Grade 6 - Unit 2 - Weather and Climate

Madison Public Schools

Unit Focus

In this unit, students will learn how weather forms as a result of the complex interactions between temperature, humidity, and air pressure. Through the study and creation of forecasts they will understand how other conditions play a role in weather. Additionally, students will learn how tools and technology are used to create forecasts and how these forecasts can be used both locally and globally. Working both independently and with their peers, students will practice real world skills in predicting and interpreting the weather. Students will apply their knowledge of weather, weather patterns and the cause and effect relationships of weather and weather systems to a culminating project investigating changes in Earth's climate. Students will be required to use graphs to interpret data and use this data to justify their claims regarding the future of Earth's climate, citing specific references to various locations around the world.

Stage 1: Desired Results - Key Understandings

Established Goals

Next Generation Science
Middle School Earth and Space Sciences: 6 - 8
- Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. *MS-ESS3-5*

Next Generation Science Standards (DCI)
Science: 6
- Because these patterns are so complex, weather can only be predicted probabilistically. ESS2.6.D2
- Global movements of water and its changes in form are propelled by sunlight and gravity. ESS2.6.C3
- 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. ESS3.6.D1

Transfer

T1 Analyze qualitative and quantitative data to interpret patterns, draw conclusions, and/or make predictions.
T2 Communicate effectively based on purpose, task, and audience to promote collective understanding and/or recommend actions.

Meaning

Understandings	Essential Questions
U1 Unequal heating and cooling of water, land, and air creates weather and weather patterns. **U2** Weather can be predicted by analyzing the temperature, movements of air masses, proximity to influencing landforms/water sources, and location. **U3** Stability of a system might be disturbed either by a sudden event or gradual changes that accumulate over time. (MS-ESS3-5) **U4** Global climate are the result of interactions of the atmosphere and the Earth's surface. **U5** Human activities contribute to changes in the Earth's environment which can affect Earth's future. **U6** Scientists examine evidence to formulate interesting questions and solve problems.	**Q1** How is weather created? **Q2** What factors influence weather and climate? **Q3** How can graphs, charts, and images be used to identify patterns in data?

Stage 1: Desired Results - Key Understandings

	Acquisition of Knowledge and Skill	
	Knowledge	**Skills**
• 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. ESS2.6.C2 • 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. ESS2.6.D3 • Variations in density due to variations in temperature and salinity drive a global pattern of interconnected ocean currents. ESS2.6.C4 • Water continually cycles among land, ocean, and atmosphere via transpiration, evaporation, condensation and crystallization, and precipitation, as well as downhill flows on land. ESS2.6.C1 • 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. ESS2.6.D1 **Student Growth and Development 21st Century Capacities Matrix** *Critical Thinking* • Synthesizing: Students will be able to thoughtfully combine information/data/evidence, concepts, texts, and disciplines to draw conclusions, create solutions, and/or verify generalizations for a given purpose. MM.1.3 *Global Thinking* • Engaging in Global Issues: Students will be able to analyze complex issues and their implications and/or consequences. MM.5.1	**K1** Weather and climate are related but not the same. **K2** Water continually cycles among land, ocean, and atmosphere. **K3** Temperature impacts molecular arrangement of molecules. **K4** In the water cycle, condensation occurs due to cooling; evaporation and transpiration occur due to heating. **K5** Clouds are indicators of different types of weather. **K6** Type of precipitation produced is dependent upon level of humidity, temperature, and other factors. **K7** As air attempts to equalize by moving from high pressure areas to low pressure areas, this causes wind from convection currents. **K8** Solar radiation heats the planet, but it does not do so evenly. Air pressure is influenced by the differences between hotter and cooler pockets of air, or fronts. **K9** Changes in Earth's climate impact organisms and landforms. **K10** Cause and effect relationships may be used to predict weather and climate patterns and changes. **K11** Scientists are investigating a variety of factors that may be causing Earth's climate to change. **K12** Graphs, charts and images can be used to identify patterns in data. **K13** <u>Vocabulary</u>: evaporation, transpiration, condensation, precipitation, run-off, sleet, hail, radiation, convection, conduction, air pressure, air mass, high pressure, low pressure, front, intervals, anemometer, barometer, carbon dioxide	**S1** Applying understanding of the properties of matter to weather and climate. **S2** Differentiating amongst the different phases in the water cycle: evaporation, transpiration, condensation, precipitation, runoff, and collection. **S3** Identifying appropriate tools and symbols to measure, record and communicate data about the weather. **S4** Analyzing and interpreting data to form conclusions and make predictions. **S5** Communicating conclusions and predictions using evidence to support claims.