Kindergarten
Hot or Hotter?

Eco-Energy for Schools

Unit Overview	
Unit Title	Hot or Hotter?
Unit Summary	Through modeling and experimentation, students will explore temperature.
Subject Area Strands	Science – Energy Math – Measurement and Data; Counting and Cardinality ELA – Informational Text; Writing; Speaking and Listening Social Studies – Individuals, Groups, and Interactions
Grade Level	Kindergarten
Appropriate Time	5 days

Lesson Foundation			
Targeted Content Standards	**Common Core Standards**		
		Mathematics	MD.1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object. MD.2. Directly compare two objects with a measurable attribute in common, to see which object has "more of"/"less of" the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter. CC.3 Write numbers from 0 to 20. Represent a number of objects with a written numeral 0-20.
		English / Language Arts	<u>Reading Strands for Informational Text</u> RI K.1 With prompting and support, ask and answer questions about key details in a text. RI K.7 With prompting and support, describe the relationship between illustrations and the text in which they appear (e.g., what person, place, thing, or idea in the text an illustration depicts). <u>Writing</u> W.K.2. Use a combination of drawing, dictating, and writing to compose informative/explanatory texts in which they name what they are writing about and supply some information about the topic. <u>Speaking and Listening</u> SL K.2 Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
	TN Standards		
		Science	Inquiry 1 Identify tools, skills, knowledge, and dispositions needed to conduct scientific inquiry. Inquiry 2 Ask questions, make logical predictions, plan investigations, and

			represent data. Inquiry 3 Explain the data from an investigation. GLE 0007.10.1 Identify the sun as the source of heat and light. GLE 0007.10.1 Place a thermometer in a sunny window and one in a shady area of the classroom and record the temperatures over time. Compare, discuss, and record any temperature differences. GLE 0007.10.2 Investigate the temperature differences in various locations around the school. Discuss and record the results.
		Social Studies	K.6.01 Recognize the impact of individual and group decisions on citizens and communities.
		Next Generation Science Standards	K-PS3-1. Make observations to determine the effect of sunlight on Earth's surface.

Lesson Foundation – Big Ideas & Cross-Curricular Connections

Big Ideas

- The Sun is a source of light and heat.
- Temperature can be compared and measured (hotter or colder)
- Thermometers measure heat.

Cross-Curricular Connections

- Making a Thermometer: Cardinality, Scientific Tools, Predictions, Writing Numerals
- Color and Temperature: Bar Graph, Energy, Writing Numerals, Collaboration
- Hot/Cold Broadcast- Comparing and Contrasting, Temperature Variances
- Water, Grass, Sand- Careers, Different Temperature Examples, Speaking, Collaboration

Lesson Foundation – Essential Questions

1. What would life be like if there were no sun?
2. Why do people go swimming in lakes and oceans in the summer? Why not the winter?

Lesson Foundation – Student Objectives

Going Beyond	• I can use writing to describe different degrees of temperature. • I can number a list beyond 20. • I can compare two thermometers to determine which is hotter. • I can design a basic experiment on temperature.
Mastery	• I can use a combination of drawing and writing to describe different degrees of temperature. • I can describe measureable attributes of temperature- hotter or colder. • I can compare two objects and tell which is hotter or colder. • I can number a list up to 20. • I can use a thermometer to measure temperature. • I can follow a basic experiment on temperature. • I can demonstrate through experimentation how the Sun heats different objects.
Building the Basics	• I can use drawing to describe different degrees of temperature. • I can number a list to 10. • I can identify a hot or cold familiar object. • I can participate in a basic experiment on temperature.
Lesson Foundations – Prerequisite Content & Skills	
Content Knowledge	• One-to-One Correspondence • Basic Phonics • Letter Formation
Skills	• iPad Responsibility • Proper Thermometer Use
Unit Anchor Text	
Unit Anchor Text	Too Hot? Too Cold?: Keeping Body Temperature Just Right by Caroline Arnold
Unit Companion Texts	
Informational Text(s)	• Hot and Cold by Allan Fowler • Weather Words and What They Mean by Gail Gibbons • What is a Thermometer by Lisa Trumbauer
Assessments	
Formative Assessments	• Students will be assessed throughout the unit using teacher observation during discussions, questioning, and learning stations. • Think, Pair, Share will be incorporated during and after the text readings. Students will summarize their new knowledge and share it with another student.

