

Your Name: Jenifer Troyer	
Grade Level: Third	Subject Area: Science/Writing
Lesson #1: What Is Weather? What Is Climate?	

### The Teaching Process

#### Lesson Overview:

In this introductory study of weather, students will learn about the atmosphere and its interaction with the earth's surface. They learn that the study of weather includes temperature, clouds and sky conditions, as well as precipitation, wind, and storms. This will serve as the foundation for an in-depth understanding of how weather and climate vary across geographical locations and why forecasting weather is important to many people.

#### Unit Objectives:

Students will record patterns of weather at different times and in different places so they can use those patterns as evidence to support an explanation and (4ESS1-1) make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to explain that weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate is a range of an area's typical weather conditions and how those conditions vary over years.

Students will be introduced to the four major climate zones on earth- tropical (Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and arctic/polar (McMurdo Station, Antarctica).

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

##### Science and Engineering Practices:

##### Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Represent data in tables and various graphical displays (bar graphs and pictographs) to reveal patterns that indicate relationships. (3-ESS2-1)

##### Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world (s).

- 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. (3-ESS3-1)

##### Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

- Obtain and combine information from books and other reliable media to explain phenomena. (3-ESS2-2)

##### Crosscutting Concepts:

##### Patterns

- Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2)

##### Cause and Effect

- Cause and effect relationships are routinely identified, tested, and used to explain change. (3-ESS3-1)

[Type text]

List of Materials

Pencils

Paper

Chart Paper/Markers

Weather Music/Sounds

Weather Books/Magazines

Handout 1 (Note-taking sheet)

Handout 2 (Weather/Climate sheet)

Marzano vocabulary worksheets

Discovery Science Clip: Understanding Weather & Climate

Computer/Internet Access/Projector)

Instructional Sequence

Phase One: Engage the Learner

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

What's the teacher doing?

The teacher plays sound/video clips of various types of weather to encourage students to consider the varieties of weather and the way weather affects them. Instruct students to write/draw write down words, phrases, and images that come to mind related to weather as they listen to the music/sounds.

Optional/Extension:

Encourage students to create a word splash in small groups with words that are related to the topic prior to instruction. They could also add weather pictures from magazines/newspapers.

What are the students doing?

1. Students independently write down their ideas.
2. After the allotted time students share what they wrote or drew with their assigned group.
3. Students share their ideas with the class.

Phase Two: Explore the Concept

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

What's the teacher doing?

The teacher provides post-it notes and weather books, magazines, and web sites to students and encourages them to explore.

Teacher collects/sorts post-it notes into categories and guides students to generalize and condense questions and statements. Compile the questions and have students use them as a reading/viewing guide in the next activity and throughout the unit.

What are the students doing?

During this time, students take notes and record what they are learning and questions they have. Students can use post-it notes and note a? for questions they have, ! for something that surprises them, L for something they've learned, and W for a word they need help understanding. They can transfer these notes on a chart and cite their source.

[Type text]

Phase Three: Explain the concept and define terms	
Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.	
<p>What's the teacher doing?</p> <p>Teacher shows video clip from Discovery Education: Science Is Elementary: What in the World? The Earth Explained: Weather and Climate.</p> <p>Explain to students that the following program will explain the dynamics of weather and climate. Tell students that while weather conditions may seem erratic at times, weather and climate do follow basic scientific rules which make them predictable.</p> <p>Have students listen for answers to their questions as they view clip one.</p> <p><a href="http://app.discoveryeducation.com/search?Ntt=weather+and+climate&amp;N=18341">http://app.discoveryeducation.com/search?Ntt=weather+and+climate&amp;N=18341</a>  <i>In this video we learn that weather is the condition of the atmosphere in terms of heat, air pressure, wind, and moisture that changes almost daily whereas climate is the long-term weather in a certain area. The concepts of water vapor, evaporation, condensation, and precipitation are introduced in a discussion of the water cycle. The different layers of the atmosphere are named and discussed, as is the role of the sun in providing heat energy to warm the earth and its atmosphere. Wind, air masses, fronts, storms and other weather phenomena are described, as are hurricanes and tornados. The video concludes with a brief reference to instruments used to measure various aspects of weather.</i></p>	<p>What are the students doing?</p> <p>Students are note-taking while viewing video segment <u>Introduction: What is Weather.</u></p>

Phase Four: Elaborate the Concept	
Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.	
<p>What's the teacher doing?</p> <p>Provide time for students to share out what they learned from the video clip about weather and climate. Help students develop definitions for weather and climate from students using Marzano vocabulary sheets.</p>	<p>What are the students doing?</p> <p>Together students construct definitions for weather and climate and develop drawings, examples, and non-examples.</p>

[Type text]

Phase Five: Evaluate students' Understanding of Concept

The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.

What's the teacher doing?

Teacher presents students with weather/climate sheet on which students evaluate and label statements according to whether they refer to weather or climate.

The sheet can be found at:

<http://sites.education.miami.edu/psell/files/2011/12/Weather-Part-II.pdf>

What are the students doing?

Students identify and label statements with the word weather or climate and explain the difference.

Name \_\_\_\_\_ Student Handout

Weather Note Taking Guide

? I have questions about...	! I was surprised....	L I learned...	W Words I need help understanding...

[Type text]

## Weather/Climate Unit Question Study Guide

These discussion topics and questions will span during the length of the unit.

### Introduction: What is Weather?

1. How is weather different from climate?

### The Water Cycle: Humidity : Clouds and Fog: Precipitation

2. What is the water cycle?
3. How are clouds formed? What are the three main types of clouds? How is fog formed?

### The Atmosphere and Sun: Temperature

4. What are the five layers of the atmosphere?
5. What is the layer within the troposphere that keeps out harmful UV rays?
6. In which layer does most weather activity happen?
7. How does the sun impact climate?
8. How does the sun create seasons and weather conditions on different parts of the planet?
9. How often does the Earth rotate on its axis?

### Wind: Air Pressure

10. How does sunlight affect wind? What is this pattern of air circulation called?
11. What are the different sections of air in the troposphere called?

[Type text]

## Fronts and Storms:

12. How do meteorologists classify air masses?
13. What is an air mass like if it is formed over an ocean? Over land?
14. Does an air mass formed near the Equator hold more water vapor than one formed near the poles?
15. What is the difference between an air mass that is warmer or colder than the ground below it?
16. What is the line called along which two air masses meet?
17. What are the four different kinds of fronts?
18. What is a cold front?
19. What weather conditions are associated with a cold front?
20. What is a warm front?
21. What weather conditions are associated with this type of front?
22. What is a stationary front? What weather conditions can be expected from this type of front?
23. What is an occluded front? What weather conditions are associated with an occluded front?
24. How are thunderstorms formed?
25. What is lightning?
26. How is thunder produced?
27. Why do we usually see the lightning before we hear the thunder?

[Type text]

28. What does it mean if you hear thunder at the same time as you see lightning flash?

29. How is air pressure affected by sunlight?

30. Which of these pressure systems can form storms?

31. What is a hurricane?

32. What frontal storm is stronger than a hurricane?

33. What other differences are there between hurricanes and tornadoes?

Forecasting Weather

34. Can meteorologists always predict the weather?

35. What instruments do meteorologists use to keep track of the weather?

36. How else do meteorologists observe and predict weather?

## Weather/Climate Unit Question Study Guide Answers

These discussion topics and questions will span during the length of the unit.

Use these discussion topics and questions to review the program material.

1. How is weather different from climate? *[Weather is the short-term condition of the atmosphere in terms of heat, pressure, wind, and moisture. Climate is the weather in a certain area over a long period of time.]* Have students describe the weather in your area today. Then have them describe the climate (and the different seasons if necessary). How does today's weather match the climate in your area?

2. What is the water cycle? *[The water cycle is the process of recycling water between Earth and its atmosphere.]* What are the three stages in the water cycle? *[The first stage is evaporation. This is when the sun pulls water up into the air. When water is heated by sunlight, it expands and turns into water vapor. The second stage is condensation, which means the air has reached its saturation point and can hold no more water vapor. When enough tiny droplets of water have condensed, there is precipitation, where the water falls back to the Earth in the form of rain, sleet, or snow.]* How is water vapor measured? *Scientists measure water vapor in terms of relative humidity—how much water there is in the air compared to how much the air can actually hold.]* When is the saturation point reached? *[The saturation point is reached when there is 100 percent relative humidity.]* Ask students if they have ever heard these terms on weather forecasts. If possible, watch or listen to a weather forecast in your area the day you show this program. Then tell students what the relative humidity is today. Is there a chance of precipitation? How do you know?

