

Grade Level: Kindergarten	Topic/Unit: Day Sky	Lesson Name: The Sun: The Heat is On!
Lesson Time: Approximately 5 science class periods approximately 30 - 40 minutes each, and 2-3 ELA class periods to prepare/present presentations.	Lesson Description: <i>Essential Question: How does the sun affect our Earth?</i> This lesson is located within the Day Sky unit, where the unit's focus is upon the objects that we see within the day sky. This particular lesson would come after a learning about the Sun (its characteristics and importance). This lesson will focus on global temperature weather exploration, as well as local temperature pattern tracking and comparisons. A summative Day Sky unit assessment will be given from the Science Fusion curriculum. Background: From Earth, we can see many things in our day sky. The Sun is vital to giving our planet the warmth it needs for living things to survive. We can measure the effects of the Sun using tools, such as a thermometer. We can also use tools that are located off of our planet. This lesson will provide a basic overview satellites and how they provide a different vantage point to learn about what is happening on our Earth. Students will use local temperature data to compare our part of the world to others and discuss why there may be differences.	
Prior Student Knowledge		Possible Preconceptions/Misconceptions
<ul style="list-style-type: none"> • Students should be familiar with comparing information in both number and graph forms • Students should be familiar what it means to orbit and rotate. • Students should be familiar with the sun and that it heats our Earth. 		<ul style="list-style-type: none"> • The sun makes everywhere on the Earth the same temperature.
STANDARDS		
NGSS: K-ESS2 Earth's Systems		
Science & Engineering Practices: <i>Analyzing and Interpreting Data</i> Use observations to describe patterns in the natural world in order to answer scientific questions. <i>Engaging in Argument from Evidence</i> Construct an argument with evidence to support a claim. Connection to Nature of Science: <i>Scientific Knowledge is based on Empirical Evidence</i> Scientists look for patterns	Disciplinary Core Ideas: <i>ESS2.D: Weather and Climate</i> Weather is the combination of sunlight, wind, snow, or rain, and temperature in a particular region at a particular time. People measure these conditions to describe and record the weather and to notice patterns over time.	Crosscutting Concepts: <i>Patterns</i> Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. <i>Systems and System Models</i> Systems in the natural and designed world have parts that work together.

and order when making observations about the world.		
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Common Core Standards	Florida State Specific Standards*
<p>RL.K.1 - With prompting and support, ask and answer questions about key details in a text.</p> <p>RL.K.10 - Actively engage in group reading activities with purpose and understanding</p> <p>W.K.7 - Participate in shared research and writing projects</p> <p>K.CC.A - Know number names and the count sequence</p> <p>CCSS.MathPractice.MP2 - Reason abstractly and quantitatively</p> <p>CCSS.MathPractice.MP4 - Model with mathematics</p> <p>CCSS.MathPractice.MP6 - Attend to precision</p>	<p>* The state of Florida has not adopted NGSS and CCSS standards.</p> <p>Science:</p> <p>SC.K.E.5.3 - Recognize that the Sun can only be seen in the daytime</p> <p>SC.K.E.5.6 - Observe that some objects are far away and some are nearby as seen from Earth.</p> <p>SC.K.N.1.3 - Keep records as appropriate of investigations conducted</p> <p>SC.K.N.1.5 - Recognize that learning can come from careful observation</p> <p>SC.K2.CS-CP.1.1 - Identify different kinds of data (e.g., text, charts, graphs, numbers, pictures, audio, video, and collections of objects).</p> <p>SC.K2.CS-CP.1.2 - Collect and manipulate data using a variety of computing methods (e.g., sorting, totaling and averaging).</p> <p>Math:</p> <p>MAFS.K.CC.1 - Know number names and the count sequence</p> <p>MAFS.K.CC.3.6 - Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group</p> <p>MAFS.K12.MP2 - Reason abstractly and quantitatively</p> <p>MAFS.K12.MP4 - Model with mathematics</p> <p>MAFS.K12.MP6 - Attend to precision</p> <p>English Language Arts:</p> <p>LAFS.K.RI.1.10 - Actively engage in group reading activities with purpose and understanding</p> <p>LAFS.K.RI.1.1 - With prompting and support, ask and answer questions about key details in a text.</p> <p>LAFS.K.RI.1.2 - Within prompting and support, identify the main topic and retell key details in a text.</p> <p>LAFS.K.RI.1.3 - With prompting and support, describe the connection between two individuals, events, ideas, or pieces of information in a text.</p> <p>LAFS.K.SL.1.1 - Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups.</p> <p>LAFS.K.SL.2.4 - Describe familiar people, places, things and events and with prompting and support, provide additional</p>

