 9 explores the effect of the sun and moon on Earth. The formation of celestial bodies, discovery of other planetary systems, and the understanding of the universe is the context of Topic 10.

Topic Essential Question: How does energy move throughout Earth’s atmosphere and ocean?

Lessons

- Topic Launch/Quest Kickoff
- Lesson 1 Climate Factors
- Lesson 2 Climate Change
- Lesson 3 Effects of a Changing Climate
- Topic Close – Assessment, Quest Findings

NYSSLS Performance Expectations

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. [Clarification Statement: Examples of factors could include human activities (such as fossil fuel combustion, cement production, and agricultural activity) and natural processes (such as changes in incoming solar radiation or volcanic activity). Examples of evidence could include tables, graphs, and maps of global and regional temperatures, atmospheric levels of gases such as carbon dioxide and methane, and the rates of human activities. Emphasis is on the major role that human activities play in causing the rise in global temperatures.]

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and protecting ecosystem stability.* [Clarification Statement: Examples of ecosystem protections could include water purification, waste management, nutrient recycling, prevention of soil erosion, and eradication of invasive species. Examples of design solution constraints could include scientific, economic, and social considerations.]

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

Topic Opener

PE: MS-ESS3-5; MS-ETS1-1; MS-ETS1-2

SEP: Asking Questions and Defining Problems

DCI

ETS1.A – Defining and Delimiting Engineering Problems

- The more precisely a design task’s criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MSETS1-1)

ETS1.B – Developing Possible Solutions

- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2)

CCC – Stability and Change

Savvas

Highlighted labs are important to the understanding of the instructional concepts in this lesson and must be completed during Science instructional time.

- Topic Readiness Test
- *u*Connect Lab – How Do Climates Differ?
- Quest Kickoff Video – How can I help reduce my school’s carbon footprint?

Lesson 1 – Climate Factors

Savvas

PE:MS-ESS2-6

SEP: Developing and Using Models

DCI:

ESS2.D – Weather and Climate

- Weather and climate are influenced by interactions involving sunlight, the ocean, the atmosphere, ice, landforms, and living things. These interactions vary with latitude, altitude, and local and regional geography, all of which can affect oceanic and atmospheric flow patterns. (MS-ESS2-6)

CCC: Systems and System Models

Guiding Objectives:

- Students will compare time scales of the same phenomena to: Identify weather as a description of short-term atmospheric conditions; recognize climate as long-term patterns in atmospheric conditions.
- Students will analyze and interpret data to provide evidence to support how latitude, altitude, distance from large bodies of water, and ocean currents affect patterns of circulation in the atmosphere and ocean.
- Students will construct an explanation for how patterns of circulation determine regional climates.

Literacy Connection

- Integrate With Visuals

Vocabulary

- climate

Academic Vocabulary

- describe

Connect - TE/SB p.384

- Connect It!
- Quest Connection
- Inquiry Warm-Up Lab – How Does Latitude Affect Climate?

Investigate - TE/SB pp.385-388; 390-391

- **Investigate Lab – Classifying Climates**
- Video – How Ocean Currents Help Regulate Climate
- Interactivity – Two Sides of the Mountain
- Literacy Connection (p.387)
- Reading Checks (pp.387; 389)
- Math Toolbox (p.386)

Synthesize - TE/SB pp. 389; 391-392

- Interactivity – Olympic Choices
- Quest Check-In Interactivity – Footprint Steps
- Quest Check-In
- Model It! (p.391)

Demonstrate – TE/SB p.392

- Lesson 1 Check
- Lesson Quiz 1

Lesson 2 – Climate Change

PE: MS-ESS3-5; MS-LS2-5

SEP: Asking Questions and Defining Problems

DCI:

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 Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)

CCC: Stability and Change

Savvas

Guiding Objectives:

- Students will provide quantitative reasoning as evidence to support: Patterns of change in global temperatures; the effects of greenhouse gasses on global temperatures.
- Students will construct an explanation for how both natural processes and human activities affect global temperatures.