3. How are clouds formed? *[Clouds are formed in the second stage of the water cycle—condensation—when the tiny water droplets bind to dust particles floating in the air.]* What are the three main types of clouds? *[Cumulus clouds, stratus clouds, and cirrus clouds are the main types.]* Have students describe each of these clouds, reminding them of the discussion starter activity. *[Cumulus clouds are formed by rising air currents and are big and puffy. Stratus clouds look layered and are formed when a layer of clouds is cooled below its saturation point, but without any up-and-down movement. Cirrus clouds are formed entirely out of ice crystals and are high and wispy.]* How is fog formed? *[Fog is a cloud that condenses right above the ground where the saturation point has been reached.]* Do any of these descriptions match the clouds in your area today?

4. What are the five layers of the atmosphere? *[The five layers are the exosphere, the thermosphere, the mesosphere, the stratosphere, and the troposphere.]* What is the layer within the troposphere that keeps out harmful UV rays? *[It is called the ozone layer.]* In which layer does most weather activity happen? *[Most weather activity happens in the troposphere.]* How does the sun impact climate? *[Since the Earth rotates*

[Type text]

*at a tilt on its axis, the sun hits the planet differently in different places. At the Equator, the air is warmer because sunlight hits that part directly. At the poles, the sun strikes the ground at an angle, giving those parts of the Earth less heat.]* How does the sun create seasons and weather conditions on different parts of the planet? *[Since the Earth is always rotating on its axis and revolving around the sun, the temperature and the weather are always changing.]* How often does the Earth rotate on its axis? *[It spins on its axis every 24 hours, causing day and night.]*

5. How does sunlight affect wind? *[The sun can heat the air and cause it to expand and rise. Cooler air rushes in to replace the hot air and it is then heated.]* What is this pattern of air circulation called? *[It is called a convection current.]*

6. What are the different sections of air in the troposphere called? *[They are called air masses and can cover thousands of square miles.]* How do meteorologists classify air masses? *[They find out if the air mass was formed over land or an ocean, whether it was formed near the Equator or at the poles, and if it is colder than the ground below it.]* What is an air mass like if it is formed over an ocean? Over land? *[It is likely that an air mass formed over an ocean will have more water vapor than if it was formed over land.]* Does an air mass formed near the Equator hold more water vapor than one formed near the poles? *[Yes. Warm air holds more water vapor than cold air.]* What is the difference between an air mass that is warmer or colder than the ground below it? *[An air mass that is warmer tends to be stable because the cold air stays below it. An air mass that is colder than the ground is usually unstable because the warm air is likely to rise and form thunderclouds.]*

7. What is the line called along which two air masses meet? *[This line is called a front—this can cause sudden changes in weather depending on the type of front.]* What are the four different kinds of fronts? *[They are cold front, warm front, stationary front, and occluded front.]* What is a cold front? *[A cold front occurs when a cold air mass advances on a warm one. The heavier cold air rushes under the warm air, which is forced upwards.]* What weather conditions are associated with a cold front? *[There are strong winds and quick-forming clouds. If there is rain, it is usually short-lived but heavy.]* What is a warm front? *[In a warm front, warm air rises slowly upwards over the cold air and gradually cools.]* What weather conditions are associated with this type of front? *[It produces cirrus clouds then stratus clouds. The rain that comes with a warm front tends to be light and steady, possibly lasting for days.]* What is a stationary front? *[A stationary front occurs when a warm front and a cold front meet but neither advance on the other.]* What weather conditions can be expected from this type of front? *[There are usually mild breezes and very light rain that can last for days.]* What is an occluded front? *[An occluded front is when a warm air mass is caught between two cold air masses.]* What weather conditions are associated

[Type text]

with an occluded front? *[These usually produce a mix of both cold and warm frontal weather, followed by more cold frontal weather.]*

8. How are thunderstorms formed? *[Thunderstorms are formed by a cumulus cloud that has grown from an increased amount of moisture. When the top of the cloud becomes high and cold enough, the water vapor turns to ice and precipitation begins.]* What is lightning? *[Lightning is the discharge of electricity from the thundercloud to the ground or to another thundercloud.]* How is thunder produced? *[Thunder is the sound produced by the explosive expansion of air heated by the lightning.]* Why do we usually see the lightning before we hear the thunder? *[We see the lightning first because light travels faster than sound.]* What does it mean if you hear thunder at the same time as you see lightning flash? *[It means you are on the squall line—the line along which the rain is falling.]*

10. How is air pressure affected by sunlight? *[Convection currents can form air masses into cells of high pressure air (highs) or low pressure cells of air (lows).]* Which of these pressure systems can form storms? *[Low pressure cells, usually forming on the edges of occluded fronts or other frontal systems, can create frontal storms.]* What is a hurricane? *[A hurricane is a frontal storm forming above tropical oceans, where there are especially large masses of warm, moist air.]* What frontal storm is stronger than a hurricane? *[A tornado, also formed by winds that begin in occluded fronts, is the most violent storm with winds that can reach 300 miles per hour. Hurricanes have winds that can blow as fast as 150 miles per hour.]* What other differences are there between hurricanes and tornadoes? *[Hurricanes cover much larger areas, but form over water. Tornadoes cover smaller areas, but often come in groups on land, leaving a trail of destruction.]*

11. Can meteorologists always predict the weather? *[No, but modern forecasting is correct about 85 percent of the time.]* What instruments do meteorologists use to keep track of the weather? *[They use thermometers to measure temperature, barometers to measure air pressure, hygrometers to measure relative humidity, anemometers to measure wind speed, and weather vanes to measure wind direction.]* How else do meteorologists observe and predict weather? *[They use space satellites that track storm systems and weather patterns.]*

[Type text]



Name \_\_\_\_\_ Date \_\_\_\_\_

### Weather and Climate

Directions: Identify if the statement refers to weather or climate.

1. "It is a bright sunny day outside." This refers to the area's \_\_\_\_\_.
2. "It is always so hot and humid here. I wear summer clothes year round." This refers to the area's \_\_\_\_\_.
3. "It is very foggy outside. We should go for our jog this evening." This refers to the area's \_\_\_\_\_.
4. "It is best to go skiing in January. It snows most of the month of January." This refers to the area's \_\_\_\_\_.
5. "I'd better put on my galoshes; it's going to be a wet one." This refers to the area's \_\_\_\_\_.
6. "I was going to wear my favorite dress today, but I looked out my window and saw the trees blowing in the wind. I figured it would be windy most of the day." This refers to the area's \_\_\_\_\_.

7. Write a sentence about the weather: \_\_\_\_\_  
\_\_\_\_\_

8. Write a sentence about the climate: \_\_\_\_\_  
\_\_\_\_\_

9. What is the difference between weather and climate?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Your Name: Jenifer Troyer	
Grade Level: Third	Subject Area: Social Studies/Science
Lesson #2: What Comes From the Curve?	

### The Teaching Process

**Lesson Background/Overview:** The heat of the sun warms the earth and its atmosphere. Because the earth is curved, some regions and materials heat up more quickly than others, creating warmer and cooler air masses. The sun's rays hit different regions of the earth at different angles, creating distinct climates throughout the world. A region's proximity to bodies of water and elevation also affects its weather and climate.

In this lesson students explore how the curved shape of earth affects the climate throughout the world and consider how variations in weather are caused by changing conditions throughout the atmosphere including changes in temperature, pressure, humidity, wind and precipitation.

#### Unit Objectives:

Students will record patterns of weather at different times and in different places so they can use those patterns as evidence to support an explanation and (4ESS1-1) make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to explain that weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate is a range of an area's typical weather conditions and how those conditions vary over years.

Students will be introduced to the four major climate zones on earth- tropical (Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and arctic/polar (McMurdo Station, Antarctica).

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Science and Engineering Practices: (See Lesson 1)

Crosscutting Concepts: (See Lesson 1)

#### List of Materials

Pot

Sentence Strips

2 unsharpened Pencils per group

Paper

Modeling Clay for each group

Pens

Climate Zone Outline Map handouts:

[http://www.sscde.org/lessons/files/G\\_K3\\_LES\\_ClimateintotheClimateZones.pdf](http://www.sscde.org/lessons/files/G_K3_LES_ClimateintotheClimateZones.pdf)

Discovery Science Clip: The Atmosphere and Sun: Temperature

Computer/Internet Access/Projector

## Instructional Sequence

Phase One: Engage the Learner	
These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.	
<p>What's the teacher doing?</p> <p>Teacher puts on an apron and chef hat and comes out with a kettle labeled weather. Asks students to consider how weather is like cooking? (It is shaped by four main ingredients: the sun, the earth, the air, the water).</p> <p>Ask students what ingredients go in to making the weather. Write ideas on sentence strips and put into the pot. (Have blank strips in the pot.) Pull out blank strips as students share the names/types of weather that result from the combination of these ingredients.</p>	<p>What are the students doing?</p> <p>Students share out ingredients and types of weather.</p>
Phase Two: Explore the Concept	
Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.	
<p>What's the teacher doing?</p> <p>This activity is called: Straight On and was created by Janice VanCleave's and published in her book: <i>Weather: Mind Boggling Experiments You Can Turn into Science Fair Projects</i>.</p> <p>Teacher introduces the procedure for today's exploration.</p> <ol style="list-style-type: none"><li>1. Turn paper sideways.</li><li>2. Mold a walnut-sized piece of clay into a 1 ½ inch column.</li><li>3. Place the clay on the top left edge of the paper.</li><li>4. Lay the eraser of one pencil on top of the clay column so that the end of the pencil rests on the paper.</li><li>5. Hold the second pencil on top of the first one and slide it downward along the top of the first pencil until its tip just touches the paper.</li><li>6. Use the pen to mark where each pencil touches the paper.</li><li>7. Move the two pencils to a vertical position so that they stand side by side on the paper.</li><li>8. Use the pen to mark where the left side of each pencil touches the paper.</li><li>9. Compare the distance between the first two marks to the distance between the second two marks.</li></ol>	<p>What are the students doing?</p> <p>Students are watching and noting the steps of the investigation so they are prepared to carry out steps in small groups.</p> <p>Students compare distances between first two marks and second two marks. They increase the clay ball to 5 inches and observe what happens.</p>

