Englewood Public School District
Science
Grade 6
Third Marking Period

Unit 4: Weather and Climate

Overview: This unit connects the concepts of earth's waters with weather and climate patterns. Students make sense of how Earth's geosystems operate by modeling the flow of energy and cycling of matter within and among different systems. A systems approach is also important here, examining the feedbacks between systems as energy from the Sun is transferred between systems and circulates though the ocean and atmosphere. The crosscutting concepts of *cause and effect*, *systems and system models*, and *energy and matter* are called out as frameworks for understanding the disciplinary core ideas. In this unit, students are expected to demonstrate proficiency in *developing and using models* and *planning and carrying out investigations* as they make sense of the disciplinary core ideas. Students are also expected to use these practices to demonstrate understanding of the core ideas.

Time Frame: 20 to 25 Days

Enduring Understandings:
The 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.

Essential Questions:
What factors interact and influence weather and climate?
What is the relationship between the complex interactions of air masses and changes in weather conditions?
What are the major factors that determine regional climates?

Standards	Topics and Objectives	Activities	Resources	Assessments
(MS-ESS2-5) **Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.** **(MS-ESS2-6)** **Develop and use a model to describe how unequal**	**Topics** Air Composition Air Pressure Air Pollution Twenty-First Century Themes and Skills include: • The Four C's	Students will complete the text activities: 1. How long will a candle burn? 2. Soda-bottle Barometer 3. Working Under Pressure Lab 4. Is air there? 5. What's on the jar? 6. How clean is the air? (MS-ESS2-5, CRP8, RST.6-	**Text:** Prentice Hall Science Explorer: Weather and Climate **Materials:** For How long will candle burns? • Safety goggles • Modeling clay	**Formative Assessments:** Do Now/Ticket to Leave Class Discussion Journal Entries **Benchmark Assessments:** Common Formative

heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

(MS-ESS3-5)
Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

- Life and Career Skills
- Information and Media literacy
- Global Awareness
- Environmental Literacy

Objectives

Students will:

Explain why the composition of Earth's atmosphere is important to living things.

Explain how increasing altitude affects air pressure and density.

Identify causes and effects of air pollution.

Evaluate evidence that air pollution leads to changes in atmospheric temperature.

8.9)
Students will use data to analyze the link between carbon dioxide and temperature change in Getting to the Core. The Link Between Temperature and Carbon Dioxide.
(CRP8, WHST.6-8.8)

Enrichment Activity:
Design a life support system that would allow humans to live in every level of the atmosphere taking into consideration changes in temperature, pressure, and radiation.
(MS-ESS3-5, CRP4, 8.1.8.A.3)

- Aluminum pie pan
- Short candle
- Matches
- Small glass jar
- Stopwatch
- Oven mitt
- Large glass jar

For Soda-bottle barometer:
- 2-liter soda bottle
- Long straw
- Modeling clay
- Water

For Working Under Pressure?
- Safety goggles
- Modeling clay
- Scissors
- White glue
- Tape
- Pencil
- Wide-mouthed glass jar
- Metric ruler
- Rubber band
- Large rubber balloon
- Drinking straw, (12-15cm)
- Cardboard strip, 10cm x 25cm

For Is air there?:
- Heavy rubber band
- Plastic bag
- Wide-mouthed glass jar

For What's on the jar?:
- Safety goggles
- Modeling clay
- Aluminum pie plate
- Candle
- Matches

Assessment

Exact Path

Summative Assessments:
Students will respond to questions, *How long will a candle burn?* and *Soda-bottle Barometer*.

Student will be graded on *Working Under Pressure Lab* assessment questions.

Students will demonstrate understanding of air pollution by developing models in the *What's on the jar?* and *How clean is the air?* Activities.

Students will be assessed on the accuracy of their data analysis for Getting to the Core. The Link Between Temperature and Carbon Dioxide.

Alternative Assessments:

Students will develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.

