

Anoka-Hennepin Secondary Curriculum Unit Plan

Department:	Science	Course:	Advanced Earth Science 8	Unit 4 Title:	Meteorology	Grade Level(s):	8
Assessed Trimester:	Trimester 3	Pacing:	1 Trimester Students will work through regular material in approximately 3 days per week with additional days for enrichment.	Date Created:	6/18/2013	Last Revision Date:	6/17/2014

Course Understandings: *Students will understand that:*

- Scientific inquiry is a way of processing information about their world through the interactions among technology, engineering, and mathematics.
- Scientific investigations involve asking testable questions. Different kinds of questions suggest different scientific investigations and findings of current investigations will guide future investigations.
- Many cultures and groups have been and continue to be involved in advancements in engineering, exploration, and inquiry.
- The Earth is dependent on the sun as an energy source, which influences interactions, patterns, and cycles on Earth.
- Earth systems are distinct but interrelated and affect human lives.
- In order to maintain and improve their existence, humans interact with and influence Earth systems.

DESIRED RESULTS (Stage 1) - WHAT WE WANT STUDENT TO KNOW AND BE ABLE TO DO?

Established Goals

Benchmark:

**8.3.2.1.3:** Explain how heating of the Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents, and the water cycle, as well as influencing global climate.

**8.3.2.1.2:** Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat.

**8.3.2.2.1:** Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate, and distribution of particulates and gases.

For example: Certain gases contribute to the greenhouse effect.

**8.3.2.2.2** Analyze changes in wind direction, temperature, humidity and air pressure and relate them to fronts and pressure systems.

**7.1.1.2.4:** Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations.

**8.1.1.1.1:** Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given.

For example: Evaluate the use of pH in advertising products related to body care or gardening.

**8.1.1.2.1:** Use logical reasoning and imagination to develop descriptions, explanations, predictions, and models based on evidence.

**8.1.3.4.1:** Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts.

For example: Use data or satellite images to identify locations of earthquakes and volcanoes, ages of sea-floor, ocean surface temperatures, and ozone concentration in the stratosphere.

**8.3.2.3.2:** Describe how the water cycle distributes materials and purifies water.

*For example:* Dissolved gases in rain can change the chemical composition of substances on Earth.

*Another example:* Waterborne disease.

**8.3.2.2.3:** Relate global weather patterns to patterns in regional and local weather.

**8.3.2.3.1:** Describe the location, composition, and use of major water reservoirs on the Earth, and the transfer of water among them.

**8.3.4.1.2:** Recognize that land and water use practices in specific areas affect natural processes and those natural processes interfere and interact with human systems.

*For example:* Levees change the natural flooding process of a river. *Another example:* Agricultural runoff joins the water cycle and influences natural systems far from the source.

**8.1.3.3.1:** Explain how constraints like scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations. (Trimester 2 and Trimester 3)

Literacy Benchmark:

**6.13.6.6:** Analyze the author’s purpose in describing phenomena, providing an explanation, describing a procedure, or discussing/reporting an experiment in a text.

**6.13.8.8:** Distinguish among claims, evidence, reasoning, facts, and reasoned judgment based on research findings, and speculation in a text.