[Type text]

<p>Another exploration entitled <i>Sunny Rays and Angles</i> can be used as an alternative or supplementary activity. It can be found at:  <a href="http://blogs.canby.k12.or.us/uploads/harms/Prenice%20Hall%20Climate%20and%20Climate%20Change%20(seasons).pdf">http://blogs.canby.k12.or.us/uploads/harms/Prenice%20Hall%20Climate%20and%20Climate%20Change%20(seasons).pdf</a>  Teacher circulates while small groups carry out the exploration steps listed above and repeat the original experiment by changing the height of the clay the second time around to 5 inches.</p>	
--	--

<p>Phase Three: Explain the concept and define terms</p>	
--	--

<p>Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.</p>	
---	--

<p><b>What's the teacher doing?</b>  The teacher asks students to consider why the marks made when the pencils were slanted were farther apart than the marks that were made when the pencils were in a vertical position.</p> <p>The teacher then offers the following explanation and shows clip three of Discovery Education video clip introduced in lesson one:  <a href="http://app.discoveryeducation.com/search?Ntt=weather+and+climate&amp;N=18341">http://app.discoveryeducation.com/search?Ntt=weather+and+climate&amp;N=18341</a></p> <p>Explain to students that they learned that depending on how close a region is to the equator, the everyday weather and the region's climate can be affected. The sun's rays hit different regions of earth at different angles, creating distinct climates throughout the world. Generally, the hottest places on earth are near the equator, which receive the most direct rays from the sun. Places farther from the sun tend to be cooler because the sun's rays strike the ground there at an angle. The same amount of sunlight is spread over a larger area in other places on the earth.</p> <p>For example, polar regions (at the North and South poles) are far from the equator. These regions do not receive direct sunlight. As a result, the weather in the area is cold, even during the summer months. The climate in the region is therefore referred to as polar with cold temperatures most of the year. A region's proximity to bodies of water and elevation also affects its weather and climate.</p> <p>Variations in weather are caused by changing conditions throughout the atmosphere, including changes in temperature, pressure, humidity, wind, and precipitation.</p> <p>The heat of the sun warms the earth and its atmosphere.</p>	<p><b>What are the students doing?</b>  Students read text or view video segment with purpose of finding answers to the questions:</p> <p><i>How does the sun impact climate?</i></p> <p><i>How does the sun create seasons and weather conditions on different parts of the planet?</i></p>
---	--

[Type text]

<p>Because the earth is curved, some regions and materials heat up moiré quickly than others, creating warmer air masses and cooler air masses. The movement of these air masses causes changes in weather. Thus, the sun’s energy is the fuel that keeps the atmosphere in a state of constant change.</p> <p>The pencils in this experiment represented the sun’s rays. The vertical pencils are like the direct rays received at the equator, and the slanted pencils are angled rays received near the north and south poles. The marks on the paper indicated the areas heated by the rays. The slanted rays mark off a wider area. Places that receive slanted rays from the sun are cooler because the same amount of heat is spread over a larger area.</p>	
---	--

Phase Four: Elaborate the Concept	
<p>Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.</p>	
<p><b>What’s the teacher doing?</b> Give each student or pair of students an outline map of the earth. Have students look at the world outline map, and go over the general climate patterns that occur as latitude increases.</p> <p>Also discuss the seasonal temperature variations. The main thing they should know is that areas further away from the equator tend to be cooler and that, except in places close to the equator, temperatures are cooler in the winter and warmer in the summer. Discuss the difference in seasons for the various climate zones.</p>	<p><b>What are the students doing?</b> Students identify and label climate zones: Polar Temperate Desert Tropical</p>

Phase Five: Evaluate students’ Understanding of Concept	
<p>The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept</p>	
<p><b>What’s the teacher doing?</b> Teacher asks students to reflect on how the curved shape of the earth affects climates throughout the world.</p>	<p><b>What are the students doing?</b> Students use provided resource materials to identify the 7 continents numbered below. They color each continent as follows: Africa (blue), Antarctica (orange), Asia (yellow), Australia (pink), Europe (green), North America (purple), and South America (brown). Then indicate the climate zone or zones the majority of the continent is located in.</p>

[Type text]

Name \_\_\_\_\_ Date \_\_\_\_\_

**CLIMATE ZONES**

Climate refers to a larger pattern that helps us to understand weather. A region’s climate is determined by the average weather in the location over a long period of time. There are several factors that cause climates to vary from one place to another. In general, the climate of an area is determined by its location on the Earth’s surface and the air masses associated with the particular area. An air mass is a large body of air that has about the same temperature, humidity (moisture), and pressure across it. The Earth has three main climate zones: tropical, temperate, and polar.

The climate region near the equator with warm air masses is known as tropical. In the tropical zone, the average temperature in the coldest month is 18 °C. This is warmer than the average temperature of the warmest month in the polar zone.

The North and South poles have climates that are polar because of nearby cold air masses. In this climate zone, the warmest months average less than 10 °C. This is lower than the average temperature of the coldest months in the tropical zones.

The climate zone known as temperate is located between the equator and the North and South poles. The average temperature of the coldest months in the temperate zone is lower than that of the tropical zones, while the average temperature of the warmest months in the temperate zone is higher than that of the polar zone.

