

Phoenixville Area School District Understanding by Design (UbD) Science Template

Grade Level 3

Unit Name: Water & Climate

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Stage 1 Desired Results		
	<i>Transfer</i>	
<p>Overarching NGSS & PA Standards:</p> <p>3.3.3.A Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.</p> <p>3.3.3.B Obtain and combine information to describe climates in different regions of the world.</p> <p>3.3.3.C Make a claim about the merit of a design solution that reduces the</p>	<p><i>Students will be able to independently use their learning to...</i></p> <ol style="list-style-type: none"> 1. Ask questions and/or define problems 2. Develop and/or use models 3. Plan and/or carry out investigations 4. Analyze and interpret data using computational thinking 5. Obtain, evaluate, and communicate information (supported by evidence) 6. Construct explanations and design solutions 	
	<i>Meaning-Making</i>	
	<p><i>Students will understand that...</i></p> <p>Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next.</p> <p>Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years.</p> <p>A variety of natural hazards result from natural processes. Humans cannot eliminate natural hazards but can take steps to reduce their impacts.</p>	<p>ESSENTIAL QUESTIONS <i>Students will keep considering...</i></p> <ul style="list-style-type: none"> • How does water interact with other materials? • How does temperature affect water and weather? • Steam seems to come and go on windows and mirrors. How does that happen and what does it have to do with weather? • Is it warmer in the summer and cooler in the winter everywhere in the United States? • What happens to rainwater that falls on ground covered with soil?

impacts of a weather-related hazard.		
<p>Which branch(es) of science apply:</p> <p>E&SS</p>	<i>Knowledge and Skills Acquisition</i>	
	<p style="text-align: center;">UNDERSTANDINGS</p> <p><i>Students will know...</i></p> <ul style="list-style-type: none"> • Water forms beads on waterproof materials and soaks into absorbent materials. • Water moves downhill. The angle of the slope and the amount of water affect flow. • Temperature is a measure of how hot matter is. • Water expands when heated and contracts when cooled. • A material that floats in water is less dense. • Cold water is more dense than warm water. • Water expands when it freezes; ice is less dense than liquid water. • Ice melts when heated; water freezes when cooled. • Weather is measured using observations and tools such as thermometers, wind vanes, and wind gauges. • Evaporation is the process by which liquid (water) changes into gas (water vapor). • High temperatures, greater surface area, and moving air (wind) increase the rate of evaporation. • Condensation is the process by which gas (water vapor) changes into liquid water; it occurs on a cool surface. • Evaporation and condensation contribute to the movement of water through the water cycle. • Typical weather in a region often varies with seasons. High and low temperatures and amount of precipitation are the main ways to describe seasonal weather change. The Sun's energy drives weather. • Weather data in tables and in graphic displays may show patterns over time. • Climate is the average or typical weather that can be expected to occur in a region, based on long-term observation and data analysis. • Weather-related natural hazards include tornadoes, hailstorms, blizzards, lightning, floods, and drought. • People often modify their homes and their way of life to deal with floods. • Wetland protection and restoration is one way to prevent floods. • Soil is rock particles mixed with organic material called humus. • Soils retain more water than rock particles alone. • Water drains more easily through some earth materials than through others. • The energy of flowing water can be used to do work; waterwheels are machines powered by flowing water. 	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> • Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. • Obtain and combine information from books and other reliable media to explain phenomena. • Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.

	KEY VOCABULARY	
	barometer blizzard climate data Earth erosion flood forecast hurricane	precipitation rain gauge regions season temperature thermometer tornado weather wind vane