	<p>detail.</p> <p>LAFS.K.SL.2.6 - Speak audibly and express thoughts, feelings and ideas clearly.</p> <p>LAFS.K.W.1.2 - 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.</p> <p>LAFS.K.W.2.6 - With guidance and support from adults, explore a variety of digital tools to produce and publish writing including in collaboration with peers.</p> <p>LAFS.K12.W.2.6 - Use technology, including the internet, to produce and publish writing and to interact and collaborate with others.</p> <p>LAFS.K12.W.3.7 - Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.</p>
Justification	
<p>This lesson integrates science, reading, writing, math and technology specifically through the classroom lesson.</p> <p>Through science the students will practice data collection skills through recording the local temperature and look critically for patterns. They will use their observation skills to view real-time world temperature data to compare their local temperature to those around the world. They will discover what a satellite is, where they are located, as well as their importance in order to provide data to scientists. Students will further discover places in the world that have temperatures similar to theirs and draw conclusions about temperatures in different environments.</p> <p>Math works jointly in this lesson with science in that it supports recognizing numbers and understanding their placement in a sequence of numbers. Students will use this knowledge to compare local temperatures to look for patterns, as well as how these temperatures compare with those around the world. Additional math applications are applied through graphing of data.</p> <p>This lesson provides excellent opportunities for extended work with reading and writing. Through these various occasions, the importance of recording information accurately and with precision in our science observations will continue to be supported. The students will read for understanding using picture representations, an online book and data sets. They will also write to share their findings as scientists do. The students will have opportunities to record results in their science journals and prepare and present their analyses of temperature data.</p> <p>Integration such as this, enhances student understanding that science is not just experiments, design, and engineering. They begin to realize that reading for understanding is important to further their knowledge and that writing for understanding is equally important, thus allowing others to read their results and findings, as well as for them to communicate verbally to share what they have discovered. These are all important thoughts that are consistently shared and emphasized with students throughout the school year.</p>	
Measurable Objectives	
Students will be able to:	

- Recall that the sun provides light and warmth to the Earth (DOK 1)
- Observe and describe features of a satellite (DOK 1)
- List types satellites (DOK 1)
- Compare a series of temperature data (DOK 2)
- Hypothesize about future weather (DOK 3)
- Draw conclusions about the relationship of weather data to how weather can be predicted (DOK 3)
- Apply concepts of vital signs to the Earth to design a poster explaining why data types are important. (DOK 4)

Materials and Resources Required	
<ul style="list-style-type: none"> • Previous learning, or charts about the sun • Image of AQUA Satellite • Exit Ticket: Satellite 1 [Blackline Master] (1 per student) • Temperature Graph Paper [Blackline Master] • Student science/STEM journal • Chart paper and markers • Online Book: “What is a Forecast” by Jennifer Boothroyd (https://www.getepic.com/app/read/9032) • Observation Checklist: Group Work [Blackline Master] • Poster paper (1 per group of students) 	<ul style="list-style-type: none"> • Plickers account set up • Plickers question added to queue including the Plickers image located in resources • Student Plickers cards (1 per student) • Computer (teacher) • Projector • Smart phone with Plickers App loaded • Video Files: “A Magnificent Eruption in Full HD NASA”; Animation of AQUA satellite launch • NASA Eyes on the Earth • Google Earth • Student report rubric [Blackline Master]
E-Learning Connections	
<ul style="list-style-type: none"> • EPIC Books e-book: What is a Forecast?” by Jennifer Boothroyd • Online videos • NASA Eyes on the Earth application: https://eyes.nasa.gov/eyes-on-the-earth.html • Google Earth website: https://www.google.com/earth/ • Plickers (www.plickers.com) 	
Engaging Context or Phenomena	
<p>Engaging phenomena for this lesson will begin with a video of the sun. Students are affected every day with the effects of the sun. This personal connection will help engage students with regard to how weather (both average and extreme) affects them and others around the world, as well as why weather patterns are important in their daily life.</p>	
Lesson Plan Procedures	
ENGAGE	<p>Teacher will show students a video of a close up of the sun. Following the video, the Teacher will ask students what we will continue to talk about in this lesson. [the sun]</p> <p>Teacher will review with students their learning about the sun from previous lessons.</p> <p>Teacher will ask students how the sun affects our lives in Florida. Follow up with a question asking about how do students think we can get information about temperatures? [If they mention meteorologists, then ask about how they might get their information.]</p> <p>At the conclusion of the discussion, the teacher will show students an image rendering of the AQUA satellite (NASA, n.d.). The teacher will ask “What do you think this might be?” Allow for discussion.</p> <p>The teacher will introduce the vocabulary word (without definition): <i>satellite</i>. Then ask the question “Where do you think a satellite is located?” Allow for discussion, then provide the definition of satellite: “A moon, planet or machine that orbits a</p>