Summative Assessments	• **Pre-Test** Students will draw, phonetically label, and number ten of their favorite toys. • **Post-Test** Repeat the process by using the "T"emperature Chart as the assessment. • **Pre-Test** Using the Temperature Picture Cards, ask the students to place them into two piles, hot and cold. • **Post-Test** Repeat the process while encouraging the student to place the cards in order from coldest to hottest.
Writing Assessments	• "T"emperature Chart o Divide a piece of drawing paper in half, creating a T Chart. Label the sides "hot" and "cold". One side will be specifically for hot and the other for cold. Each student will create a labeled, numbered drawing of situations throughout their day that are considered hot or cold. There must be ten drawn and labeled examples. • Hot and Cold Book – o Directions for assembly o Students will create a six-page book with a front cover that illustrates 3 pairs of items that demonstrate hotter and colder temperatures. The students will also phonetically label the drawings.

Unit Vocabulary

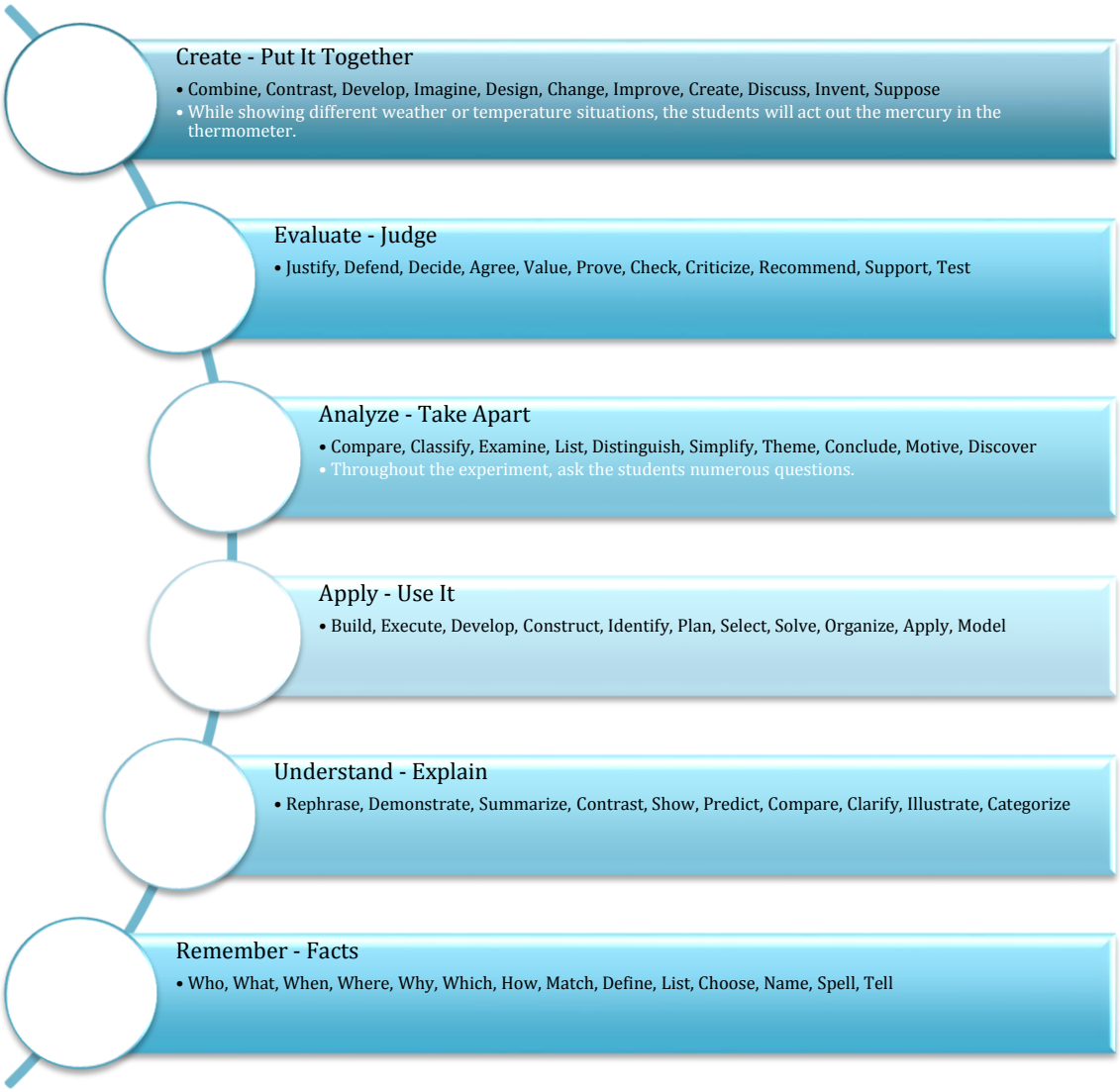
Term	Definition
Temperature	Measures how much heat something has
Thermometer	A tool to measure temperature
Digital Thermometer	A thermometer that gives the numeric reading of temperature
Traditional Thermometer	A thermometer that uses Mercury to measure temperature

Teaching the Unit

Initial Strategies	"Sid The Science Kid" Video This video shows an experiment using a thermometer to show the change in temperatures. It depicts student putting their thermometers in ice and then in warm oatmeal and noticing the change in the thermometer. The students also make predictions.

