

	<p>CCSS.ELA-LITERACY.RI.5.7</p> <p>Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.</p> <p>CCSS.ELA-LITERACY.SL.5.1</p> <p>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grade 5 topics and texts</i>, building on others' ideas and expressing their own clearly.</p> <p>CCSS.ELA-LITERACY.SL.5.3</p> <p>Summarize the points a speaker makes and explain how each claim is supported by reasons and evidence.</p>
Objectives	<ul style="list-style-type: none"> ● Students will be able to clearly explain why the Sun appears to be larger and brighter than the other stars, even if it is not when they are compared side by side. ● Students will be able to articulate what constellations are and why they are seen in predictable and observable patterns throughout the year. ● Students will be able to use print and digital sources to find answers to questions proposed by the teacher. ● Students will write, publish, and share clear narratives. ● Students will engage in productive talks with peers and the teacher.
Resources and Materials (Including Technology Integration)	<p>Lesson One Materials:</p> <ul style="list-style-type: none"> ● 2-3 balloons per group ● Round objects of various sizes (optional) ● String ● Photograph of the night sky that includes Sirius ● Electronic devices or information sheets about the size of Sirius if devices are not available ● Highlighters ● STEMscopedia article, "Observing the Stars" ● List of star distances from Earth (http://www.sciencekids.co.nz/sciencefacts/topten/closeststars.html) ● Blank paper ● Writing tools ● Small objects for use in a scaled model such as mini marshmallows,

beads, modeling clay, etc. (optional)

- Rulers

Lesson Two Materials:

- Constellation cards
- Word card set for partners that include these vocabulary words: *constellations, revolve (revolution), Earth, Sun, orbit*
- Lined paper

Lesson Three Materials:

- Variety of myth stories about the constellations
- 4 mil black plastic sheeting 20'x50'
- Utility tape
- 30 gallon trash bag
- Box fan
- Scissors
- Flashlight
- Sharpened pencils
- Devices or paper for writing a story

Technology Integration:

- Students will use technology in a variety of ways throughout the unit. Students will be encouraged to do their own research when questions are raised during some of the lessons. Students will also use technology to publish and share original narratives at the end of the unit.
- The teacher will use technology to print information for students as needed, look up and share images that pertain to the lessons, and show a video about constellations.

Resources:

Accelerate Learning. (n.d.). Explore 1 Activity: Star Model. Retrieved from <https://app.acceleratelearning.com/scopes/13691/elements/645621>.

Accelerate Learning. (n.d.). Up in the Wonderful Sky. Retrieved from <https://app.acceleratelearning.com/scopes/13695/elements/646382>.

APOD: 2004 March 4 - Cold Mountain Sky. (n.d.). Retrieved from <https://apod.nasa.gov/apod/ap040304.html>.

Inflatable Planetarium - Stories in the Sky Activity. (2018, August 6). Retrieved from <https://www.jpl.nasa.gov/edu/teach/activity/inflatable-planetarium/>.

Jones. (2019, August 26). {FREE} Printable Constellation Cards. Retrieved from

<https://simplelivingcreativelearning.com/constellation-montessori-inspired-3-part-cards/>.

	<p>Mitton, J., Balit, C., & Tirion, W. (2006). <i>Zoo in the sky: a book of animal constellations</i>. Washington, D.C.: National Geographic Society.</p> <p>Mitton, J., & Balit, C. (2009). <i>Once upon a starry night a book of constellations</i>. Washington, D.C.: National Geographic.</p> <p>NCTE/IRA. (2004). Rubric for a Narrative Writing Piece. Retrieved from http://www.readwritethink.org/files/resources/lesson_images/lesson116/NarrativeRubric.pdf</p> <p>Science Kids. (2018, December 20). Top Ten Lists: Closest Stars to Earth. Retrieved from http://www.sciencekids.co.nz/sciencefacts/topten/closeststars.html</p> <p>STEMscopedia: Observing the Stars. (n.d.). Retrieved from https://app.acceleratelearning.com/scopes/13691/elements/640712.</p> <p>Tonight's Sky. (n.d.). Retrieved from https://hubblesite.org/resource-gallery/learning-resources/tonights-sky.</p>
<p>Pre-Assessment/ Activating Background Knowledge</p>	<p>Before teaching the unit, pass out blank paper. On one side, ask students to brainstorm what they know about the night sky. On the other side, ask students to draw, in as much detail as they can, their best representation of the night sky. Once students have completed the assessment, the brainstorming and picture can be examined for knowledge or misconceptions of:</p> <ul style="list-style-type: none"> ● Star shapes, sizes, and colors ● Patterns of stars (constellations) ● Other objects visible at night such as planets, meteors, etc.
<p>Differentiation/ UDL Consideration</p>	<p>Lesson One--If students will be reading the STEMscopedia article on their own before discussing it, provide students who have difficulty reading with a digital copy. That way, they can use a text reader program. Alternatively, students could be paired so that a stronger reader would be able to read the article to those student partners who would struggle.</p> <p>Students could also pair up during the Explore stage for students who struggle with using electronic devices and conducting research due to cognitive impairments, severe spelling concerns, or visual impairments.</p> <p>In the Elaborate stage, Special Education students could be given a reduced number of stars to include in their models. The rounding could also be completed for the students, or they could just work with whole numbers as needed. If students have advanced skills, they could model more than the suggested number of stars.</p> <p>Lesson Two--In the Explain stage when students are asked to write a paragraph, provide struggling writers with sentence frames and a word bank to assist them. If the technology is available, students with physical disabilities could use talk to text</p>