	<p>planet or star.” (NASA, 2014)</p> <p>First explain that satellites can orbit in different positions around the Earth – some are close to the Earth, some are farther away. Depending on their placement they can move fast (closer to Earth) and slower (farther from Earth).</p> <p>The teacher will have students pretend to be a satellite and practice what it means to orbit. Find a large area to work with either outside, or a gymnasium and place an object in the center. The teacher will ask students to remind him/her what it means to orbit something.</p> <p>The teacher will explain that there are many different types of satellites orbiting our Earth, with each having their own special purpose. We are going to model what it might look like. Place a group of students in Low Earth Orbit around the object. Have them speed walk in a circle around the object. Next, place another group of students in Medium Earth Orbit and have them walk at a normal pace. Finally, place a third group of students in High Earth Orbit and have them take long strides as they walk a circle around the object.</p> <p>Have students regroup where they can view NASA’s Eyes on the Earth application. The teacher will have students state their observations about what they are seeing. If needed, the teacher can prompt questions such as, “<i>What do you see rotating? What do you see orbiting? How can you compare the activity you just did to what you see on the screen?</i>” in order to lead students to the discovery that this is a model of the Earth with the current satellite missions that are orbiting our Earth. These satellites are take measurements from above our planet, such as temperature, wind speeds, sea level heights and much more.</p> <p>The teacher will explain that the picture shown earlier to the students is a picture of the AQUA satellite. <i>These satellites are important in providing information about the Earth’s water cycle but is also collecting information about temperatures in Earth’s air, land and water (NASA, 2018). We are going to focus on the temperature aspect of this satellites.</i></p> <p>Teacher will ask students: “<i>How do you think a man-made satellite gets to where it is supposed to be?</i>” Allow for discussion, then show a short animated video of the AQUA satellite being put into space.</p> <p>Teacher will hand out an Exit Ticket: [Satellite 1] to each student. Teacher will read the directions: “<i>Draw a picture of a satellite, keeping in mind its definition. Label the objects in your drawing.</i>”</p> <p>Teacher will collect exit tickets from students.</p>
EXPLORE	Teacher will have students get out their STEAM Journal and either utilize existing temperature data that students have

	<p>collected through an on-site weather station or seek and record data from another source (such as Weather Underground) that provides a history of temperatures for school’s location. (if temperature data is not already graphed, have students fill in a bar graph [Blackline Master link])</p> <p>Teacher will ask students to look at their graphs and in a STEAM journal entry (Title: Our Weather Observations; Date: mm/dd/yy) describe what they see. Then allow for discussion. Teacher will then ask students if they see a pattern (something that happens over and over; or repeats itself). Allow for further discussion and adding to their STEAM Journal Entry.</p> <p>Teacher will ask students “What is a forecast, or what is important in order to forecast? Record on an anchor chart.</p> <p>Teacher will read the book What is a Forecast? By Jennifer Boothroyd.</p> <p>Teacher will ask the students: “How does this book relate to the discussion we have been having today? Direct students to Turn and Talk to a partner about the book that was just read “How does this book apply to patterns in weather?”</p> <p>Teacher will ask the students: “After speaking to your partner, is there anything else we can record on our chart paper about forecasts, or the tools that are needed?” The teacher will record any new information provided by students in a new color on the chart paper. If students do not mention the use of satellites to help forecast, help students connect back to the discussion about satellites.</p> <p>Teacher will ask students to forecast what they believe the temperatures will be for the next five days. Have them use a color to mark that will be easily contrasted to what is normally used to indicate actual temperature. Have students check their forecasts for the next 5 days.</p>
<p>EXPLAIN</p>	<p>The teacher will bring up view NASA’s Eyes on the Earth application on the computer and project it onto the board. Have students help locate where they live on the Earth, then have students refer to their data to tell what the temperature is. Compare this to what the application is showing.</p> <p>The teacher will briefly describe the temperature legend on the screen that provides a key to the temperature based on the color. Have students then repeat back what colors tell us the location is hot, warm, cold.</p> <p>Teacher will ask probing question to students: “When you look at the Earth, is the temperature the same over the entire planet? Why do you think it is?” Have students Turn and Talk with a partner to discuss. Ask several partners to share. The teacher will ask each pair “How do you know?”</p> <p>The teacher will have students help locate other places on the</p>

