Grade 6 Science
Unit # 2 – Earth and Space Science
Topic 6 Weather in the Atmosphere – 23 Days

Unit Overview: Students make sense of phenomena as they explore the disciplinary core ideas through the lens of crosscutting concepts, such as Systems and System Models, Cause and Effect, and Matter and Energy. Students begin their discovery of the physical world with models and observable phenomena and move to explore Earth's systems and their interactions, weather in the atmosphere, rocks and minerals, plate tectonics, and Earth's surface systems – erosion and deposition.

Topic Essential Question: What determines weather on Earth?

Lessons

- Topic Launch/Quest Kickoff
- Lesson 1 The Atmosphere Around You
- Lesson 2 Water in the Atmosphere
- Lesson 3 Air Masses
- Lesson 4 Predicting Weather Changes
- Lesson 5 Severe Weather and Floods
- Topic Close –Assessment, Quest Findings

NYSSLS Performance Expectations

MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the Sun and the force of gravity. [Clarification Statement: Emphasis is on the ways water changes its state as it moves through the multiple pathways of the hydrologic cycle. Examples of models could include conceptual or physical models.] [Assessment Boundary: A quantitative understanding of the latent heats of vaporization and fusion is not assessed.]

MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. [Clarification Statement: Emphasis is on how air flows from regions of high pressure to low pressure, the complex interactions at air mass boundaries, and the movements of air masses affect weather (defined by temperature, pressure, humidity, precipitation, and wind at a fixed location and time). Emphasis is on how weather can be predicted within probabilistic ranges. Data can be provided to students (such as weather maps, diagrams, and visualizations) or obtained through laboratory experiments (such as with condensation).] [Assessment Boundary: Assessment includes the application of weather data systems but does not include recalling the names of cloud types, weather symbols used on weather maps, the reported diagrams from weather stations, or the interrelationship of weather variables.]

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-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. [Clarification Statement: Emphasis is on how some natural hazards, such as volcanic eruptions and severe weather, are preceded by phenomena that allow for reliable predictions, but others, such as earthquakes, occur suddenly and with no notice, and thus are not yet predictable. Examples of natural hazards could include those resulting from interior processes (such as earthquakes and volcanic eruptions) and surface processes (such as mass wasting and tsunamis), or from severe weather events (such as blizzards, hurricanes, tornadoes, floods, and droughts). Examples of data could include the locations, magnitudes, and frequencies of the natural hazards. Examples of technologies could include global technologies (such as satellite images to monitor hurricanes or forest fires) or local technologies (such as building basements in tornado-prone regions or reservoirs to mitigate droughts).]

MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and pha substance when thermal energy is added or removed. [Clarification Statement: Emphasis is on qualitativ level models of solids, liquids, and gases to show that adding or removing thermal energy increases or decreases kinetic energy of the particles until a change of phase occurs. Examples of models could include drawings and diagrams. Examples of particles could include ions, molecules, or atoms. Examples of substances could include sodium chloride, water, carbon dioxide, and helium.]

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Topic Opener

PE: MS-ESS2-5; MS-ESS3-2
SEP: Analyzing and Interpreting Data
DCI:
ESS3.B – Natural Hazards

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)

CCC: Cause and Effect; System 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
- *u*Connect Lab – Puddle Befuddlement
- Quest Kickoff Video – How can you prepare for severe weather?
- Quest Kickoff

Lesson 1 – The Atmosphere Around You

PE: MS-ESS2-5; MS-ESS2-6; MS-ESS3-2; MS-PS1-4
SEP: Developing and Using Models
DCI:
ESS2.C: The Roles of Water in Earth's Surface Processes

- The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)

ESS2.D: Weather and Climate

- Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)

ESS3.C – Human Impact on Earth's Systems

- Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. (MS-ESS3-3)
- Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise. (MS-ESS3- 3),(MS-ESS3-4)

PS1.A: Structure and Properties of Matter

- (NYSED) In a solid, the particles are closely spaced and vibrate in position but do not change their relative locations. In a liquid, the particles are closely spaced but are able to change their relative locations. In a gas, the particles are widely spaced except when they happen to collide and constantly change their relative locations. (MS-PS1-4)
- (NYSED) The changes of state that occur with variations in temperature and/or pressure can be described and predicted using these models of matter. (MS-PS1-4)

CCC: Cause and Effect; Systems and System Models; Developing and Using Models

Savvas

Guiding Objectives:

- Students will identify and synthesize data to construct an explanation of: The structure and layers of Earth's atmosphere and the composition and characteristics of each layer in Earth's atmosphere.
- Students will use models and analyze information to predict the stability and change caused by unequal heating of Earth's atmosphere by the sun.

