



**Grade 8 Science – Course 3**  
**Unit 3 – Earth and Space Science**  
**Topic 7 Energy in the Atmosphere and Ocean – 14 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 Energy in Earth’s Atmosphere
- Lesson 2 Patterns of Circulation in the Atmosphere
- Lesson 3 Patterns of Circulation in the Ocean
- Topic Close – Assessment, Quest Findings

**MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of Earth cause patterns of atmospheric and oceanic circulation that determine regional climates. [Clarification Statement: Emphasis is on how patterns vary by latitude, altitude, and geographic land distribution. Emphasis is on the sunlight-driven latitudinal banding causing differences in density that create convection currents in the atmosphere, the Coriolis effect, and resulting prevailing winds; emphasis of ocean circulation is on the transfer of heat by the global ocean convection cycle, which is constrained by the Coriolis effect and the coastlines of continents. Examples of models could include diagrams, maps and globes, or digital representations.] [Assessment Boundary: Assessment does not include the dynamics of the Coriolis effect.]**

**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-ESS2-6; MS-ETS1-2

**SEP:** Developing and Using Models

**CCC** – Cause and Effect; Systems and System Models

**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
- **uConnect Lab – Does a Plastic Bag Trap Heat?**
- Quest Kickoff Video – What is the most efficient way for a container ship to cross the Atlantic?

**Lesson 1 – Energy in the Earth’s Atmosphere**

**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 identify and describe evidence that energy moves through Earth’s atmosphere by radiation, conduction, and convection.
- Students will cite textual evidence to support how energy from the sun is either absorbed or reflected by the different levels of the atmosphere.
- Students will analyze relationships to describe how the greenhouse effect traps and absorbs gasses in the atmosphere.

**Literacy Connection**

- Determine Central Ideas

**Vocabulary**

- electromagnetic wave
- greenhouse effect
- thermal energy
- convection
- conduction
- radiation

**Academic Vocabulary**

- absorb

**Connect** - TE/SB p.342

- Connect It!
- Quest Connection
- Poll – Comparing Sand and Water Temperatures

**Investigate** - TE/SB pp.343-348

- *Investigate Lab – Heating Earth’s Surface\**
- Video – Energy in the Earth’s Atmosphere
- Interactivity – Fluids on the Move
- Literacy Connection (p.344)
- Reading Checks (pp.345; 347)
- Math Toolbox (p.347)

**Synthesize** - TE/SB pp. 349-350

- Interactivity – Patterns in the Wind
- Quest Check-In Lab – Choose Your Speed
- Quest Check-In
- Model It! (p.349)

**Demonstrate** – TE/SB p.350

- Lesson 1 Check
- Lesson Quiz 1

*\*Denotes accompanying lab video*

**Lesson 2 – Patterns of Circulation in the**

**Atmosphere**

**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)
- The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)

**CCC:** Systems and System Models

**Savvas**

**Guiding Objectives:**

- Students will identify and describe evidence that the wind results from: Differences in air pressure from unequal heating of the atmosphere; the jet stream and ocean currents.
- Students will cite textual evidence to support how unequal heating and Earth’s rotation affect wind and weather conditions.
- Students will analyze relationships to describe how: winds that blow over short distances and affect local weather are called local winds; winds that occur over large areas and move around the globe are called global winds; global convection currents and the Coriolis effect interact to make the wind pattern of clam areas and global wind belts around the Earth.

**Literacy Connection**

- Translate Information

**Vocabulary**

- wind
- sea breeze
- land breeze
- Coriolis effect
- jet stream

**Academic Vocabulary**

- area
- model

**Connect - TE/SB p. 352**

- Connect It!
- Quest Connection
- Inquiry Warm-Up Lab – Turn, Turn, Turn

**Investigate - TE/SB pp. 353-355; 357-359**

- Video – Patterns of Circulation in the Atmosphere
- **Investigate Lab – United States Precipitation**
- Interactivity – Where the Wind Blows
- Virtual Lab – An Adventure at Maui Beach
- Reading Check (pp.354; 357; 359)
- Math Toolbox (p.354)
- Literacy Connection (p.359)

**Synthesize - TE/SB pp. 356; 359-360**

- Interactivity – Winds Across the Globe
- Model It! (p.356)
- Quest Check-In Interactivity – Wind at Your Back
- Quest Check-In

**Demonstrate – TE/SB p.359**

- Lesson 2 Check
- Lesson 2 Quiz

**CLRI Connections:**

- Biography: [Warren Washington](#)

Dr. Warren Washington became one of the first developers of groundbreaking atmospheric computer models in collaboration with Akira Kasahara in the early 1960s. These models, which use fundamental laws of physics to predict future states of the atmosphere, have helped scientists understand climate change.

