

Grade: 5 th grade	Topic: The Sun is a star	Number of lessons: 5-6
Brief Lesson Description:		
<p>This series of lessons and investigations will be part of a 5th grade Earth and Space Science unit exploring Earth’s place in the Universe. Students will have already explored patterns of motion causing day and night, the apparent motion of the sun in the sky, and would have collected data about patterns in sunrise/sunset times. Prior to these lessons students will have discussed how different motions of objects in space result in predictable and observable patterns in data. The patterns explored are patterns observed from Earth (day/night, seasons, moon phases, seasonal changes in constellations) but all involve the sun and stars. So, in this series of lessons students will zoom away from earth and look out into space and focus on the sun as a star, why it looks so big and bright to us and how it compares in size, distance, and color to other stars. Data collected from various probes/satellites will be used to make observations and comparisons.</p>		
Performance Expectations and Goals:		
<p>Students should develop an understanding of the following:</p> <ol style="list-style-type: none"> 1. The sun is a star 2. The sun appears brighter and bigger because of its distance to earth 3. Stars vary in size, color, shape 4. Data collected from satellites and probes can provide invaluable data and understanding about natural objects in space 		
<p>Disciplinary Core Ideas: 5-ESS1-1 The sun is a star that appears larger and brighter than any other stars because it is closer. Stars range greatly in their distance from Earth.</p>	<p>Science & Engineering Practices: Identify the limitations of models. Make observations to produce data to serve as the basis for evidence for an explanation of a phenomenon.</p>	<p>Cross Cutting Concepts: Patterns can be used as evidence to support an explanation. Natural objects exist from the very small to the immensely large</p>
Background Information and skills already introduced:		
<p>Students have spent time taking about and exploring scientific patterns and using observable data from patterns to support claims. Students have worked collaboratively to collect data and share observations. Students have explored how the rotation of the earth results in predictable and observable patterns of day and night. Students have created a model of day and night.</p>		
NASA Resources Used:		
<p>Parker solar probe: https://blogs.nasa.gov/parkersolarprobe/</p> <p>Solar Orbiter: https://www.esa.int/Science_Exploration/Space_Science/Solar_Orbiter</p> <p>STEREO (Solar Terrestrial Relations Observatory): https://www.nasa.gov/mission_pages/stereo/mission/index.html</p>		

Lesson Plan:

ENGAGE: 1 class period

Objective: To introduce students to some of the amazing images of stars and to get students thinking about why they look different and what they have in common.

1. Students will observe [images](#) collected from various probes/satellites and make some initial observations and develop some questions. Note – there are some human made light sources presented to introduce that not every light in the sky is a star.
2. Students will discuss and then complete our [notice/wonder lab sheet](#) with a partner. Students are encouraged to list 5 things that they notice and 3 things that they wonder. Pictures of the images will be posted around the room to allow students to look closely and move throughout.
3. Guiding questions as teacher observes student conversations: What do all the images have in common? Are all the lights natural or are some human made? Are all the stars the same color/size/brightness? I wonder why?

EXPLORE: 2-3 class periods

Leading questions:

- Why do the stars look different?
- Why are some stars brighter?
- Why does our sun look so big compared to other stars?
- Why do we see our sun during the day but other stars at night?

1. Leading questions will be posted around the room.
2. After discussing the leading questions and providing time for small and large group discussions, students will focus in on the questions of why some stars seem brighter.
3. Students will work in pairs to complete [modified Kesler Exploration Stations](#). Students will have the freedom to choose the order in which they complete the stations with exception of
 - Watch It! Students will watch a [video](#) and answer questions
 - Read It! Students will read a short passage and answer questions
 - Explore It! Students will complete a short lab activity comparing the brightness of flashlights held at different distances. Included in this activity are [images taken by Hubble](#)
 - Research It! [NASA's Space Place](#) will be used to research the sun and stars
 - Organize It! (to be completed after at least 2 of the previous stations) Students will sort description cards into The Sun or Betelgeuse
 - Illustrate It! Students are asked to draw a model to show understanding – they will include Earth and three stars at different distances. They will label each star as least, more, and most luminous.
 - Write It! Students will be asked to complete 1 of 3 short answer questions
 - Assess It! Students will work together to complete 4 reflection questions

*Stations have been [color coded and laminated](#) to help students stay organized. The teacher

will act as a facilitator moving from group to group, listening and guiding when necessary. Students will have autonomy in which stations to complete first and how long to stay at each station. Multiple copies of each station have been prepared.

EXPLAIN:

-Students will be given the images from [the slides](#) and will glue them into their lab books then they will write in the facts/notes as we move through the discussion.

ELABORATE:

An introduction to constellations – for generations different cultures/peoples have been amazed by the night sky. Before technologies allowed us to collect data on stars, stories were created and passed down about the beautiful specks of light in the sky. Astrologists now use those 88 official constellations to help create maps in the sky. Although stars may appear close together when we look up at them – they may be very far apart.

Students will go to the [list of zodiac constellations](#) – Pick a constellation and scroll down to the Major Stars section. Record each star’s distance on the [data table](#). Are the stars close together? Which star do you predict would be the brightest?

Explore [images from Hubble](#)

EVALUATE:

Students will be evaluated throughout the lessons on:

- Class/small group discussion participation
- Focus and completion of stations
- [Probe](#)