In tropical and polar climates, the weather is consistent throughout the year. In temperate zones, the weather is affected by both warm and cold air masses at different times during the year, so the weather changes with the seasons.

~~~~~

Directions: Using the information above, label the 2 tropical zones, 2 polar zones, 2 temperate zones, and the equator on the map.



[Type text]

This activity was found on: <http://sites.education.miami.edu/psell/files/2011/12/Weather-Part-II.pdf>. CLIMATE ZONES

10. Locate Wisconsin on the map. What climate zone is Wisconsin in?

---

11. Based on the climate zone that Wisconsin is located in, describe the type of weather this area most often receives?

---

12. How is the equator related to the amount of sunlight a climate zone receives?

---

Directions: Using the internet or other resource materials, identify the 7 continents numbered below. Color each continent as follows: Africa (blue), Antarctica (orange), Asia (yellow), Australia (pink), Europe (green), North America (purple), and South America (brown). Then indicate the climate zone or zones the majority of the continent is located in.



[Type text]

|                               |                                      |
|-------------------------------|--------------------------------------|
| Your Name: Jenifer Troyer     |                                      |
| Grade Level: Third            | Subject Area: Science/Social Studies |
| Lesson #3: Exploring Climates |                                      |

### The Teaching Process

#### Lesson Background/Overview:

In this lesson students explore three different climate zones polar, temperate, and tropical. They are introduced to climographs which are graphical representations of basic climatic parameters, mainly monthly average temperature and precipitation, at a certain location.

#### Unit Objectives:

Students will record patterns of weather at different times and in different places so they can use those patterns as evidence to support an explanation and (4ESS1-1) make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to explain that weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate is a range of an area's typical weather conditions and how those conditions vary over years.

Students will be introduced to the four major climate zones on earth- tropical (Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and artic/polar (McMurdo Station, Antarctica).

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Science and Engineering Practices: (See Lesson 1)

Crosscutting Concepts: (See Lesson 1)

#### List of Materials

Books Depicting different climates (polar, temperate, tropical)

Climate Zone Graphic Organizer:

[http://www.sscde.org/lessons/files/G\\_K3\\_LES\\_ClimateintotheClimateZones.pdf](http://www.sscde.org/lessons/files/G_K3_LES_ClimateintotheClimateZones.pdf)

Earth Climate Zone handout: (From previous lesson) (above site)

Polar, Temperate, and Tropical Climograph Transparencies (above site)

Poster size World Map (Highlighting Climate Zones)

Venn Diagram Worksheets (1 for each student)

Discovery Science Clip: [The Atmosphere and Sun: Temperature](#)

Computer/Internet Access/Projector

### Instructional Sequence

#### Phase One: Engage the Learner

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

#### What's the teacher doing?

Provide students with a copy of the climate graphic organizer. Review the three climates they identified during previous lesson. Ask them to name the word that would name the climate of Wisconsin (temperate). Have

#### What are the students doing?

Students brainstorm words and phrases that tell about the climate of Wisconsin and list them in their graphic organizer.

[Type text]

|                                                                                                                                          |  |
|------------------------------------------------------------------------------------------------------------------------------------------|--|
| students label the first column temperate. Have them work in groups to list words and phrases that would tell about Wisconsin's climate. |  |
|------------------------------------------------------------------------------------------------------------------------------------------|--|

Phase Two: Explore the Concept

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

|                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?</p> <p>The teacher provides post-it notes and books about different climate zones, magazines, and web sites to students and encourages them to explore.</p> <p>After giving students time to explore, teacher guides a class discussion and has students share their ideas.</p> | <p>What are the students doing?</p> <p>During this time, students take notes and record what they are learning. Students can add words and phrases to their graphic organizer.</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Three: Explain the concept and define terms

Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?</p> <p>Teacher shows Temperate Climograph (Visual 2A) and discusses the word climograph (climate, graph). Teacher explains that climographs show the average temperature and rainfall for a place. Have students share observations about temperature and precipitation in each of the climates. Students can add notes to their graphic organizers.</p> <p>Overlay temperate climograph on polar climograph so students can see a visual representation of the differences. Ask students to compare and contrast polar and temperate climates. Do the same thing with polar and tropical and then temperate and desert.</p> | <p>What are the students doing?</p> <p>Students compare and contrast temperature and precipitation in different climate zones and connection this to what they learned in the previous lesson about the way rays from the sun spread unevenly over the earth.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Four: Elaborate the Concept

Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.

|                                                                                                  |                                                                                                    |
|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?</p> <p>Explain to students that throughout the remainder of the</p> | <p>What are the students doing?</p> <p>Students locate and label their destination on the map.</p> |
|--------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|

[Type text]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>unit we will be studying more about four main climate zones in our world as we obtain and combine information about the weather of Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and arctic/polar (McMurdo Station, Antarctica).<br/>Have students label these areas on their climate zone maps.</p> <p>Assign small groups a destination and provide classroom atlases/maps so they can locate their destination.</p> <p>Provide temperature and precipitation climographs for each location.</p> | <p>They examine the climograph for their particular location and then write a few sentences about the temperature and precipitation.</p> <p>Students can come together as a whole group and label their location on the class map. They can then share out what they learned about the climate.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Phase Five: Evaluate students' Understanding of Concept</p>                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                |
| <p>The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept</p> |                                                                                                                                                                                                                                                                                                |
| <p>What's the teacher doing?<br/>Teacher revisits lesson focus: What are the different types of climates? What words tell about each? Gives students the task of selecting two locations and comparing and contrasting the climates.</p>                                                                                                                                                                                                                                   | <p>What are the students doing?<br/>Students can compare and contrast two different climates they learned about on a Venn diagram.</p> <p>(Comparison statements and evaluation pieces throughout the unit can be completed by students and used at the end of the unit in a review game.)</p> |

Name \_\_\_\_\_ Student Handout

Climates Note Taking Guide

| Temperate | Polar | Tropical | Desert |
|-----------|-------|----------|--------|
|           |       |          |        |

[Type text]

|                                 |                               |
|---------------------------------|-------------------------------|
| Your Name: Jenifer Troyer       |                               |
| Grade Level: Third              | Subject Area: Science/Writing |
| Lesson #4: What Causes Seasons? |                               |

### The Teaching Process

#### Lesson Overview:

After exploring climates in the previous lesson, students will learn more about earth's seasons in the various climate zones.

#### Unit Objectives:

Students will record patterns of weather at different times and in different places so they can use those patterns as evidence to support an explanation and (4ESS1-1) make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to explain that weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate is a range of an area's typical weather conditions and how those conditions vary over years.

Students will be introduced to the four major climate zones on earth- tropical (Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and artic/polar (McMurdo Station, Antarctica).

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Science and Engineering Practices: (See Lesson 1)

Crosscutting Concepts: (See Lesson 1)

#### List of Materials

Pencils

Paper

Globe

Flashlights

Masking Tape

Journals

### Instructional Sequence

#### Phase One: Engage the Learner

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

#### What's the teacher doing?

Ask students: *How do you know when the seasons change? What happens outside?* (Answers might include observing migrating birds, flowers blooming, and leaves changing color) *How is the weather different in each season? Why do seasons change?*

#### What are the students doing?

Students brainstorm seasonal changes and consider how and why the weather in each season changes. They reflect on the hottest and coldest weather they have experienced.

[Type text]

|                                                                                                                                                       |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>Ask students to think of the coldest day they can remember. What was the weather like? Ask them to think of the hottest day they can remember.</p> |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|--|

Phase Two: Explore the Concept

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>What's the teacher doing?</b><br/>         The teacher places a lamp fixture in a central location of the classroom. (Remove the lamp shade and place a large soft white light bulb in the lamp. Turn on the lamp and turn off the classroom lights.) Explain to students that through the use of models we can gain important insight about the way systems on earth work, which can in turn be helpful in understanding weather patterns. (Lamp will represent the sun).</p> <p>The teacher will place a label on the globe on each of the four places representing the climate zones will be studied. Have a student tilt the globe so that the Wisconsin is facing the lamp and remind students the earth is tilted on its axis.</p> <p>Ask students for suggestions on what might result from a change in position of either object. Take time to demonstrate and explore and discuss student suggestions.</p> | <p><b>What are the students doing?</b><br/>         Students provide suggestions on how the position of either object might change and what observable effects would follow.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Three: Explain the concept and define terms

Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <p><b>What's the teacher doing?</b><br/>         Tell students to watch the Northern Hemisphere as a day passes (and the student rotates the globe around its axis once). Even though the X experiences night and day, the whole Northern Hemisphere (top half of the globe) is getting direct lamplight during the day. Ask students what season it is in the Northern Hemisphere (summer).<br/>         Now, without changing the tilt, have the student walk around the lamp (tell him/ her to orbit around the sun) so that he or she is opposite of where he started. You might consider having students chant through 6 months (from July to December, perhaps) as the student orbits to demonstrate how long it takes to make one revolution</p> | <p><b>What are the students doing?</b><br/>         Students are watching and participating in the demonstration.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|

[Type text]

|                                                                                                                                                                       |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| around the sun. Now, the Northern Hemisphere (and the X) is getting less direct lamplight (winter), but the Southern Hemisphere is getting direct lamplight (summer). |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

Phase Four: Elaborate the Concept

Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>What's the teacher doing?</b><br/>         Take time to repeat the demonstration asking students to consider the direct lamplight that would be received with regard to the four major climate zones on earth- tropical (Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and artic/polar (McMurdo Station, Antarctica).</p> <p>Students should be encouraged to make connections with climate zone information addressed in previous lesson.</p> <p>Revisit climographs for the regions. Provide each group of students a temperature/precipitation climograph for their region.</p> | <p><b>What are the students doing?</b><br/>         Students are comparing and contrasting the earth and sun positions and seasons of (Barro Colorado Island, Panama, desert (Egypt), temperate (Wisconsin), and artic/polar (McMurdo Station, Antarctica).</p> <p>Students analyze climographs to discover patterns and trends in temperature and precipitation and share out observations with the class.</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Five: Evaluate students' Understanding of Concept

The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept

|                                                                                                                                                                                                    |                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>What's the teacher doing?</b><br/>         Assign students the task of making a diagram to show the positions of the Earth and sun during the winter season for their assigned location.</p> | <p><b>What are the students doing?</b><br/>         Groups create their own poster showing the overall weather pattern for each of the seasons in their assigned region.</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                 |                               |
|---------------------------------|-------------------------------|
| Your Name: Jenifer Troyer       |                               |
| Grade Level: Third              | Subject Area: Science/Writing |
| Lesson #5: What is Temperature? |                               |

### The Teaching Process

#### Lesson Background/Overview:

Temperature is a measure of the average speed of the motion of air molecules. The faster the molecules move the higher the temperature. Temperature is determined by many factors especially sunlight and wind and can be measured. Temperature variations can be caused by many factors including sun, wind, shade, surfaces, colors, and reflections.

In this lesson students will explore that temperature can be measured; different microclimates exist within the school; and seasonal temperature variations exist.

#### Unit Objectives:

Students will record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to understand weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate as a range of an area's typical weather conditions and how those conditions vary over years.

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Crosscutting Concepts: (See Lesson 1)

Science and Engineering Practices: (See Lesson 1)

#### List of Materials

Pencils/Colored Pencils

Graph Paper

Three Bowls for each group

Water of Varying Degrees

Thermometers (Place in a variety of locations outside the school ahead of time)

School Maps-One Poster Size Map

Discovery Science Clip: [The Atmosphere and Sun: Temperature](#)

Computer/Internet Access/Projector

### Instructional Sequence

#### Phase One: Engage the Learner

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

#### What's the teacher doing?

Teacher provides students bowls of hot, lukewarm, and cold water. Students are asked to pretend their fingers are thermometers and then describe the temperatures they feel. The teacher uses the answers to introduce the concept of numerical degrees to describe how hot or cold

#### What are the students doing?

Students work together to find words to describe and compare the different temperatures they feel.

Students discuss why it might be important to know how warm/cold something is.

[Type text]

|                                                                                                                |                                                                     |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| something is.<br><br>Teacher then demonstrates how to read a thermometer and explains how a thermometer works. | Students discuss some examples of things we measure in temperature. |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|

Phase Two: Explore the Concept

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

|                                                                                                                                                                   |                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What's the teacher doing?<br>The teacher will have students retrieve thermometers that were placed in different locations inside and outside the school building. | What are the students doing?<br>Students should then be encouraged to analyze their findings and speculate on why variations exist and what conditions contributed. |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Three: Explain the concept and define terms

Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

|                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What's the teacher doing?<br>The teacher will have students share out and plot temperatures on a poster size map and then lead a discussion on reasons for the variations and how a bar graph can be a valuable tool to show temperature data and allow for comparison within locations. | What are the students doing?<br>After collaboratively collecting temperature data the class as a whole can create a table and bar representation of data and then use this to draw conclusions. |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Four: Elaborate the Concept

Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.

|                                                                                                                  |                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| What's the teacher doing?<br>Teacher provides temperature data to groups of students and poster size bar graphs. | What are the students doing?<br>Students create monthly temperature bar graphs in groups for their assigned location.<br><br>Students present their graphs to the group and share their observations based on the data. |
|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Five: Evaluate students' Understanding of Concept

The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.

What's the teacher doing?

Teacher provides students question so they can demonstrate their level of understanding.

What are the students doing?

Students compare temperatures around the world with their current area. Where is it hotter? How much hotter is the hottest place? Where is it colder? How much colder is the coldest place? Where are temperatures similar to our area?

Tropical Location: Barro Colorado Island, Panama

| Month     | Average Temperature |
|-----------|---------------------|
| January   | 91                  |
| February  | 91                  |
| March     | 92                  |
| April     | 92                  |
| May       | 90                  |
| June      | 89                  |
| July      | 89                  |
| August    | 89                  |
| September | 88                  |
| October   | 88                  |
| November  | 88                  |
| December  | 90                  |

Temperate Location: Milwaukee, Wisconsin

| Month     | Average Temperature |
|-----------|---------------------|
| January   | 29                  |
| February  | 33                  |
| March     | 42                  |
| April     | 54                  |
| May       | 65                  |
| June      | 75                  |
| July      | 80                  |
| August    | 79                  |
| September | 71                  |
| October   | 59                  |
| November  | 46                  |
| December  | 33                  |

Polar Location: McMurdo Station, Antarctica

| Month     | Average Temperature |
|-----------|---------------------|
| January   | 27                  |
| February  | 15                  |
| March     | -1                  |
| April     | -5                  |
| May       | -7                  |
| June      | -9                  |
| July      | -14                 |
| August    | -15                 |
| September | -12                 |
| October   | -2                  |
| November  | 15                  |
| December  | 26                  |

[Type text]

## Desert Location: Cairo, Egypt

| Month     | Average Temperature |
|-----------|---------------------|
| January   | 66                  |
| February  | 68                  |
| March     | 74                  |
| April     | 83                  |
| May       | 90                  |
| June      | 84                  |
| July      | 98                  |
| August    | 94                  |
| September | 92                  |
| October   | 86                  |
| November  | 77                  |
| December  | 69                  |

## Average Monthly Temperatures

| Month     | BCI | Milwaukee | Egypt | McMurdo Station |
|-----------|-----|-----------|-------|-----------------|
| January   | 91  | 29        | 66    | 27              |
| February  | 91  | 33        | 68    | 15              |
| March     | 92  | 42        | 74    | -1              |
| April     | 92  | 54        | 83    | -5              |
| May       | 90  | 65        | 90    | -7              |
| June      | 89  | 75        | 84    | -9              |
| July      | 89  | 80        | 98    | -14             |
| August    | 89  | 79        | 94    | -15             |
| September | 88  | 71        | 92    | -12             |
| October   | 88  | 59        | 86    | -2              |
| November  | 88  | 46        | 77    | 15              |
| December  | 90  | 33        | 69    | 26              |

[Type text]



[Type text]

|                                                      |                               |
|------------------------------------------------------|-------------------------------|
| Your Name: Jenifer Troyer                            |                               |
| Grade Level: Third                                   | Subject Area: Science/Writing |
| Lesson #6: What is Humidity? How can it be Observed? |                               |

### The Teaching Process

**Lesson Background/Overview:**  
Humidity is the amount of water vapor in the air and the effects can be observed. Students will review the stages of the water cycle and learn how humidity affects the weather.

In this lesson students will be introduced to the concept of relative humidity and examine the relative humidity monthly averages in different climate zones.

**Unit Objectives:**  
Students will record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to understand weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate as a range of an area's typical weather conditions and how those conditions vary over years.

**Standards addressed :**  
**Disciplinary Core Ideas:**  
3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.  
3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.  
3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.  
**Science and Engineering Practices: (See lesson 1)**  
**Crosscutting Concepts: (See lesson 1)**

**List of Materials**  
Pencils  
Paper  
Salt/Sugar  
Pinecones  
Leaves  
Sponges  
Water  
Chart Paper  
Discovery Science Clip: [The Water Cycle: Humidity Chapter- Clouds and Fog - Precipitation](#)  
Computer/Internet Access/Projector

### Instructional Sequence

|                                                                                                                                                                                                                                                                                                                           |                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Phase One: Engage the Learner                                                                                                                                                                                                                                                                                             |                                                                                        |
| These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit. |                                                                                        |
| What's the teacher doing?<br>Start the lesson discussing what the students know about                                                                                                                                                                                                                                     | What are the students doing?<br>Have them brainstorm answers about humidity and how it |

[Type text]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| <p>relative humidity. How can you tell whether the air is dry or humid? (Some responses may include frizzy hair when humid.) Is summer or winter more humid? Less? Ask students: What is humidity? How does it affect the weather?</p> <p>Ask students to consider how leaves differ when it is dry and when it is humid. Ask students to consider how pine cones might serve as an indicator of humidity. Put a pinecone outside where it can be observed from time to time. (Ongoing)</p> <p>Possible Extensions:<br/>Other short demonstrations might be helpful in reinforcing concepts previously taught.</p> <p><u>The Sun Causes Evaporation:</u><br/>Place ten drops of water in two pie tins. Place one in the sun and one in the shade. Share observations.</p> <p><u>The Wind Causes Evaporation:</u><br/>Wet two areas of the chalkboard/wall. Set up a fan so it is blowing on one. Share observations.</p> | <p>affects the weather.</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|

Phase Two: Explore the Concept

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