Literacy Connection

- Support Authors Claim

Vocabulary

- atmosphere
- altitude
- air pressure
- wind

Academic Vocabulary

- stable

Connect - TE/SB p. 222

- Connect It!
- Write – Mountaintop Meal Preparations
- Quest Connection

Investigate - TE/SB pp. 223-228

- *u*Investigate Lab – Effects of Altitude on the Atmosphere
- Video – The Atmosphere Around You
- Interactivity – Layers of the Atmosphere
- Reading Checks (pp. 225)
- Math Toolbox (p.224)
- Literacy Connection (p.227)
- Model It!

Synthesize - TE/SB p. 228

- Interactivity – Patterns in the Wind
- Reading Check (p.228)

Demonstrate – TE/SB pp. 229

- Lesson 1 Check
- Lesson Quiz 1

Lesson 2 – Water in the Atmosphere

PE: MS-ESS2-4

SEP: Developing and Using Models

DCI:

ESS2.C – The Roles of Water in Earth's Surface

- (NYSED) Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation, sublimation, deposition, precipitation, infiltration, and runoff. (MS-ESS2-4)

CCC: Energy and Matter

Savvas

Guiding Objectives:

- Students will analyze and interpret data to describe evidence that: Water vapor enters the atmosphere through a number of processes; water is continually evaporating and condensing in the atmosphere and this process forms clouds; and precipitation is a vital part of the water cycle.
- Students will develop and use models to demonstrate that water is always moving between the surface of Earth and the atmosphere.
- Students will analyze cause and effect relationships in order to predict how temperature determines the type of precipitation for an area.

Literacy Connection

- Summarize Text

Vocabulary

- water cycle
- evaporation
- condensation
- dew point
- humidity
- relative humidity
- precipitation

Academic Vocabulary

- cycle

Connect - TE/SB p. 230

- Connect It!
- Inquiry Warm Up Lab – Water in the Air
- Quest Connection

Investigate - TE/SB pp. 231-237

- Video – Water Cycle
- *u*Investigate Lab – How Clouds and Fog Form
- Interactivity – Water Cycle
- Interactivity – Ways That Water Move
- Reading Check (pp. 233; 236)
- Literacy Connection (p.233)
- Teach with Visuals (p.235)
- Math Toolbox (p.236)

Synthesize - TE/SB pp. 237-238

- Interactivity – Interruptions in the Water Cycle
- Reading Check (p.237)
- Model It! (p.237)
- Quest Check In – Interactivity – Water and Severe Weather

Demonstrate – TE/SB p. 238

- Lesson 2 Check
- Lesson 2 Quiz

Lesson 3 – Air Masses

PE: MS-ESS2-5
SEP: Planning and Carrying Out Investigations
DCI:
ESS2.C – The Roles of Water in Earth's Surface Processes

- The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)

ESS2.D – Weather and Climate

- Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)

CCC: Cause and Effect

zSpace Activities (code)

Sea and Land Breezes (E421)

Sea_and_Land_Breezes - Experiences

Students will collect data to provide evidence for how the movement of air masses results in changes in weather conditions.

Savvas

Guiding Objectives:

- Students will analyze and interpret data to describe evidence that air masses are commonly moved by the prevailing winds and jet streams.
- Students will develop and use models to demonstrate how the air masses of different temperatures and humidity collide, resulting in a front
- Students will construct explanations using reasoning to predict similar patterns by recognizing that: Storms and changeable weather often develop along fronts; they type of front that develops depends on the characteristics of the air masses and the direction in which they move.

Literacy Connection

- Read and Comprehend

Vocabulary

- air mass
- jet stream
- front
- cyclone
- anticyclone

Academic Vocabulary

- prevailing
- stationary

Connect - TE/SB p. 240

- Connect It!
- Class Discussion – Sinking and Rising
- Quest Connection

Investigate - TE/SB pp. 241-245

- *u*Investigate Lab – Weather Fronts
- Interactivity – When Air Masses Collide
- Video – Three Types of Fronts
- Reading Check (pp.242; 244)
- Literacy Connection (p.244)
- Model It! (p.245)

Synthesize - TE/SB pp. 246-247

- Interactivity – Mapping out the Weather
- Reading Check (p.246)
- Quest Check-In Interactivity – All About Air Masses
- Quest Check-In

Demonstrate – TE/SB p.247

- Lesson 3 Check
- Lesson 3 Quiz

Lesson 4 – Predicting Weather Changes

PE: MS-ESS2-5, MS-ESS2-6
SEP: Developing and Using Models
DCI:
ESS2.C – The Roles of Water in Earth's Surface Processes

- The complex patterns of the changes and the movement of water in the atmosphere, determined by winds, landforms, and ocean temperatures and currents, are major determinants of local weather patterns. (MS-ESS2-5)
- Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. (MS-ESS2- 6)

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)
- Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)
- 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: Cause and Effect; Systems and System Models

Savvas
Guiding Objectives:

- Students will develop and use models to demonstrate how meteorologists: Use observations, patterns, and tools to predict the weather; determine the effect of global patterns on local weather by observing and tracking the movements of jet streams and ocean currents.
- Students will analyze and interpret data to describe evidence that: Technological improvements in gathering weather data have improved weather forecast accuracy; computers process weather data quickly and help forecasters make predictions.
- Students will construct explanations using reasoning to predict similar patterns by recognizing that: Patterns analysis is essential for weather forecasting; technology makes data collection and analysis more accurate, easier, and quicker than direct observation.

