

6<sup>th</sup>

**Unit 5: Weather and Climate**

**Number of Days: 20**

<b>Unit Focus</b>	<b>Essential Questions</b>	<b>Next Generation Standards</b>	<b>Disciplinary Core Ideas(DCI)</b>
<p><b><i>What factors interact and influence weather and climate?</i></b></p> <p>This unit is broken down into three sub-ideas: Earth's large-scale systems interactions, the roles of water in Earth's surface processes, and weather and climate. Students make sense of how Earth's geo-systems 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 through 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.</p>	<ul style="list-style-type: none"><li>• <b>What factors affect weather and climate?</b></li><li>• <b>How do meteorologists predict the weather?</b></li><li>• <b>What are natural disasters and how are they predicted?</b></li></ul>	<ul style="list-style-type: none"><li>• <b>MS-ESS2-4</b></li><li>• <b>MS-ESS2-5</b></li><li>• <b>MS-ESS2-6.</b></li></ul>	<ul style="list-style-type: none"><li>• <b>MS-ESS2.C: The Roles of Water in Earth's Surface Processes</b></li><li>• <b>MS-ESS2.D: Weather and Climate</b></li><li>• <b>MS-ESS3.B: Natural Hazards</b></li></ul>

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**Link to Unit 7:  
Weather and Climate**

**[https://njctl.org/  
courses/science/6th-  
grade-science/weather-  
climate-and-natural-  
hazards/](https://njctl.org/courses/science/6th-grade-science/weather-climate-and-natural-hazards/)**

**\*All teachers must  
register at  
<http://www.NJCTL.org>**

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## *NGSS Framework*

**Science and Engineering Practices**

**Disciplinary Core Ideas**

**Crosscutting Concepts**

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<p><b><u>Developing and Using Models</u></b></p> <ul style="list-style-type: none"> <li>• Develop and use a model to describe phenomena. (MS-ESS2-6)</li> <li>• Develop a model to describe unobservable mechanisms. (MS-ESS2-4)</li> </ul> <p><b><u>Planning and Carrying Out Investigations</u></b></p> <ul style="list-style-type: none"> <li>• 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)</li> </ul>	<p><b><u>ESS2.C: The Roles of Water in Earth's Surface Processes</u></b></p> <ul style="list-style-type: none"> <li>• 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)</li> <li>• 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)</li> <li>• Global movements of water and its changes in form are propelled by sunlight and gravity. (MS-ESS2-4)</li> <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><u>ESS2.D: Weather and Climate</u></b></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>• Because these patterns are so complex, weather can only be predicted probabilistically. (MS-ESS2-5)</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><u>Cause and Effect</u></b></p> <ul style="list-style-type: none"> <li>• Cause and effect relationships may be used to predict phenomena in natural or designed systems. (MS-ESS2-5)</li> </ul> <p><b><u>Systems and System Models</u></b></p> <ul style="list-style-type: none"> <li>• 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)</li> </ul> <p><b><u>Energy and Matter</u></b></p> <ul style="list-style-type: none"> <li>• Within a natural or designed system, the transfer of energy drives the motion and/or cycling of matter. (MS-ESS2-4)</li> </ul>
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English Language Arts	Mathematics
<p>Cite specific textual evidence to support analysis of science and technical texts. (MS-ESS2-5),(MS-ESS3-5) <b>RST.6-8.1</b></p> <p>Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic. (MS-ESS2-5) <b>RST.6-8.9</b></p> <p>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. (MS-ESS2-5) <b>WHST.6-8.8</b></p> <p>Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest. (MS-ESS2-6) <b>SL.8.5</b></p>	<p>Reason abstractly and quantitatively. (MS-ESS2-5),(MS-ESS3-5) <b>MP.2</b></p> <p>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. (MS-ESS2-5) <b>6.NS.C.5</b></p> <p>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. (MS-ESS3-5) <b>6.EE.B.6</b></p>

### Unit 5: *Weather and Climate*

**Approximate Days: # 20**

- Standard(s):
- **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.
- **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 heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.

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<b>Student Outcomes</b>	<b>Inquiry Based Learning Activities</b>	<b>Materials/Resources</b>
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## *Students will know that:*

- The effect that various factors have on weather and climate.
- How atmospheric and oceanic circulation occurs.
- What probability forecasting is and how it is used.
- What natural disasters are how they are predicted.