|                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?</p> <p>Divide the class into groups of four students each. Distribute supplies (1 dry sponge on a plate, a cup of water, 1 plastic spoon and a copy of the worksheet; see Figure 2).</p> | <p>What are the students doing?</p> <ol style="list-style-type: none"> <li>1. Have the students squeeze the sponges so they can see there is no water in them. Ask the students how much water is in the sponge? (Answer: None)</li> <li>2. One spoonful at a time, have the students <i>slowly</i> and <i>carefully</i> pour water onto the sponges. Have the students count how many spoonfuls of water are being added and have one group member keep a tally (see Figure 1).</li> <li>3. After a few spoonfuls, stop the students and ask them the following questions: What is happening to the water? Where is it going? What do you think is going to happen as you keep filling the sponge with water? Can you put water into this sponge forever? Will we be counting forever?</li> <li>4. Have the students resume adding water to the sponge by the spoonful until the sponge starts to drip water (reaches saturation). Ask the students to</li> </ol> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|  |                                                                         |
|--|-------------------------------------------------------------------------|
|  | explain what has happened to the sponge? Why is water dripping from it? |
|--|-------------------------------------------------------------------------|

Phase Three: Explain the concept and define terms

Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?</p> <p>Explain to the students that the sponge is like the air. Ask the students: How does the water dripping from the sponge act like rain or a cloud? Explain that air can "hold" water, too, similar to the sponge. Ask if anyone knows another name that means something is full (of water, like the air or the sponge)? Share the word "saturated." Explain that when something (air or the sponge) is full (of water) we say that it is saturated.</p> <p>Have students view segment two from Discovery Education: <a href="#">The Water Cycle: Humidity - Clouds and Fog – Precipitation.</a></p> | <p>What are the students doing?</p> <p>Students take notes related to the water cycle and the formation of clouds.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|

Phase Four: Elaborate the Concept

Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?</p> <p>Explain to the students that they could use a scale to measure/predict how much water is in their sponge and how close it is to dripping. Meteorologists can also measure how close is it to raining by using a humidity scale for water present in the air.</p> <p>Provide small groups relative humidity data for their specified location. As a group have them create a line graph to showing the average humidity level by month. Students can also be provided with data indicating the average number of days receiving precipitation by month for their location.</p> | <p>What are the students doing?</p> <p>Students are constructing line graphs to show average monthly relative humidity for their assigned location.</p> <p>They will present their line graphs to the class and discuss patterns and trends in the data.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Five: Evaluate students' Understanding of Concept

The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.

What's the teacher doing?

The teacher will guide students to compare and contrast relative humidity data representative of each climate region.

What are the students doing?

Students will state how the humidity pattern in their assigned region is similar or different from the humidity pattern in another region after analyzing student constructed graphs.

Tropical Location: Barro Colorado Island, Panama

| Month     | Average Relative Humidity |
|-----------|---------------------------|
| January   | 80                        |
| February  | 80                        |
| March     | 80                        |
| April     | 82                        |
| May       | 88                        |
| June      | 88                        |
| July      | 88                        |
| August    | 88                        |
| September | 88                        |
| October   | 88                        |
| November  | 88                        |
| December  | 85                        |

Temperate Location: Milwaukee, Wisconsin

| Month     | Average Relative Humidity |
|-----------|---------------------------|
| January   | 82                        |
| February  | 73                        |
| March     | 83                        |
| April     | 68                        |
| May       | 53                        |
| June      | 80                        |
| July      | 92                        |
| August    | 93                        |
| September | 39                        |
| October   | 64                        |
| November  | 48                        |
| December  | 67                        |

Polar Location: McMurdo Station, Antarctica

| Month     | Average Relative Humidity |
|-----------|---------------------------|
| January   | 67                        |
| February  | 66                        |
| March     | 65                        |
| April     | 65                        |
| May       | 64                        |
| June      | 64                        |
| July      | 60                        |
| August    | 59                        |
| September | 58                        |
| October   | 60                        |
| November  | 62                        |
| December  | 68                        |

[Type text]

Desert Location: Cairo, Egypt

| Month     | Average Relative Humidity |
|-----------|---------------------------|
| January   | 40                        |
| February  | 33                        |
| March     | 27                        |
| April     | 21                        |
| May       | 18                        |
| June      | 20                        |
| July      | 24                        |
| August    | 28                        |
| September | 31                        |
| October   | 31                        |
| November  | 38                        |
| December  | 41                        |

Average Monthly Relative Humidity

| Month     | BCI | Milwaukee | Egypt | McMurdo Station |
|-----------|-----|-----------|-------|-----------------|
| January   | 80  | 82        | 40    | 67              |
| February  | 80  | 73        | 33    | 66              |
| March     | 80  | 83        | 27    | 65              |
| April     | 82  | 68        | 21    | 65              |
| May       | 88  | 53        | 18    | 64              |
| June      | 88  | 80        | 20    | 64              |
| July      | 88  | 92        | 24    | 60              |
| August    | 88  | 93        | 28    | 59              |
| September | 88  | 39        | 31    | 58              |
| October   | 88  | 64        | 31    | 60              |
| November  | 88  | 48        | 38    | 62              |
| December  | 85  | 67        | 41    | 68              |

[Type text]

|                                  |                               |
|----------------------------------|-------------------------------|
| Your Name: Jenifer Troyer        |                               |
| Grade Level: Third               | Subject Area: Science/Writing |
| Lesson #7: Creating A Rain Gauge |                               |

### The Teaching Process

#### Lesson Background/Overview:

Rain, snow, sleet, and hail are forms of precipitation that fall from the clouds. This occurs when water vapor attaches to nuclei in clouds and becomes too heavy to be held aloft by air currents. Water droplets become heavier by bumping into one another and sticking together or by colliding with ice crystals and then freezing and sticking together. Precipitation can be measured and patterns are analyzed.

Rain can originate as either water or ice. If sleet passes through a layer of warm air, it will melt and reach the earth as rain. Sleet consists of round, hard balls of ice about the size of raindrops. It is formed when rain or half-melted snow falls through a layer of ice and freezes.

Hail is formed by the collision of super cooled water droplets with small ice crystals. It is formed when there are strong updrafts that bounce the hail between moister and dryer areas. Every time it bounces, the hailstone adds another layer of ice, so the bigger the hailstone the longer it has been bouncing in the clouds.

Snow falls to earth as either individual crystals or as snowflakes, which are large masses of crystals. In the atmosphere.

The form that precipitation takes depends on the temperature of the various layers of air it passes through on the way to the ground.

#### Unit Objectives:

Students will record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to understand weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate as a range of an area's typical weather conditions and how those conditions vary over years.

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Science and Engineering Practices: (See lesson 1)

Crosscutting Concepts: (See lesson 1)

#### List of Materials

Pencils

Paper

Markers

Computer/Internet Access/Projector

Video Clip from Global Precipitation Measurement Mission:<http://pmm.nasa.gov/node/837>

Rain gauge

Coffee cans, canning jars, soup cans, drinking cups or glasses, or other empty, cylindrical containers

Rulers

Masking tape

[Type text]

## Instructional Sequence

### Phase One: Engage the Learner

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

#### What's the teacher doing?

Ask students to consider the forms in which water is present on earth. Discuss the fact that it is present in three different forms of matter: as a liquid (in oceans and lakes); as a gas (in clouds), and as a solid- (in ice packs and glaciers such as in Antarctica and the North Pole.

#### What are the students doing?

Students identify the forms of water present on earth and give examples.

### Phase Two: Explore the Concept

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

#### What's the teacher doing?

Using an inflatable ball earth, explain that students will toss the ball around the room and record whether their right thumb lands on land or water when they catch the ball. Students could also note where water is located (oceans). (This would be valuable in enabling students to see the salt water-fresh water ratio).

#### What are the students doing?

Students toss an inflatable earth around and note whether their thumb lands on water or land.

### Phase Three: Explain the concept and define terms

Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

#### What's the teacher doing?

The following lesson discussion/activity was developed by the Global Precipitation Measurement Mission:  
<http://pmm.nasa.gov/node/837>

Ask students if there is more water or land on Earth, and talk about how Earth is often called the "Water Planet". Talk about why water is important for life, and let them offer some examples.

Ask what the water in the ocean tastes like, and help them understand it has salt in it. Have a brief discussion about the differences between salt water and freshwater, and which of these most living things need for survival.

#### What are the students doing?

Students compare the amount of fresh water to the amount of salt water.

[Type text]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>Ask student if they think more water on Earth has salt or is “fresh water”. Then say “If you imagine that all the water on Earth is in this cup- covering 70% of Earth’s surface- let me show you how much is fresh water, which is what living things need to survive.”</p> <p>Take an eyedropper, and invite a student to come up and take out one eyedropper of water. Have the student put it into the medicine cup. Tell the students that the amount squeezed from the eyedropper represents how much water is fresh water, and the rest has salt in it.</p> <p>Add some salt to the cup, and ask if that would taste good. Reinforce that we need fresh water, and not salt water, to meet our needs. Then tell the students that even the little bit of water in the medicine cup isn’t available for us to use, because most of it is either ice in glaciers (explain what a glacier is), ice caps (like where it is almost always frozen in the North Pole) or deep underground where we can’t get to it.</p> |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Phase Four: Elaborate the Concept                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                     |
| Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.                                                       |                                                                                                                                     |
| <p>What’s the teacher doing?<br/>Show the students the short video entitled, “The Freshwater Connection” by going to this link (and <a href="http://pmm.nasa.gov/education/videos/gpm-freshwater-connection">http://pmm.nasa.gov/education/videos/gpm-freshwater-connection</a>).</p> <p>Encourage students to explain why it is important study and track Earth's freshwater resources.</p> <p>Show students a simple rain gauge. Explain to students how it is used to measured precipitation.</p> | <p>What are the students doing?<br/>Students think about and explain the importance of studying and tracking earth’s resources.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| Phase Five: Evaluate students’ Understanding of Concept                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                       |
| The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept. |                                                                                                                       |
| <p>What’s the teacher doing?<br/>Explain that now that students understand the importance of precipitation in providing us with freshwater, they will use their engineering skills to design and test an</p>                                                                                                                                                                                                                                                         | <p>What are the students doing?<br/>Students work in small groups with provided materials to design a rain gauge.</p> |

[Type text]

instrument that could use to measure how much rain is falling. Give students materials to work with and circulate to answer questions, but guide them to try out their own ideas

Precipitation data from student created gauges can be compared with a real rain gauge's reading. Data can be tracked and graphed.

|                                                     |                               |
|-----------------------------------------------------|-------------------------------|
| Your Name: Jenifer Troyer                           |                               |