Transfer	
<b>Students will be able to independently use their learning to: (product, high order reasoning)</b> <ul style="list-style-type: none"><li>Create weather instruments, collect and analyze data to better understand the atmosphere and weather phenomenon.</li><li>Research the effects of climate change, both present and future, and identify possible solutions or actions that could be taken to slow down these effects.</li></ul>	
Meaning	
<b>Unit Understanding(s):</b> <b>Students will understand that:</b> <ul style="list-style-type: none"><li>The atmosphere and its health can impact the Earth and all life on it.</li><li>The Earth’s surface, atmosphere, and life have changed immensely throughout time and will continue to change.</li><li>Uneven heating of the Earth drives weather patterns and ocean currents affecting global climate.</li></ul>	<b>Essential Question(s):</b> <b>Students will keep considering:</b> <ul style="list-style-type: none"><li>How can present and past conditions impact the future?</li><li>What effects do living and non-living things have on the atmosphere?</li><li>How does maintaining a healthy atmosphere affect the future of the environment?</li><li>How is climate different from weather?</li><li>How is Earth’s weather produced?</li></ul>
Acquisition	
<b>Knowledge - Students will:</b> <ul style="list-style-type: none"><li>Students will know that winds and ocean currents are the result of temperature differences in the atmosphere and hydrosphere. (8.3.2.1.3)</li><li>Students will recognize the creation of ocean currents due to wind and temperature differences. (8.3.2.1.3)</li><li>Students will identify density differences in the air and water due to uneven heating. (8.3.2.1.3)</li><li>Students will recognize and describe the variation in temperature, pressure, and compositions among the layers of the atmosphere. (8.3.2.2.1)</li><li>Students will identify the regions for ozone, weather, and the jet stream. (8.3.2.2.1)</li><li>Students will know the names of the substances that compose the atmosphere and how they relate to the greenhouse effect. (8.3.2.2.1)</li><li>Students will recognize that climatic changes are influenced by the atmosphere. (8.3.2.1.3)</li><li>Students will recognize that the Coriolis Effect affects global wind patterns. (8.3.2.2.3)</li><li>Students will describe how different cloud types are associated with certain weather conditions. (8.3.2.2.2)</li><li>Students will recognize that the water cycle demonstrates all of the phases of matter. (8.3.2.1.3)</li><li>Students will identify the major water reservoirs on Earth and describe the location and composition. (8.3.2.3.1)</li><li>Students describe how the water cycle distributes materials and purifies water. (8.3.2.3.2)</li><li>Students will examine the process of water purification; may include evaporation, aeration, and filtration. (8.3.2.3.2)</li><li>Students will understand the processes in the water cycle. (8.3.2.3.2)</li><li>Students will recognize how humans can impact the land. (8.3.4.1.2)</li><li>Students will recognize how humans can impact water systems. (8.3.4.1.2)</li><li>Students will be able to examine reasoning and evidence from presented data. (7.1.1.2.4)</li><li>Students will be able to identify faulty reasoning. (7.1.1.2.4)</li><li>Students will understand that evidence consists of observations and data. (8.1.1.1.1)</li><li>Students will identify facts vs. opinions. (8.1.1.1.1)</li><li>Students will identify opinions that are presented as facts. (8.1.1.1.1)</li></ul>	<b>Reasoning - Students will:</b> <ul style="list-style-type: none"><li>Students will compare heat absorption on land versus water. (8.3.2.1.3)</li><li>Students will compare land and sea breezes and why they occur.. (8.3.2.2.3)</li><li>Students will analyze a diagram of the water cycle. (8.3.2.3.2)</li><li>Students will interpret a diagram of the layers of the atmosphere.(8.3.2.2.1)</li><li>Students will interpret a weather map. (8.1.3.4.1)</li><li>Students will predict the weather based on data. (8.1.3.4.1)</li><li>Students will analyze how a shift in wind direction and change in cloud type are related to the passing of a pressure system. (8.3.2.2.2)</li></ul> <b>Literacy Learning Targets Embedded Throughout Year:</b> <ul style="list-style-type: none"><li>Students will use texts, articles and websites to gather information. (6.14.2.2)</li><li>Students will write and develop opinions on science topics. (6.14.1.1)</li><li>Students will be able to suggest alternative explanations about the natural world based on scientific evidence. (7.1.1.2.4)</li><li>Students will be able to critically evaluate explanations proposed by others based on scientific evidence. (7.1.1.2.4)</li><li>Students will differentiate between observation and inference. (8.1.1.1.1)</li><li>Students will compare and contrast an earth science issue in which fact and opinion are intermingled. (8.1.1.1.1)</li><li>Students will evaluate conclusions to see if they follow logically from the evidence given. (8.1.1.1.1)</li><li>Students will be able to demonstrate the processes of scientific inquiry using descriptions, explanations, predictions, and models. (8.1.1.2.1)</li><li>Students will be able to evaluate whether descriptions, explanations, predictions, and models are based on evidence. (8.1.1.2.1)</li><li>Students will use information to make a logical argument for or against whether humans affect global climate. (7.1.1.2.4)</li></ul> <b>Skills - Students will:</b> <ul style="list-style-type: none"><li>Students will use available technology to conduct an investigation to observe the rate of heat absorption of land versus water. (8.3.2.1.2)</li><li>Students will observe the greenhouse effect using Vernier probes. (8.3.2.2.1)</li><li>Students will explore weather instruments. (8.3.2.2.2)</li><li>Students will collect and analyze weather data and use it to make predictions. (8.1.3.4.1)</li></ul>

<ul style="list-style-type: none"><li>Students will be able to explain how constraints like scientific laws and engineering principles, as well as economic, political, social, and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations. (8.1.3.3.1)</li></ul>	

<b>Common Misunderstandings</b> <ul style="list-style-type: none"><li>Air has no mass or weight</li><li>Humid air is heavier than dry air</li><li>Air pollution is always caused by human activity</li><li>The hydrosphere is the same thing as the atmosphere</li><li>Air is oxygen</li><li>Humidity and relative humidity are the same</li><li>Ozone causes the Greenhouse Effect</li><li>Personal opinion is scientifically valid</li></ul>	<b>Essential new vocabulary</b> <ul style="list-style-type: none"><li>Hydrosphere</li><li>Atmosphere</li><li>Particulate</li><li>Nitrogen</li><li>Troposphere</li><li>Stratosphere</li><li>Mesosphere</li><li>Thermosphere</li><li>Exosphere</li><li>Ionosphere</li><li>Chlorofluorocarbons</li><li>Ozone Layer</li><li>Jet Stream</li><li>Weather</li><li>Greenhouse effect</li><li>Carbon Dioxide</li><li>Climate</li><li>Global Warming</li><li>Faulty reasoning</li><li>Air pressure</li><li>Global winds</li><li>Prevailing Westerlies</li><li>Prevailing easterlies</li><li>Trade Winds</li><li>Monsoons</li><li>Local winds</li><li>Land Breeze</li><li>Sea Breeze</li><li>Coriolis effect</li><li>Cumulus</li><li>Cirrus</li><li>Stratus</li><li>Cumulonimbus</li><li>Nimbostratus</li><li>Alto cumulus</li><li>Fog</li><li>Precipitation</li><li>Air mass</li><li>High Pressure System</li><li>Low Pressure system</li><li>Humidity</li><li>Relative humidity</li><li>Saturation</li><li>Cold front</li><li>Warm front</li><li>Stationary front</li><li>Weather vane</li><li>Anemometer</li><li>Barometer</li><li>Psychrometer</li><li>Isobars</li><li>Transpiration</li><li>Runoff</li><li>Infiltration</li><li>Groundwater</li><li>Reservoir</li><li>Saltwater</li><li>Freshwater</li><li>Aquifer</li><li>Aeration</li><li>Filtration</li><li>Pollutant</li><li>Heat absorption</li><li>Deep ocean current</li><li>Surface current</li><li>El Niño</li><li>La Niña</li><li>Salinity</li></ul>
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