Project, Visual Representations, Journals

Model the ways water changes its state as it moves

			• Glass jar • Oven mitt For How clean is the air?: • Rubber band • Coffee filters • Thermometer • Low-power microscope • Vacuum cleaner with intake hose (1 per class) **Websites:** Air Pressure Demos **Videos:** See links in Getting to the Core. The Link Between Temperature and Carbon Dioxide	through the multiple pathways of the hydrologic cycle. Drawings Response Logs
	Topics Air Masses and Fronts Predicting the Weather Climate Twenty-First Century Themes and Skills include: • The Four C's • Life and Career Skills • Information and Media literacy • Global Awareness • Environmental Literacy **Objectives** Students will:	Students will complete the text activities 1. How do fluids of different densities behave? 2. Reading a Weather Map Lab 3. Sunny Rays and Angles Lab (6.EE.6) Students will create their own weather map using the Make your own weather map website and provide a written forecast based on the map they create. (RST.6-8.1) Students will complete the Climate Jigsaw Research Project and report findings to the class (8.1.8.A.3, 9.2.8.B.3)	**Text:** Prentice Hall Science Explorer: Weather and Climate **Materials:** For How do fluids of different densities behave?: • Cardboard divider • Plastic shoe box • Red food coloring • Warm water • Table salt • Blue food coloring • Cold water • Apron For Reading a Weather Map Lab • Text book weather map **Websites:** • Make your own weather	**Formative Assessments:** Do Now/Ticket to Leave Class Discussion Journal Entries **Summative Assessments:** Student will be assessed based on *Reading a Weather Map Lab* and *Sunny Rays and Angles Lab* responses. Students will be evaluated on the accuracy of weather map they create via Make your own weather map website and forecast they create for the map. Students will receive a grade

	Identify the major types of air masses and fronts. Determine the outcome when two air masses collide. Use a weather map to predict future weather. Identify features of the six main climate regions. Evaluate evidence for climate change.	Students will explore website and use the information to create a climate change infographic. (MS-ESS2-6, 6.NS.5)	map • A Student's Guide to Global Climate Change **Videos:** Air Masses and Fronts **Additional Resources:** www.sciencea-z.com/main/UnitResource/unit/70/earth-space-science/grades-5-6/atmosphere-and-climate quizlet.com/subject/6th-grade-science-weather-and-climate https://www.msnucleus.org/membership/html/k-6/wc/pdf/wc6we.pdf **Books:** https://www.storyjumper.com/book/index/109292/Air-Masses https://usborne.com/browse-books/catalogue/subject/1/G/GWC/weather-and-climate/ https://www.ranker.com/list/books-about-the-subject-climatology/reference https://www.scholastic.com/teachers/articles/teaching-content/books-teaching-about-weather-0/	for the Climate Jigsaw Research Project using the provided scoring rubric. Students will demonstrate their understanding of climate change by creating an infographic of evidence. **Alternative Assessments**: Students will support an argument with evidence, data, or a model. Checklists Journals Peer Reviews Graphic organizers Self-Assessments Visual Representations

Accommodations and Modifications:

Students with special needs: Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning.
The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

ELL/ESL students: Students will be supported according to the recommendations for "can do's" as outlined by WIDA – https://www.wida.us/standards/CAN_DOs/
This particular unit has limited language barriers due to the physical nature of the curriculum.

Students at risk of school failure: Formative and summative data will be used to monitor student success at first signs of failure student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations. More time and will be made available with a certified instructor to aid students in reaching the standards.

Gifted and Talented Students: Students excelling in mastery of standards will be challenged with complex, high level challenges related to the complexity in planning and carrying out investigations and analyzing and interpreting data.