## *Students will be able to:*

- **Describe** the effects that factors and locations have on weather and climate.
- **Describe** how circulation transports heat and moisture around the Earth.
- **Translate** information on a weather map into a weather forecast.
- **Create** a weather map based on information.
- Explain how natural disasters can be predicted.

## **Temperature and Circulation Demonstration**

<https://njctl.org/courses/science/6th-grade-science/weather-climate-and-natural-hazards/attachments/temperature-and-circulation-demo/>

## **Heat Capacity Demo**

<https://njctl.org/courses/science/6th-grade-science/weather-climate-and-natural-hazards/attachments/heat-capacity-demo/>

## **Ocean Circulation Simulation**

<https://njctl.org/courses/science/6th-grade-science/weather-climate-and-natural-hazards/attachments/ocean-circulation-simulation/>

## **Climate Trends Lab**

<https://njctl.org/courses/science/6th-grade-science/weather-climate-and-natural-hazards/attachments/climate-trends-lab/>

## **Materials Needed:**

### **Materials:**

- Clear, glass cake pan
- Water
- Red and blue food coloring
- Ice
- Sterno cooking fuel (tea lights, if this is inaccessible)
- Matches
- Gallon plastic bag
- 4 Styrofoam cups

### **Materials:**

- 2 – 500 or 1000 mL glass beakers
- 2 - Thermometers
- 2 – Hot plates (or Bunsen burners with ring stands)
- 200 mL water (approximate)
- 200 mL sand (approximate)

### **Materials (per group):**

- A large, plastic plant saucer (without ridges)
- 3 Styrofoam cups
- Ice water
- Hot water
- Red and blue food coloring

### **Materials (per lab group):**

- Lamp or other direct heat source
- 2 thermometers
- 2 500 ml beakers
- 1 1000 ml Erlenmeyer flask

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### Resources:

- [www.NJCTL.org](http://www.NJCTL.org)
- [www.nicerc.org](http://www.nicerc.org)
- [https://www.youtube.com/playlist?list=PLSzDiTp\\_K4OccO-3-Cpkeywhd8vlljmEH](https://www.youtube.com/playlist?list=PLSzDiTp_K4OccO-3-Cpkeywhd8vlljmEH)
- <http://www.ck12.org/>
- [http://www.ck12.org<https://urldefense.proofpoint.com/v2/url?url=http-3A\\_\\_www.ck12.org&d=CwMFaQ&c=uVBC5aaqdp04wbCmyXNuQqcl6-HHVF3q1DNb\\_Pgp7v8&r=sNJUdrLZ\\_tffMB5A06zIXFw0XW\\_5tS9haJqOoP6a318&m=pxqBwqiQg9FHOsDRGvWq4yKISNIVZAGgnFdvRehjUlc-ELL](http://www.ck12.org<https://urldefense.proofpoint.com/v2/url?url=http-3A__www.ck12.org&d=CwMFaQ&c=uVBC5aaqdp04wbCmyXNuQqcl6-HHVF3q1DNb_Pgp7v8&r=sNJUdrLZ_tffMB5A06zIXFw0XW_5tS9haJqOoP6a318&m=pxqBwqiQg9FHOsDRGvWq4yKISNIVZAGgnFdvRehjUlc-ELL)  
related resource
- <http://bpsscience.weebly.com/science-and-literacy-close-reading-cwa--more.html>

### Technology Resources:

1. *Explore Learning*
2. *United Streaming*
3. *YouTube*
4. *Phet*
5. *Teacher Tube*

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<p><b>Differentiated Instruction:</b></p> <p><b>Modifications / Extensions:</b> How will I differentiate the curriculum for ESL, gifted, at-risk, etc?</p> <ul style="list-style-type: none"><li>• <b>All Learners:</b> Guided Notes/ Graphic Organizers/ Study Guides Opportunities to rework and re-submit work</li><li>• <b>Assessments:</b> Extra Time/ Use of notebook or reference cards/ Break into smaller tasks/ Word Banks/ Reduce choices on multiple choice questions</li></ul>	<p>What evidence will I collect that demonstrate that the students have achieved the objective?</p> <ul style="list-style-type: none"><li>• <b>Teacher Created:</b> Tests Quizzes Lab Reports Mid Terms Final Exams</li><li>• <b>Alternate Assessments:</b> Journal Responses OEQ/Short Responses grade using a 0-3 Rubric Lab Reports Oral Assessments Portfolio Projects</li></ul>
<p><b>Assessments:</b></p> <ul style="list-style-type: none"><li>• <b>DOQ's on edConnect</b></li></ul>	