Direct Instruction	Make a thermometer Materials: Tap water Rubbing alcohol 11-ounce clear, narrow-necked plastic bottle Red food coloring Clear plastic drinking straw Modeling clay Store bought thermometer (optional) • Add equal parts of tap water and rubbing alcohol to the bottle, filling about 1/4 of the bottle. • Add a couple drops of red food coloring. Swish to mix. • Put the straw in the bottle, but don't let the straw touch the bottom. • Use the modeling clay to seal the straw in place. Leave a portion of the straw sticking out from the bottle. The seal should be tight between the straw and bottle. The straw's opening should be clear. • To test if the homemade thermometer works have a student place his or her WARM hands around the bottle and observe what happens to the mixture in the bottle. Other ways to test the thermometer are by placing it in a windowsill and observing how it reacts to the heat or cold there, or placing the thermometer in a bowl of hot water. The bottle may also be placed in a freezer. • Give this analogy: When it's cold the thermometer shrinks to stay warm, just like they do when they are cold. (Have everyone act out being in a coiled-up position and cold.) When it is warm, we like to spread out and enjoy the warm and play! (Ask the students to uncoil and stretch to the sun like they were warm.) Just like any thermometer, the mixture expands when it's heated. As the alcohol-water mixture expands it moves up through the straw. If the bottle gets very hot, the liquid would come through the top of the straw. Adapted from Education.com
Higher-Level Cognitive Function Strategies	• Throughout the experiment, ask the students numerous questions: o Why are we using red food coloring? o Have you ever seen a thermometer with red mercury? You must be VERY careful with this kind of thermometer. The mercury is not safe. o Why do you think the water went up the straw? o What would happen if we put the bottle in ice? o What would happen if we put the bottle in hot water? o Name some things that would make the red water (temperature) raise. o Name some things that would make the red water (temperature) fall. • While showing different weather or temperature situations, the students will act out the mercury in the thermometer. Have the students stand up, and model with their bodies what the red part of the thermometer would look like when something hot or cold was called out. When it was hot, they will raise their hands high and reach

toward the Sun, which is also hot. Students curled into a ball like they were freezing when something cold was called out.



Guided Practice & Activities

- Color and Temperature
  - Materials:
    - Two thermometers
    - Construction paper (half sheets of black, pink, tan and white paper)
    - Stapler
    - Scissors

1. Place students into small groups of 4.
2. Give each group a half sheet of black, tan, pink, and white construction paper. Group members will choose a piece of paper.
3. The student will make a "pocket" out of each piece of paper. A stapler or tape can be used to fasten the pockets.
4. Ask the students to predict the temperature of the inside of each pocket when they are placed in direct sunlight.
5. Each group will number their pockets 1-4 to demonstrate their predictions of cold- hottest.

	6. Put a thermometer in each pocket, and leave them with the groups, not in the sun, for 10 minutes. 7. Remove the thermometers, record the temperature, and return the thermometer to the pocket. 8. Place the pockets in direct sunlight. 9. Every five minutes, remove the thermometers, record the temperature, and return the thermometer to the pocket. 10. Make a simple bar graph to display the results. Compare and contrast the results with the students. Can you guess (hypothesize) why the brown and black pockets have a higher temperature? 11. Lead students to the discovery that the color of objects affects its temperature because the dark colors hold heat. o Once the data has been gathered, make a simple bar graph for comparison. Have a discussion with the students to solidify understanding that color can make a difference in temperature. Darker colors hold heat more than lighter colors. 1. Which of the three pockets had the highest temperature? 2. Why? 4. Which pocket showed the smallest temperature? Why? 5. What colors do we usually wear in the summer vs. the winter?
STEM Projects	• <u>Hot/Cold Broadcast</u> o Materials: - iPad, flipcam, or other filming device - Props that demonstrate hot and cold temperatures: beach towel, sunglasses, bathing suit, umbrella, gloves, scarf, toboggan, coat, shorts, t shirt, cooking pot, ice chest, etc. o The students will apply their knowledge and understanding of familiar examples of temperature by creating a video demonstration of examples of different temperatures. Students will be able to distinguish the temperature of common situations. - **Role:** The student will take on the role of Preschool TV News Anchor that will teach the audience about things that are hot or cold. - **Audience:** People at home. - **Scenario:** One student will act as a TV Preschool TV News Anchor and will describe the situations throughout the day/night that are either hot or cold in temperature. They may "dress up" for their segment of the news show and it may be video taped for broadcast play over the school closed circuit system. - **Independent Work:** Divide a piece of drawing paper in half. One side will be specifically for hot and the other for cold. Each student will create a labeled drawing of situations throughout their day that are considered hot or cold.