English Language Learners	**Special Education**	**At-Risk**	**Gifted and Talented**
● Provide a computer for written work ● Speak and display terminology ● Teacher modeling ● Peer modeling ● Provide ELL students with multiple literacy strategies. ● Word walls ● Use peer readers ● Give page numbers to help the students find answers ● Provide two sets of textbooks, one for home and one for school ● Provide visual aides ● Provide additional time to complete a task ● Use graphic organizers	● Provide a computer for written work ● Utilize modifications & accommodations delineated in the student's IEP ● Work with paraprofessional ● Use multi-sensory teaching approaches. ● Work with a partner ● Provide concrete examples ● Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA). ● Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling).	● Using visual demonstrations, illustrations, and models ● Give directions/instructions verbally and in simple written format. Oral prompts can be given. ● Peer Support ● Increase one on one time ● Teachers may modify instructions by modeling what the student is expected to do ● Instructions may be printed out in large print and hung up for the student to see during the time of the lesson. ● Review behavior expectations and make adjustments for personal space or other behaviors as needed. ● Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their	● Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ● Curriculum compacting ● Inquiry-based instruction ● Independent study ● Higher order thinking skills ● Adjusting the pace of lessons ● Interest based content ● Real world scenarios ● Student Driven Instruction ● Use project-based science learning to connect science with observable phenomena. ● Structure the learning around explaining or solving a social or community-based issue. ● Collaborate with after-school programs or clubs to extend learning opportunities.

		community. • Provide opportunities for students to connect with people of similar backgrounds (e.g. conversations via digital tool such as SKYPE, experts from the community helping with a project, journal articles, and biographies).	

Interdisciplinary Connections:

ELA-NJSLS/ELA:
RST.6-8.1: Cite specific textual evidence to support analysis of science and technical texts.
RST.6-8.9: Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.
WHST.6-8.8: Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

Integration of 21st Century Skills:
9.2.8.B.3
Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Mathematics:
6.EE.6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
6.NS.5: Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation**.**

Career Ready Practices:
CRP4: Communicate clearly and effectively and with reason.
CRP8: Utilize critical thinking to make sense of problems and persevere in solving them.

Integration of Technology Standards NJSLS 8:
8.1.8.A.3: Use and/or develop a simulation that provides an environment to solve a real-world problem or theory.

Key Terms:
Air mass – very large body of air with similar properties
Air Pressure – the force of air against earth's surface
Anemometer – an instrument used to measure wind speed
Barometer – instrument used to measure air pressure
Climatograph – weather map
Dew point – the temperature at which a volume of air cannot hold any more water vapor
Doppler radar – a type of radar that calculates distance and shows direction of movement
Forecast – prediction of what the weather will be like in the future
Front – boundary between warm and cold air masses
Humidity – moisture in the air in the form of a gas called water vapor
Hurricane – large tropical storms that form over warm oceans
Meteorologist – a scientist who studies the weather
Precipitation – ice crystals or water which falls from clouds
Psychrometer – an instrument used to measure relative humidity
Relative humidity – the measurement that compares the amount of water vapor in the air with the amount the air can hold at a certain temperature
Satellites – detect large weather systems across the globe to determine worldwide patterns
Temperature – how hot or cold the air is
Thermometer – an instrument used to measure temperature
Tornado – violent funnel-shaped cloud with extremely strong winds
Weather balloons – balloons which contain sensors and radio transmitters which broadcast weather data back to ground stations

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Developing and Using Models • Develop and use a model to describe phenomena. (MS-ESS2-6) • Develop a model to describe unobservable mechanisms. (MS-ESS2-4) **Planning and Carrying Out Investigations** • Collect data to produce data to serve as the basis for evidence to answer scientific questions or test design solutions under a range of conditions. (MS-ESS2-5)	**ESS2.C: The Roles of Water in Earth's Surface Processes** • Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. (MS-ESS2-4) • 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)	**Cause and Effect** • Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5) **Systems and System Models** • Models can be used to represent systems and their interactions—such as inputs, processes and outputs—and energy, matter, and information flows within systems. (MS-ESS2-6) **Energy and Matter**

	• Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4) • 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)	• Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)