Literacy Connection

- Cite Textual Evidence

Vocabulary

- greenhouse gas
- greenhouse effect
- climate change
- global warming
- fossil fuel

Academic Vocabulary

- impact

Connect - TE/SB p. 394

- Connect It!
- Quest Connection
- Write – Regional Climate Change

Investigate - TE/SB pp. 395-401

- Video – Climate Change
- *u*Investigate Lab – What is the Greenhouse Effect?
- Interactivity – In the Greenhouse
- Interactivity: Human Impact on Climate Change
- Virtual Lab – Frozen in Time
- Model It! (p. 396)
- Reading Check (p.398)
- Math Toolbox (p.398)
- Literacy Connection (p.398)

Synthesize - TE/SB pp. 402-403

- Interactivity – Climate Change Q & A
- Model It! (p.356)
- Quest Check-In Lab – Energy Savings at School
- Reading Check (p.402)
- Quest Check-In

Demonstrate – TE/SB p. 403

- Lesson 2 Check
- Lesson 2 Quiz

CLRI Connections:

- Article: [“What Climate Science Loses Without Enough Black Researchers”](#)

The geosciences, which includes climatology, is home to the least diverse population of PhD candidates among the STEM disciplines. Vernon Morris has been working to right these wrongs. He’s been encouraging students of color to enter a field that needs them—he was a founding director of the atmospheric sciences program at Howard University. NASA started a Justice, Equity Diversity, and Inclusion Group to work with historically Black colleges and universities on Earth-observation projects, which measure things like aerosols and precipitation.

Lesson 3 – Effects of a Changing Climate

PE: MS-ESS3-5

SEP: Asking Questions and Defining Problems

DCI:

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 Earth’s mean surface temperature (global warming). Reducing the level of climate change and reducing human vulnerability to whatever climate changes do occur depend on the understanding of climate science, engineering capabilities, and other kinds of knowledge, such as understanding of human behavior and on applying that knowledge wisely in decisions and activities. (MS-ESS3-5)

CCC: Stability and Change

Savvas

Guiding Objectives:

- Students will represent quantitative relationships to provide evidence to support how changes in global temperature impact sea levels.
- Students will use text evidence to support the author’s claim that: Sea levels are rising; global temperatures and organisms’ adaptations are connected; human actions impact climate change.

Literacy Connection

- Support Author’s Claim

Vocabulary

- cascade effect
- alternative energy

Academic Vocabulary

- argument

Connect - TE/SB p. 406

- Connect It!
- Quest Connection
- Poll – How You Affect Climate

Investigate - TE/SB pp. 407-412

- *u*Investigate Lab – Thermal Expansion of Water*
- Video – Effects of a Changing Climate
- Interactivity – Methane Management
- Literacy Connection (p.408)
- Reading Check (p. 410)
- Math Toolbox (p.409)
- Design It! (p.412)

Synthesize - TE/SB pp. 413- 414

- Interactivity – Emission Reduction
- Quest Check-In Interactivity – Make a Difference
- Reading Check (p.413)
- Quest Check-In

Demonstrate – TE/SB p.414

- Lesson 3 Check
- Lesson 3 Quiz

*Denotes accompanying lab video

CLRI Connections:

- Article: [“Four Black advocates who are diversifying the climate movement”](#)

The mainstream environmental movement is overwhelmingly white—and it’s only getting whiter. Black people are a small minority in big green groups, even though environmental issues disproportionately affect people of color. But the next generation of Black advocates is working to change that. This article includes four leading climate advocates to talk about justice, activism and what it means to be Black and green.