| Grade Level: Third                                  | Subject Area: Science/Writing |
| Lesson #8: Examining Monthly Precipitation Averages |                               |

### The Teaching Process

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lesson Background/Overview:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p>Unit Objectives:<br/>Students will record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.</p> <p>Students will learn the difference between weather and climate and be able to understand weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate as a range of an area's typical weather conditions and how those conditions vary over years.</p>                                    |
| <p>Standards addressed :</p> <p>Disciplinary Core Ideas:<br/>3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.<br/>3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.<br/>3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.</p> <p>Science and Engineering Practices: (See lesson 1)<br/>Crosscutting Concepts: (See lesson 1)</p> |
| <p>List of Materials<br/>Pencils<br/>Paper<br/>Discovery Science Clip:<a href="#">Understanding Weather &amp; Climate: Types of Precipitation</a><br/>Computer/Internet Access/Projector</p>                                                                                                                                                                                                                                                                                                                                         |

### Instructional Sequence

|                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase One: Engage the Learner                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                          |
| <p>These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.</p> |                                                                                                                                                                                          |
| <p>What's the teacher doing?<br/>Ask students to think back to ideas discussed in the previous lesson related to the reason and importance of tracking precipitation.</p> <p>Ask students to state ways precipitation affects their everyday lives and the lives of people around them and around the world.</p>                 | <p>What are the students doing?<br/>Students state reasons for tracking precipitation.</p> <p>Students tell ways that precipitation affects their own lives and the lives of others.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase Two: Explore the Concept                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <p>Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.</p> |

[Type text]

|                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?<br/>Teacher provides students with magazines, books, websites, etc. and gives students time to explore precipitation in their assigned climate location.</p> | <p>What are the students doing?<br/>Students use resources to learn about precipitation. During this time, students take notes and record what they are learning and questions they have. Students can use post-it notes and note a ? for questions they have, ! for something that surprises them, L for something they've learned, and W for a word they need help understanding. They can transfer these notes on a chart and cite their source.</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Three: Explain the concept and define terms

Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.

|                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                           |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?<br/>Teacher explains that the form precipitation takes-rain, snow, sleet, or hail-depends on the temperature of the various layers of air it passes through on the way to the ground.</p> <p>The type and amount of precipitation vary greatly among climate zones. Play audio clip from Discovery Education: <a href="#">Understanding Weather &amp; Climate: Types of Precipitation</a>.</p> | <p>What are the students doing?<br/>Students note various forms of precipitation and climatic conditions that result.</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|

Phase Four: Elaborate the Concept

Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.

|                                                                                                                            |                                                                                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?<br/>Teacher provides precipitation data to groups of students and poster size bar graphs.</p> | <p>What are the students doing?<br/>Students create monthly precipitation bar graphs in groups for their assigned location.</p> <p>Students present their graphs to the group and share their observations based on the data.</p> |
|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Phase Five: Evaluate students' Understanding of Concept

The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.

|                                                                                                                                   |                                                                                                                                                             |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>What's the teacher doing?<br/>Teacher provides students question so students can demonstrate their level of understanding.</p> | <p>What are the students doing?<br/>Students compare precipitation averages representative of the different climate zone with their current area. Where</p> |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|

[Type text]

|  |                                                                                                                                                                                                                                              |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | receives the most precipitation? How much more? Which region receives the least precipitation? In which locations are monthly averages most stable? During which seasons does a specific location receive the most precipitation? The least? |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

[Type text]

|                                    |                               |
|------------------------------------|-------------------------------|
| Your Name: Jenifer Troyer          |                               |
| Grade Level: Third                 | Subject Area: Science/Writing |
| Lesson #9: How Does the Wind Blow? |                               |

### The Teaching Process

#### Lesson Background/Overview:

Wind is the flow of air over the earth's surface. It results from the uneven heating of the earth's surface by the sun. Warm air expands and rises, while cooler air rushes in to fill the place of the cooler air. The earth's rotation deflects the wind, steering it in different directions.

In this lesson students will explore the causes of wind and explore how wind direction and speed can be measured.

#### Unit Objectives:

Students will record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.

Students will learn the difference between weather and climate and be able to understand weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate as a range of an area's typical weather conditions and how those conditions vary over years.

#### Standards addressed :

##### Disciplinary Core Ideas:

3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

Science and Engineering Practices: (See lesson 1)

Crosscutting Concepts: (See lesson 1)

#### List of Materials

Pencils

Paper

Balloon

Soda bottle

Bowls (One for hot water and one for cold water) Two strips of stiff cardboard of the same size

Four small paper cups

Scissors

Pen

Ruler

Stapler

Drawing pin

Pencil with a rubber on the end

Stopwatch

Graph paper

Notepad

## Instructional Sequence

### Phase One: Engage the Learner

These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.

#### What's the teacher doing?

On a windy day, go outside and have students examine what is happening to the trees. Pose the following questions:

What is wind?

What causes wind?

Take students out to the school flag to consider which direction the wind is blowing from. Have students wet a finger and consider which side evaporates first as the side/direction the wind is blowing from.

(The teacher may also construct or have students construct a wind sock/vane to show the direction.)

Inside:

Teacher demonstration:

Place a balloon over the mouth of a bottle. Remind students that the temperature inside the bottle is the same of that of the room.

Pour hot water into a cup and have students observe what happens when the bottle is placed inside the cup. (After a few moments, the balloon will stand straight up as the air inside the bottle expands into the balloon. Compare this to what happens as the sun warms the air around the earth which then creates an area of low pressure. Cold air rushes to take the place. This movement of air is called wind.

Extension: This rap might be fun for all or some of your students to perform for each other or to sing as a class. The lyrics are from the Weather Dude (his website is on the ideas and resources page).

*It might seem funny for you to think*

*The air we breathe can rise and sink*

*It might be really heavy, it may be light,*

*But molecules of air have weight all right.*

*And when they're warm and trippin,' they dance around,*

*That's when changing air pressure can be found.*

*And when that changing pressure builds so high*

*Then the air we breathe can start to fly.*

*The air will move, drift, flow,*

#### What are the students doing?

Students record observations.

What is wind?

What causes wind?

[Type text]

*From high pressure down to where it's low.  
 And when that flow of air actually begins,  
 We have what you and I call...WINDS!  
 Maybe it'll be just a gentle breeze  
 Or a full-tilt storm that uproots trees.  
 But when the trees are swaying to and fro,  
 Say, hey, that's the way winds blow. Winds blow!*

**CHORUS:**

*Say hey, that's the way winds blow! blow! blow!  
 Okay, that's the way winds blow! blow! blow!  
 You want to hear, you want to know,  
 What makes them really go! go! go!  
 Keepin' sailboats' sails up high,  
 Pushin' clouds across the sky,  
 Making your favorite kite to fly,  
 Say hey, that's the way winds blow!  
 So what makes those pressure shifts?  
 Why, it's Mr. Sun, if you get my drift.  
 If it's a little warmer here and a little cooler there  
 Then you have some different temperatures in the air.  
 The warmer air rises so there's room for more,  
 And the cooler air moves to where the warm air was  
 before.  
 The wind keeps blowing from cold to hot,  
 So THIS song is over. NOT!  
 Because if the pressure difference is extreme,  
 And there aren't too many miles in between,  
 The wind can start to howl, it can roar.  
 It can blow away rooftops and treetops and more.  
 So air pressure helps the dudes forecast the wind  
 And now that you know it, amaze your friends!  
 Tell them, "Check this out man, word up, yo!"  
 Say hey, that's the way winds blow!*

**Phase Two: Explore the Concept**

Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.

**What's the teacher doing?**

Provide students materials and demonstrate steps in creating an anemometer.

**What are the students doing?**

- Students construct simple anemometers.
1. Make a cross with the cardboard strips using a stapler.
  2. Cut off the rim of the cups to make them lighter, and easier to staple to the cardboard cross.
  3. Mark one cup with the pen.
  4. Staple the cups to the ends of the cross with the mouth

|  |                                                                                                                                                                                                                                                                                                                                                   |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>of one cup facing the bottom of the other around the cross.<br/>5. Hold the pencil under the centre of the cardboard cross and push the drawing pin through the cross and into the eraser to attach the cross to the pencil.</p> <p>Allow students to take them outside and observe wind speed in different locations around the building.</p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase Three: Explain the concept and define terms                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.</p>                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                      |
| <p>What's the teacher doing?<br/>Remind students just as wind speed can be observed, it can also be measured.</p> <p>Have students refer to Beaufort Scale as they discuss their experiences around the building citing observations.</p> <p>Teacher shows short Discovery Science video<br/><a href="http://app.discoveryeducation.com/search?Ntt=weather+and+climate&amp;N=18341">http://app.discoveryeducation.com/search?Ntt=weather+and+climate&amp;N=18341</a><br/>Winds and Air Masses<br/>Fronts<br/>Air Pressure</p> | <p>What are the students doing?<br/>Students are exploring the list and encouraged to find the seasonal temperatures in their areas. They are exploring how cold it gets on a winter night, how hot it gets on a summer afternoon. They locate those temperatures on a thermometer and then consider how sunlight and wind differ in those seasons and how those differences affect temperature.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase Four: Elaborate the Concept                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                 |
| <p>Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.</p> |                                                                                                                                                                 |