Stage 2 – Evidence

Evaluative Criteria	<i>Assessment Evidence</i>	
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<p>What criteria will be used in each assessment to evaluate attainment of the desired results?</p> <p>Rubrics related to each will be developed.</p>	<p>PERFORMANCE TASK(S):</p> <p>Investigations:</p> <p>I. Task(s): Students investigate water—a critical factor defining weather and climate. Students explore the phenomena of water’s observable properties, its interactions with other materials and substrates, and make connections to outdoor experiences with water. Students compare the ways water interacts with four different surfaces. They compare the rate of flow of water on different slopes. They explore how sponges interact with water to soak up spills. Students go outdoors to explore how water interacts with natural materials. Assessment: Investigation 1 I-Check</p> <p>II. Task(s): Students continue to investigate properties of water and observe the phenomenon of how temperature affects water’s state and density. Students use standard metric units to measure temperature and observe the properties of water as it is heated, cooled, and frozen. They construct a thermometer and find that water</p>	<p>Differentiation Considerations:</p> <p>For labs, some students may wish to:</p> <ul style="list-style-type: none"> • Explain verbally instead of in a written format • Draw their responses • Write in their first language <p>If challenges arise with the complexity of the task(s), some students may need:</p> <ul style="list-style-type: none"> • Additional incremental steps
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expands as it is heated. Students compare the density of water at different temperatures and find that warm water is less dense than cool water, and that ice is less dense than liquid water. They go outdoors to investigate melting of ice in different conditions.

Assessment: Investigation 2 I-Check

III. **Task(s):** Students compare local weather data that they observe and collect to meteorologists' forecasts and historical weather data. Students explore the phenomena of evaporation and condensation, which account for the transformations of water between liquid to gas. Students find out how these transformations are the key drivers of the water cycle, the mechanism that redistributes water over the whole planet.

Assessment: Investigation 3 I-Check

IV. **Task(s):** Students analyze weather data, the everyday observable phenomena in the local atmosphere—temperature, wind, and precipitation—and think about the long-term patterns of weather in a place or region, the phenomenon known as climate. They work in groups to organize and analyze local daily weather data for 4 months of the previous year (January, April, July, and October). This leads students to think about the difference between weather (condition of the atmosphere now) and climate (typical weather that can be expected to occur in a region). Through media, students are introduced to ways that people manage the problems associated with floods. They discuss engineering methods to mitigate these weather-related hazards.

Assessment: Investigation 4 I-Check

V. **Task(s):** Students investigate how water, a renewal resource, percolates (drains) down through soils. This phenomenon prevents water from standing in pools everywhere and replenishes groundwater. Students compare what happens when water is poured through two different earth materials, soil and gravel. Students test soil in a number of locations on the schoolyard to compare the drainage rates. They construct a waterwheel and use it to lift objects, learning about the power of moving water. Students are introduced to renewable natural resources and ways to conserve them.

Assessment: Investigation 1 I-Check

Unit Activities/Projects:

- An alternative activity

Other considerations:

- When grouping students various skills sets and strengths will be considered
- When asking students to describe a model, opportunities to draw or write it, as well.
- Teacher can scribe written responses for students

	<ol style="list-style-type: none"> 1. Where I Went on a Pretend Vacation: Your task is to research an area’s regional climate and create a postcard, PowerPoint, poster, or give a short presentation about the climate of the place as if you went there. <ul style="list-style-type: none"> • Project Rubric 2. Precipitation Towers: Your task is to use stacking cubes to create 3D graphs of monthly precipitation data for a city of your choice. <ul style="list-style-type: none"> • Project Rubric 3. Storm Safety Guides: Your task is to research ways to reduce the impact of natural hazards. Then write a storm safety guide about how to prepare for and stay safe during extreme weather. <ul style="list-style-type: none"> • Project Rubric 	
<p>What criteria will be used in each assessment to evaluate attainment of the desired results?</p> <p>Rubrics related to each will be developed.</p>	<p style="text-align: center;">OTHER EVIDENCE:</p> <ul style="list-style-type: none"> • Checklists of collaborative behaviors in investigations • Checklists of collaborative behaviors in class discussions • Science Journal Entries • TO CONSIDER FOR LATER: UNIT TEST(S) <p>(What evidence will be collected to determine whether Stage 1 goals were achieved?)</p>	<p>Differentiation Considerations:</p> <p>For journal entries, consider that some students may wish to:</p> <ul style="list-style-type: none"> • Draw instead of write entries • Write in their first language • Explain responses verbally <p>If challenges arise with the complexity of the task(s), some students may need:</p> <ul style="list-style-type: none"> • Additional incremental steps • An alternative activity