<p>Topic Close</p> <ul style="list-style-type: none"> • Topic 8 Assessment and Remediation TE/SB pp. 416-419 • Quest Finding and Reflection TE/SB p. 419 	<p>Topic 8 Enrichment</p> <p>Topic 8 - Lesson 1 Enrichment</p> <ul style="list-style-type: none"> • Enrichment – The Gulf Stream and Early Exploration • Extraordinary Science – Urban Heat Islands (p.393) <p>Topic 8 - Lesson 2 Enrichment</p> <ul style="list-style-type: none"> • Enrichment – Farming and Climate Change • Case Study – The Carbon Cycle (pp.404-405) <p>Topic 8 - Lesson 3 Enrichment</p> <ul style="list-style-type: none"> • Enrichment – Cooling Things Off • uEngineer It – Changing Climate Change (p.414) <p>Topic 8 Close</p> <ul style="list-style-type: none"> • uDemonstrate Lab – An Ocean of a Problem (pp.420-423)
<p>English Language Learners (ELL) Enhancements To access hyperlinked material, you must be logged into your BPS Google Drive</p>	<p>Listening</p> <ul style="list-style-type: none"> • Cross- Linguistic Practices: Gives students opportunities to make connections between what they hear and their home language (For example, allow students to listen to a passage and identify cognates). • Activating Prior Knowledge Activating prior knowledge means both eliciting from students what they already know and building initial knowledge that they need in order to access upcoming content. • Visuals - GIFs, pictures- will assist students in understanding what they are listening to. Use visual thinking strategies to set the lens for learning. • Video to review or introduce a topic – use closed captioning to help students see the words and pronunciations while they listen to the content. • Word stretching / Vowel stretching when instructing allows students to listen closely to the pronunciation of the word. • Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of listening. Scroll for grade 8.
	<p>Speaking</p> <ul style="list-style-type: none"> • Sentence Stems/Frames - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i> • Academic Conversation Starters: Have a visual of a list of academic sentence starters that students can refer to in a discussion. • Choral Reading - To build fluency, self-confidence and motivation with reading/speaking. • Create movement to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning. • Performance Level Descriptors This document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of speaking. Scroll for grade 8.
	<p>Reading</p> <ul style="list-style-type: none"> • Supplementary Text to help reinforce concepts. • Visual Aids - Pictures or models to support vocabulary words and concepts • Video to review or introduce a topic - use closed captioning to help students read along while they listen to the content. • 4 Square / Frayer models to help students gain a deeper understanding of vocabulary. • Highlighting important text to assist students in answering questions after the reading. • Chunking-Break reading of text into chunks or paragraphs • Vocabulary Morphology- Morphology relates to the segmenting of words into affixes (prefixes and suffixes) and roots or base words, and the origins of words. Understanding that words connected by meaning can be connected by spelling can be critical to expanding a student’s vocabulary.

	<ul style="list-style-type: none"> ● Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of reading. Scroll for grade 8. <p>Instructional Accommodations (depending on the student’s needs)</p> <ul style="list-style-type: none"> ● Extended time for tests in class, projects and assignments ● Directions read. Broken down as necessary ● Model how to complete the activity in the lesson ● Oral simplification of directions or questions ● Translated version of test when available. Student may have both version English and native language version ● Use of approved bilingual glossaries from NYS in each subject
<p>Special Education Modifications</p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p>Instructional</p> <ul style="list-style-type: none"> ● Pre-teach vocabulary ● Use picture vocabulary ● Scaffold Depth of Knowledge questions ● Provide copy of notes/notes in “cloze” form ● Use of Think, Pair, and Share strategy to help process information ● Scaffold written assignments with the use of graphic organizers ● Allow for multiple ways to respond (verbal, written, response board) ● Provide model of performance task ● Modify informational text to fit the needs of the students ● Provide a digital or paper interactive notebook ● Present complex tasks in multiple ways ● Provide mnemonic strategies for scientific concepts <p>Technology:</p> <ul style="list-style-type: none"> ● Audio reading of text ● Text to type functions ● Videos to clarify/visualize science concepts ● Record class lecture/discussions and make accessible to student ● Nearpod- interactive presentations of notes <p>In Class Assessments</p> <ul style="list-style-type: none"> ● Provide multiple options for projects ● Use of timer in class ● Break all complex tasks into chunks
<p>Step Up to Writing</p> <p>Step Up to Writing Materials can be found in BPS Science K-12 Schoology Folder Grade 8 Resources Grade 8 SUTW materials</p>	<ul style="list-style-type: none"> ● Easy Two-Column Notes ● Breaking Down Definitions ● Paragraph Frame- What I Learned ● Performance Level Descriptors this document provides teachers with a description of what output they can expect from students based on earned NYSESLAT levels in the modality of writing. Scroll for grade 8.
<p>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</p>	<ul style="list-style-type: none"> ● Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications ● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population ● All students are given an opportunity to engage in science discourse ● Teacher demonstrates high expectations for all students