| <p>What's the teacher doing?<br/>Teacher shows students current wind speed and direction data for each location being studied.</p>                                                                                                                                                                                                                                                                                                                    | <p>What are the students doing?<br/>Students are analyzing worldwide weather maps/report to determine wind speed and direction for their assigned location.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Phase Five: Evaluate students' Understanding of Concept                                                                                                                                                                                                                                                                                                                                                                                                                     |  |
| <p>The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.</p> |  |

[Type text]

What's the teacher doing?

Teacher asks students to write about how wind can be measured.

What are the students doing?

Students write about how wind can be measured and how it can vary from one day to another and one climate region to another.

|                             |                               |
|-----------------------------|-------------------------------|
| Your Name: Jenifer Troyer   |                               |
| Grade Level: Third          | Subject Area: Science/Writing |
| Lesson #10: Extreme Weather |                               |

### The Teaching Process

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lesson Background/Overview:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p>Unit Objectives:<br/>Students will record patterns of the weather across different times and areas so they can make predictions about what kind of weather might happen next.</p> <p>Students will learn the difference between weather and climate and be able to understand weather is the minute-by-minute day-by-day variation of the atmosphere's condition on a local scale and climate as a range of an area's typical weather conditions and how those conditions vary over years.</p>                                    |
| <p>Standards addressed :</p> <p>Disciplinary Core Ideas:<br/>3-ESS2-1: Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.<br/>3-ESS2-2: Obtain and combine information to describe climates in different regions of the world.<br/>3-ESS3-1. Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.</p> <p>Science and Engineering Practices: (See lesson 1)<br/>Crosscutting Concepts: (See lesson 1)</p> |
| <p>List of Materials</p> <p>Pencils<br/>Paper<br/>Discovery Science Clip: <a href="#">Fronts and Storms</a><br/>Internet Access/Projector<br/>Books/Magazines/Articles on Severe Weather<br/><i>Severe Weather Research</i> template for each student from:<br/><a href="http://teachershare.scholastic.com/resources/10892">http://teachershare.scholastic.com/resources/10892</a><br/>Poster board<br/>markers and crayons<br/>chart paper<br/>overhead of <i>Severe Weather Research Rubric</i></p>                               |

### Instructional Sequence

|                                                                                                                                                                                                                                                                                                                                  |                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Phase One: Engage the Learner                                                                                                                                                                                                                                                                                                    |                                                                             |
| <p>These activities mentally engage students with an event or question. Engagement activities capture students' interest and help them to make connections with what they know and can do. The teacher provides an orientation to the unit and assesses students' prior understanding of the concepts addressed in the unit.</p> |                                                                             |
| <p>What's the teacher doing?<br/>Ask students to name various types of extreme weather they have experienced or heard about.</p> <p>Show students video clips of extreme weather to generate interest and excitement.<br/>The following activity was adapted from the severe weather lesson found on the Scholastic site at:</p> | <p>What are the students doing?<br/>Students brainstorm severe weather.</p> |

[Type text]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p><a href="http://teachersshare.scholastic.com/resources/10892">http://teachersshare.scholastic.com/resources/10892</a></p> <p>Teacher will explain the research assignment to the class and review the rubric.</p> <p>The class will work together to complete the Severe Weather Research using blizzard as an example:</p> <p>(The template should be enlarged onto a big piece of chart paper and the teacher should review the information students should be listening for during the read aloud.)</p> <p>Teacher will read aloud a nonfiction text on blizzards.</p> <p>Students will then engage in an interactive writing lesson in order to complete the required research.</p> |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Phase Two: Explore the Concept</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                 |
| <p>Students encounter hands-on experiences in which they explore the concept further. They receive little explanation and few terms at this point, because they are to define the problem or phenomenon in their own words. The purpose at this stage of the model is for students to acquire a common set of experiences from which they can help one another make sense of the concept. Students must spend significant time during this stage of the model talking about their experiences, both to articulate their own understanding and to understand another's viewpoint.</p> |                                                                                                                                                                                                                 |
| <p>What's the teacher doing?<br/>Teacher will explain the research assignment to the class and review the rubric.</p> <p>(The template should be enlarged onto a big piece of chart paper and the teacher should review the information students should be listening for during the read aloud.)</p> <p>Teacher provides students with magazines, books, websites, etc.</p>                                                                                                                                                                                                          | <p>What are the students doing?<br/>The students will choose which type of severe weather they would like to research.</p> <p>Time will be spent gathering information from books, magazines, and websites.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <p>Phase Three: Explain the concept and define terms</p>                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                         |
| <p>Only after students have explored the concept does the curriculum and/or teacher provide the scientific explanation and terms for what they are studying. The teacher may present the concepts via lecture, demonstration, reading, or multimedia (video, computer-based). Students then use the terms to describe what they have experienced, and they begin to examine mentally how this explanation fits with what they already know.</p>    |                                                                                                                         |
| <p>What's the teacher doing?<br/>Teacher provides information on various extreme weather from website:<br/><a href="http://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_natdis/cub_natdis_lesson01.xml">http://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_natdis/cub_natdis_lesson01.xml</a></p> <p>At this time it will be important to relating science concept(s) to engineering.</p> | <p>What are the students doing?<br/>Students take notes based on information related to their chosen weather event.</p> |

[Type text]

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| <p>Excerpt taken from website listed above:<br/> Engineers learn about our planet so that humans can exist with and survive its natural hazards. Engineers must be aware of natural hazards in order to prevent or minimize their harmful effects on people and property. They create devices that detect natural hazards, build structures to withstand them, and invent devices to study them. Our homes must withstand the powerful forces of wind, snow, water, fire and moving earth. Engineers design avalanche beacons and airbags, lightning rods and all kinds of environmental sensors. They also design special equipment to fight fires on the ground and from the air.</p> <p>Take time to explore above website and show examples.</p> |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| <p>Phase Four: Elaborate the Concept</p>                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                    |
| <p>Students elaborate on their understanding of the concept. They are given opportunities to apply the concept in unique situations, or they are given related ideas to explore and explain using the information and experiences they have accumulated so far. Interaction between the students is essential during the elaboration stage. By discussing their ideas with others, students can construct a deeper understanding of the concepts.</p> |                                                                                                    |
| <p>What's the teacher doing?<br/> The teacher should review the rubric again in order to make sure the students understand the requirements.</p>                                                                                                                                                                                                                                                                                                      | <p>What are the students doing?<br/> Students will transfer their research into poster format.</p> |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Phase Five: Evaluate students' Understanding of Concept</p>                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                          |
| <p>The final stage of the model has a dual purpose. It is designed for the students to continue to elaborate on their understanding and to evaluate what they know now and what they have yet to figure out. Evaluation of student understanding should take place throughout all phases of the instructional model. The evaluate stage, however, is when the teacher determines the extent to which students have developed a meaningful understanding of the concept.</p> |                                                                                                                                                                                                                                                                                          |
| <p>What's the teacher doing?<br/> Teacher will monitor and assess using questioning techniques.</p>                                                                                                                                                                                                                                                                                                                                                                         | <p>What are the students doing?<br/> Students will display their posters around the room.<br/> Students will participate in a "Gallery Walk" to view all of the posters created.</p> <p>Students will write in their science notebook 3 new facts they learned about severe weather.</p> |

# Severe Weather Research

What is a \_\_\_\_\_?

4 facts about a \_\_\_\_\_ are:

What time of year does a \_\_\_\_\_ happen? Where on earth does \_\_\_\_\_ happen?

To stay safe during a \_\_\_\_\_, you should:

---

**Name a design solution man has created to lessen the impact of this type of weather hazard.**

---

**How successful has this solution been? Why?**

---

[Type text]

Name: \_\_\_\_\_

Date: \_\_\_\_\_

|                      | 3                                                                               | 2                                                                                           | 1                                                                          |
|----------------------|---------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| Elements             | The poster includes all required elements.                                      | All but 1 of the required elements are included on the poster.                              | Several required elements were missing.                                    |
| Content              | At least 7 accurate facts are displayed on the poster.                          | 4-6 accurate facts are displayed on the poster.                                             | Less than 4 accurate facts are displayed on the poster.                    |
| Picture              | The poster includes more than 1 labeled picture and the handwriting is legible. | 1 labeled picture is displayed on the poster, but the handwriting is hard to read at times. | No picture is displayed on the poster OR the handwriting is hard to read.  |
| Spelling/Punctuation | There are less than 3 mistakes in spelling or punctuation.                      | 4-6 mistakes in spelling or punctuation.                                                    | More than 7 mistakes in spelling and punctuation.                          |
| Use of Class Time    | Used time well during each class period. Focused on getting the job done.       | Used some of the time well during class. Occasionally distracted others.                    | Did not use class time to focus on the project OR often distracted others. |

Comments:

---



---



---

Total Points \_\_\_\_/15 Grade \_\_\_\_\_

[Type text]