	<p>Earth that have similar temperatures as their location. Have students explain how they determined this. Pick several locations to Google Earth and travel to. Have students describe similarities and differences they see at each new location.</p> <p>Students will create a Science/STEM journal entry (Title: Locations Similar in Temperature; Date: mm/dd/yy) and record a location that they found to be interesting that was similar to their own temperature. Describe what they found to be interesting.</p> <p>The teacher will then have students help locate places on Earth that have much different temperatures as their own location. Have students explain how they determined this. Pick several locations to Google Earth and travel to. Have students describe similarities and differences they see at each new location.</p> <p>Students will add on to their Science/STEM journal entry and title it Locations Different in Temperature and record a location that they found to be interesting that was different in their own temperature. Describe what they found to be interesting.</p> <p>Plickers Exit Ticket: Students will need to have their Plickers card to participate in the question and response. Bring up Plickers on the computer and select today's (pre-loaded) question. Project the question on the board. Teacher will read question: <i>"Which of the locations has a temperature most similar as the location shown?"</i> Students will select their answer using their card and teacher will scan their answers using smart phone with Plickers app running.</p>
<p>ELABORATE / EXTEND</p>	<p>Teacher will explain that "when we visit a doctor they check your vital signs which include temperature. When a car goes to a repair shop, they check the "vital signs" of the car too, such as tire pressure, oil level, brakes, etc. We have been talking about the Earth and it has vital signs too. We have talked about one of them - temperature." Advise students they will be working in groups to talk about other "vital signs" or types of data of Earth that we might want to measure in addition to temperature.</p> <p>Students will work in groups of three or four to compose ideas about what other data (or vital signs) they might want to know about different places on Earth and have a group member be the recorder.</p> <p>The teacher will then ask the groups to discuss why these types of data are important. Each group's recorder will write down the ideas.</p> <p>The teacher will pass out a piece of large construction paper or poster paper to each group. Students will put together a poster to explain the data that they would want to know about and why it is important. They can use a mixture of images and words.</p>

	<p>Student groups will then present their information to the class.</p> <p>The teacher will assess students using a Student Report rubric.</p>
EVALUATE	<p>This lesson will use both Formative and Summative Assessment in order to measure whether the lesson objectives have been met.</p> <p>Formative Assessments:</p> <ul style="list-style-type: none"> • Teacher observation • Checklists during group work • Turn and talk will be used where students will share their ideas with a partner. The teacher will be listening in on the conversations as they occur. • Exit Tickets: (1) Paper; (2) Online interactive <p>Summative Assessment:</p> <ul style="list-style-type: none"> • Student Report Rubric
RESOURCES AND REFERENCES	
<p>Cubbage, B. (2018). Exit Ticket: Satellite 1. [Blackline master]. Retrieved from https://drive.google.com/open?id=1NTXB_aEPX2LAJDYHK15g2pzO1LOeNVNG</p> <p>Cubbage, B. (2018). Observation Checklist [Blackline master]. Retrieved from https://drive.google.com/open?id=1KbH6DcB1fmJK7TzpONke6iXBEni7Thsk</p> <p>Cubbage, B. (2018). Plickers Image [Image file]. Retrieved from https://drive.google.com/open?id=1GS1b_rG0-trM_sNHerzRq6jjwfgAXcrZ</p> <p>Cubbage, B. (2018). Student Report Rubric [Blackline master]. Retrieved from https://drive.google.com/open?id=1GS1b_rG0-trM_sNHerzRq6jjwfgAXcrZ</p> <p>Google Earth [Website]. Retrieved from https://www.google.com/earth/</p> <p>NASA. (n.d.). About AQUA. [Image] Retrieved from https://aqua.nasa.gov/content/about-aqua</p> <p>NASA. (2018). Aqua Earth-observing satellite mission. Retrieved from https://aqua.nasa.gov/</p> <p>NASA. (2014). What is a satellite? Retrieved from https://www.nasa.gov/audience/forstudents/5-8/features/nasa-knows/what-is-a-satellite-58.html</p> <p>NASA Goddard. (2012). NASA Magnificent Eruption in Full HD. [Video] Retrieved from: https://www.youtube.com/watch?v=GrnGi-q6iWc</p> <p>Plickers [Website]. Retrieved from http://www.plickers.com</p> <p>Stockli, R. (2009). NASA Launches Aqua Satellite. [Video] Retrieved from https://archive.org/details/VE-VID-16076</p> <p>Teaching in Room 6. (2012). Calendar Math – Graphing. [Blackline master link]. Retrieved from https://drive.google.com/file/d/0B5-R28AdFXfobmk0Q0xkckdLd1U/view</p>	