<p><b>Lesson 3 – Patterns of Circulation in the Ocean</b>  <b>PE:</b> MS-ESS2-6  <b>SEP:</b> Developing and Using Models  <b>DCI:</b>  <b>ESS2.C</b> – The Roles of Water in Earth’s Surface Processes</p> <ul style="list-style-type: none"> <li>• Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2- 6)</li> </ul> <p><b>ESS2.D</b> – Weather and Climate</p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• The ocean exerts a major influence on weather and climate by absorbing energy from the sun, releasing it over time, and globally redistributing it through ocean currents. (MS-ESS2-6)</li> </ul> <p><b>CCC:</b> Systems and System Models</p>	<p><b>Savvas</b>  <b>Guiding Objectives:</b></p> <ul style="list-style-type: none"> <li>• Students will identify and describe evidence that: Global winds drive the surface currents; unequal heating and the rotation of Earth combine to produce the patterns of ocean circulation.</li> <li>• Students cite textual evidence to support how ocean currents redistribute Earth’s energy by the motion of: The Gulf Stream; ocean currents that move in a loop around Earth’s bodies of water.</li> </ul> <p><b>Literacy Connection</b></p> <ul style="list-style-type: none"> <li>• Integrate With Visuals</li> </ul> <p><b>Vocabulary</b></p> <ul style="list-style-type: none"> <li>• current</li> <li>• El Nino</li> <li>• La Nina</li> </ul> <p><b>Academic Vocabulary</b></p> <ul style="list-style-type: none"> <li>• gradually</li> </ul> <p><b>Connect</b> - TE/SB p.362</p> <ul style="list-style-type: none"> <li>• Connect It!</li> <li>• Quest Connection</li> <li>• Write: What an Ocean Current is Like</li> </ul> <p><b>Investigate</b> - TE/SB pp. 363-368</p> <ul style="list-style-type: none"> <li>• <b>uInvestigate Lab – Modeling Ocean Current Formation</b></li> <li>• Video – Patterns of Circulation in the Oceans</li> <li>• Interactivity – Oceanic Circulation</li> <li>• Interactivity – Ocean Habitats</li> <li>• Literacy Connection (p.365)</li> <li>• Reading Check (p. 368)</li> <li>• Math Toolbox (p.366)</li> <li>• Plan It (p.367)</li> </ul> <p><b>Synthesize</b> - TE/SB pp. 368-369</p> <ul style="list-style-type: none"> <li>• Interactivity – Keeping Current on Currents</li> <li>• Quest Check-In Interactivity – Find Your Advantage</li> <li>• Quest Check-In</li> </ul> <p><b>Demonstrate</b> – TE/SB p.369</p> <ul style="list-style-type: none"> <li>• Lesson 3 Check</li> <li>• Lesson 3 Quiz</li> </ul>
<p><b>Topic Close</b></p> <ul style="list-style-type: none"> <li>• Topic 7 Assessment and Remediation TE/SB pp. 372-375</li> <li>• Quest Finding and Reflection TE/SB p. 375</li> </ul>	<p><b>Topic 7 Enrichment</b></p> <p><b>Topic 7 - Lesson 1 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – Energy in the Atmosphere</li> <li>• Extraordinary Science – Measure Radiation with a Cube (p.351)</li> </ul> <p><b>Topic 7 - Lesson 2 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – Patterns in the Atmosphere</li> <li>• uEngineer It! – Windmills of the Future (p.361)</li> </ul> <p><b>Topic 7 - Lesson 3 Enrichment</b></p> <ul style="list-style-type: none"> <li>• Enrichment – The Sargasso Sea</li> <li>• Case Study – Hurricanes in the Making (pp.370-371)</li> </ul> <p><b>Topic 7 Close</b></p> <ul style="list-style-type: none"> <li>• uDemonstrate Lab – Not All Heating is Equal (pp.376-377)</li> </ul>