Literacy Connection

- Determine Central Ideas

Vocabulary

- meteorologist

Academic Vocabulary

- synthesize

Connect - TE/SB p. 248

- Connect It!
- Class Discussion – Weather Prediction Woes
- Quest Connection

Investigate - TE/SB pp. 249-251

- *u*Investigate Lab – Tracking Weather
- Interactivity – Using Air Masses to Predict Weather
- Video – Weather Satellites
- Reading Check (p.251)

Synthesize - TE/SB pp. 252-254

- Interactivity – Weather Predicting
- Reading Check (p.253)
- Math Toolbox (p.252)
- Literacy Connection (p.253)
- Quest Check-In Interactivity – Predicting Severe Weather
- Quest Check-In

Demonstrate – TE/SB p.254

- Lesson 4 Check
- Lesson 4 Quiz

Lesson 5 – Severe Weather and Floods

PE: MS-ESS3-2
SEP: Analyzing and Interpreting Data
DCI:
ESS3.B – Natural Hazards

- Mapping the history of natural hazards in a region, combined with an understanding of related geologic forces can help forecast the locations and likelihoods of future events. (MS-ESS3-2)

Savvas

Guiding Objectives:

- Students will identify and describe evidence that describes: The characteristics of different types of severe weather; the causes associated with different types of severe weather; and damage associated with each type of storm.
- Students will analyze and interpret data to explain measures that can be taken to ensure safety in a storm.

Literacy Connection

- Cite Textual Evidence

Vocabulary

- storm
- thunderstorm
- hurricane
- tornado
- storm surge
- flood
- drought

Academic Vocabulary

- approximate

Connect - TE/SB p. 256

- Connect It!
- Write: Severe Weather Experiences
- Quest Connection

Investigate - TE/SB pp. 257-263

- *u*Investigate Lab – Predicting Hurricanes
- Interactivity – Not in Kansas Anymore
- Video – How Tornadoes Form
- Virtual Lab – Hurricane Season
- Model It! (p.259)
- Literacy Connection(p.260)
- Reading Check (pp.261; 263)

Synthesize - TE/SB pp. 264-265

- Interactivity – Tinkering with Technology
- Reading Check (p.264)
- Quest Check-In Lab – A History of Hazardous Weather
- Quest Check-In

Demonstrate – TE/SB p.265

- Lesson 5 Check
- Lesson 5 Quiz

Topic Close

- Topic 6 Assessment and Remediation TE/SB pp. 268-271
- Quest Finding and Reflection TE/SB p. 271

Topic 6 Enrichment

Topic 6 - Lesson 1 Enrichment

- Enrichment Activity – Earth's Spheres

Topic 6 - Lesson 2 Enrichment

- Enrichment – Water Shortages
- Engineering Design Notebook – Build a Dew Catcher

Topic 6 - Lesson 3 Enrichment

- Enrichment – Occluded Fronts

Topic 6 – Lesson 4 Enrichment

- Enrichment – Measuring Humidity
- Career Feature – Meteorologist

Topic 6 – Lesson 5 Enrichment

- Enrichment – Chasing that Storm
- Case Study – the Case of the Runaway Hurricane

Topic 6 – Topic Close

- *u*Demonstrate Lab – Water from Trees

English Language Learners (ELL) Enhancements
To access hyperlinked material, you must be logged into your BPS Google Drive

Listening

- **Cross- Linguistic Practices:** Gives students opportunities to make connections bet 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 student 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 6.

Speaking

- **Sentence Stems/Frames** - to begin a sentence - such as *Evolution is…* or *I think that evolution is…*
- **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 6.

Reading

- 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.
- **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 6.

Instructional Accommodations (depending on the student's needs)

- **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

Special Education Modifications Special Education students must have accommodations as per Individual Educational Plan (IEP)	**Instructional** • **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 i**nteractive notebook** • Present complex **tasks in multiple ways** • Provide **mnemonic strategies** for scientific concepts
	Technology: • **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
	In Class Assessments • Provide **multiple options** for projects • **Use of timer** in class • Break all complex tasks into chunks
Step Up to Writing Step Up to Writing Materials can be found in BPS Science K-12 Schoology Folder Grade 6 Resources Grade 6 SUTW materials	• 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 6.
Culturally and Linguistically Responsive Teaching (CLRT) in the Science Classroom	• 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