STEM Culminating Event

- <u>Water, Grass, Sand Experiment</u>
  - Materials:
    - Small bowls
    - Water (room temperature)
    - Grass
    - Sand
    - Digital Thermometers

  - Give the students the following scenario and ask them to experiment to find the example. The students will work in small groups of 3-4. Each group will have access to small containers, water, grass, sand, and digital thermometers. Explain to the students that they will design the experiment and explain the results to the class. Encourage students to take pictures throughout the process with the iPads. (This will provide the evidence for the presentations. Some students may choose to write the temperatures on a note taking app or take pictures of the thermometers.)

  - Problem Based Learning:

    You are at the park on a hot day and your mom says it is time to leave. On your way to the car, you have 4 choices of paths: grass, sand, or a large puddle. You are barefoot. Which path do you take? All of the paths are in the sun.

  - Give the students the freedom to experiment. Facilitate the learning process by walking among the groups. If groups are stuck, ask them how they know if something is too hot to touch. Do they touch it? (no) Can they see if something is too hot? (sometimes if there is steam) Can they feel the heat if they hold their hand over it? (yes) Is there a tool that they can use to tell the temperature? (thermometer) Should we put the materials in the shade or sun? (sun) Why? (because our problem deals with walking outside, not inside)
  - Once the groups have completed the task, allow time for each group to present their results. Students should stand in front of the class; give their results verbally and with their pictures using the Apple TV. The teacher should record the data from each group on a class chart, even though they may not fully understand the numerals. After everyone has shared, compare the results as a class. Which substance was the hottest? Which one was the coldest? Which surface would you walk on? Why do you think it was the hottest/coldest? (the sun heated it up the most)

Group	Grass Results	Sand Results	Puddle Results

Differentiated Instruction

- **Make a Thermometer**
  - Adjusted Questioning
  - Modeling- Performing the experiment
  - Kinesthetic- acting as the thermometer

	• **Color and Temperature**
	  ○ Modeling the process to complete an experiment
	  ○ Visual- Bar Graph
	  ○ Adjusted Questioning
	
	• **Hot and Cold Broadcast**
	  ○ Peer tutoring- Groups of 3-4
	  ○ Prompting- Props
	  ○ Visuals- Video Clips
	
	• **Water, Sand, Puddle Experiment**
	  ○ Problem Based Learning
	  ○ Peer tutoring- Groups of 3-4
	  ○ Prompting- Teacher
	  ○ Visuals- iPad Pictures and Teacher Created Chart
	
	• **Weather/Temperature Journal**
	  ○ Visuals- Labeled Picture Cards

Re-teaching Strategies	• Take short walks around the school, looking for hotter and colder locations. Using the iPad, take pictures of the different examples you find. After the walk, with a small group of struggling students, label each picture as hot or cold. The numeric value of the temperature reading is not the focus of this activity. Focus on which situation is hotter or colder.
Enrichment Strategies	• Reading a thermometer is not a kindergarten skill. Students will not be able to "read" a traditional thermometer, but may understand that 84 is bigger than 64. Encourage the students to write the numerals. Encourage the students to explain how they can identify the larger numeral. During the discussions, introduce the place value labels, "tens and ones." Some students will begin to make the connection that the tens place value is the consideration when determining the greater number.

Independent Practice Activities	• **Weather/Temperature Sorting**
	  ○ Students will match picture cards- a cold picture with a hotter picture. The twelve cards depict a thermometer and an illustration. More advanced students can place the cards in order from coldest to hottest.
	
	  ○ Bridges in Mathematics Kindergarten Supplement

Materials & Resources	**iPad** **Flipcams** **Projector** **Internet** **App- Touch the Sun**- Nonfiction exploration **Computer Simulation** **Sid the Science Kid** Two thermometers Construction paper (half sheets of black, pink, tan and white paper) Stapler Scissors

	Tap water Rubbing alcohol 11-ounce clear, narrow-necked plastic bottle Red food coloring Clear plastic drinking straw Modeling clay 4 thermometers iPad, flipcam, or other filming device Props that demonstrate hot and cold temperatures: beach towel, sunglasses, bathing suit, umbrella, gloves, scarf, toboggan, coat, shorts, t shirt, cooking pot, ice chest, etc. Small bowls Water (room temperature) Grass Sand Digital Thermometers Temperature Cards (see below) **Thermometer Instructions** **Directions for Making a Simple Book**
Comments	This unit needs to be implemented when the weather is hot and sunny. It may also be expanded another week to include the many different types of precipitation. If you have an questions you may contact: Felicia Kellner at mary.kellner@sullivank12.net Jessica Carr at jessicawcarr@hotmail.com