<p><b>English Language Learners (ELL) Enhancements</b> To access <a href="#">hyperlinked</a> material, you must be logged into your BPS Google Drive</p>	<p><b><u>Listening</u></b></p> <ul style="list-style-type: none"> <li>● <b><u>Cross- Linguistic Practices</u></b>: 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).</li> <li>● <b><u>Activating Prior Knowledge</u></b> 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.</li> <li>● <b><u>Visuals</u></b> - GIFs, pictures- will assist students in understanding what they are listening to. Use <b><u>visual thinking strategies</u></b> to set the lens for learning.</li> <li>● Video to review or introduce a topic – use <b><u>closed captioning</u></b> to help students see the words and pronunciations while they listen to the content.</li> <li>● <b><u>Word stretching / Vowel stretching</u></b> when instructing allows students to listen closely to the pronunciation of the word.</li> <li>● <b><u>Performance Level Descriptors</u></b> 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.</li> </ul>
	<p><b><u>Speaking</u></b></p> <ul style="list-style-type: none"> <li>● <b><u>Sentence Stems/Frames</u></b> - to begin a sentence - such as <i>Evolution is...</i> or <i>I think that evolution is...</i></li> <li>● <b><u>Academic Conversation Starters</u></b>: Have a visual of a list of academic sentence starters that students can refer to in a discussion.</li> <li>● <b><u>Choral Reading</u></b> - To build fluency, self-confidence and motivation with <a href="#">reading/speaking</a>.</li> <li>● Create <b><u>movement</u></b> 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.</li> <li>● <b><u>Performance Level Descriptors</u></b> 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.</li> </ul>
	<p><b><u>Reading</u></b></p> <ul style="list-style-type: none"> <li>● Supplementary Text to help reinforce concepts.</li> <li>● <b><u>Visual Aids</u></b> - Pictures or models to support vocabulary words and concepts</li> <li>● Video to review or introduce a topic - use <b><u>closed captioning</u></b> to help students read along while they listen to the content.</li> <li>● <b><u>4 Square / Frayer models</u></b> to help students gain a deeper understanding of vocabulary.</li> <li>● <b><u>Highlighting</u></b> important text to assist students in answering questions after the reading.</li> <li>● <b><u>Chunking</u></b>-Break reading of text into chunks or paragraphs</li> <li>● <b><u>Vocabulary Morphology</u></b>- 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.</li> <li>● <b><u>Performance Level Descriptors</u></b> 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.</li> </ul>
	<p><b><u>Instructional Accommodations (depending on the student’s needs)</u></b></p> <ul style="list-style-type: none"> <li>● <b>Extended time</b> for tests in class, projects and assignments</li> <li>● <b>Directions read.</b> Broken down as necessary</li> <li>● <b>Model</b> how to complete the activity in the lesson</li> <li>● <b>Oral simplification</b> of directions or questions</li> <li>● <b>Translated version</b> of test when available. Student may have both version English and native language version</li> <li>● Use of <b><u>approved bilingual glossaries</u></b> from NYS in each subject</li> </ul>

<p><b>Special Education Modifications</b></p> <p>Special Education students must have accommodations as per Individual Educational Plan (IEP)</p>	<p><b><u>Instructional</u></b></p> <ul style="list-style-type: none"> <li>● <b>Pre-teach</b> vocabulary</li> <li>● Use <b>picture vocabulary</b></li> <li>● Scaffold <b>Depth of Knowledge</b> questions</li> <li>● Provide copy of notes/<b>notes in “cloze”</b> form</li> <li>● Use of <b>Think, Pair, and Share</b> strategy to help process information</li> <li>● <b>Scaffold</b> written assignments with the use of <b>graphic organizers</b></li> <li>● Allow for <b>multiple ways to respond</b> (verbal, written, response board)</li> <li>● Provide <b>model of performance task</b></li> <li>● <b>Modify informational text</b> to fit the needs of the students</li> <li>● Provide a digital or paper <b>interactive notebook</b></li> <li>● Present complex <b>tasks in multiple ways</b></li> <li>● Provide <b>mnemonic strategies</b> for scientific concepts</li> </ul> <p><b><u>Technology:</u></b></p> <ul style="list-style-type: none"> <li>● <b>Audio</b> reading of text</li> <li>● <b>Text to type</b> functions</li> <li>● <b>Videos</b> to clarify/visualize science concepts</li> <li>● <b>Record class lecture/discussions</b> and make accessible to student</li> <li>● <b>Nearpod-</b> interactive presentations of notes</li> </ul> <p><b><u>In Class Assessments</u></b></p> <ul style="list-style-type: none"> <li>● Provide <b>multiple options</b> for projects</li> <li>● <b>Use of timer</b> in class</li> <li>● Break all complex tasks into chunks</li> </ul>
<p><b>Step Up to Writing</b></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"> <li>● Easy Two-Column Notes</li> <li>● Breaking Down Definitions</li> <li>● Paragraph Frame- What I Learned</li> <li>● <b>Performance Level Descriptors</b> 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.</li> </ul>
<p><b>Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom</b></p>	<ul style="list-style-type: none"> <li>● Materials, resources, and/or discussions address diverse cultural backgrounds and real-world applications</li> <li>● Artifacts (posters, charts, etc.) in the science classroom are representative of the cultures of the student population</li> <li>● All students are given an opportunity to engage in science discourse</li> <li>● Teacher demonstrates high expectations for all students</li> </ul>