	<p>When viewing the Tonight’s Sky video, use the closed captioning feature for students who are hearing impaired.</p> <p>Lesson Three--Students who struggle with writing may have the most difficulty with this lesson. Using a talk to text feature to record their narratives may be needed. Students with cognitive disabilities may also need to draw their star pattern and instead of crafting a story around their new constellation, just explain why they chose the design they did.</p>
<p>Preparing Students for the Lesson</p> <ul style="list-style-type: none"> ● Transitions ● Expected Behaviors 	<p>Before each lesson, students will be reminded of the following expectations for transitions and behaviors:</p> <ul style="list-style-type: none"> ● When working in partnerships, one student will be assigned as the materials manager. That student will be in charge of gathering and putting away any items needed for the class. The other partner will be the facilitator, making sure the team is keeping track of time and using an appropriate voice level. ● Partner activities are expected to be completed at a Voice Level 2--a quiet speaking voice. ● Individual activities are expected to be completed at a Voice Level 0--silence. ● During a group discussion, only the student with the microphone should be speaking. Students who wish to participate next should raise their hands and wait to be called upon. ● Transitions from one activity to the next are expected to be completed quickly and quietly. Side conversations are to be saved for a bathroom break or recess time.
<p>Daily Lessons and Activities</p>	<p>Lesson One--Comparing Star Sizes</p> <p>Engage: Pass out two balloons to each group. A student should blow up one balloon and leave the other deflated. Then, post a photograph from NASA (One example can be found at: https://apod.nasa.gov/apod/ap040304.html) that features Sirius as part of the night sky. Explain that this is a famous star because it is so bright when we look at it compared to the other stars around it. Ask students to imagine how its size compares to the size of what is truly our most famous star, the Sun. Explain that the balloon the groups have already inflated is a model of the Sun. After discussion, students should blow up the second balloon to a size they believe represents how the size of Sirius would compare to our Sun.</p> <p>Explore: After groups have made their initial models, invite students to log into their electronic devices and look on the internet to discover the accuracy of their models. Discuss how to tell whether or not an internet source is reliable. After a little digging, students should discover that Sirius is actually about twice the size of our Sun. Encourage students to consider</p>

how they might remake their models for accuracy. Students may find an object in the room that is appropriately sized or may need another balloon to get the sizing correct. If students are struggling to determine how to decide if an object is twice the size of another, show students how they can wrap string around the circumference of “Sirius” and then cut that string piece in half. If they have found an object that is half the size of Sirius, they should be able to wrap the string piece around its circumference once.

Explain: Have students share what they’ve discovered and why, if Sirius is so much bigger than the Sun, it looks so much smaller. As a class, perform a close reading of the article, “STEMscopedia: Observing the Stars.” Pass out highlighters so students can highlight information they find that helps to answer the proposed question. The article ends with two comprehension questions that students should be able to answer after reading the information and discussing it as a class.

Elaborate/Extend: Direct students to the following link, which lists the 10 closest stars to Earth:

<http://www.sciencekids.co.nz/sciencefacts/topten/closeststars.html>.

After explaining how to interpret lightyears, invite students to choose 4-5 stars from the list and create a scaled model to show the stars’ distances from Earth. Groups will need to determine how they will round the decimals and what would be an appropriate scale (cm, in, etc.). Scaled models could be simply drawn on paper, or objects such as beads, marshmallows, or clay could be used to represent the stars. As an extension, students could research the colors of each star they chose and include that detail as part of the model.

Evaluate: Provide students with the following scenario to connect what they are learning in this unit with their experience conducting scientific investigations:

Imagine you are an astronomer and you have just seen two different stars through your telescope. One looks a little bigger than the other. You are curious as to why this might be so. Write down the reasons you can think of as to why one star might look larger than another. Next, imagining you have access to any scientific equipment you need, design an investigation that would help determine which of your reasons was true.

Lesson Two--Constellations and Their Seasonal Patterns

Engage: Prior to the lesson, print off a set of constellation cards such as the ones from the following website:

<https://simplelivingcreativelearning.com/constellation-montessori-inspi>

[red-3-part-cards/](#)

Cover over the descriptions at the bottoms of the cards, and involve students in a guessing game to see if they can figure out what the constellation is representing. Reveal each answer after allowing guesses. To engage all students at once, consider having students write guesses on personal whiteboards or on an online consensus program such as Padlet.

Explore: Use the internet to determine when each constellation from the printed cards is most visible throughout the year. Have students hold the constellation cards in month order to form a circle around the classroom. Select a student to be the Sun at the middle of the room and another student to be the Earth. Have “Earth” demonstrate rotation and revolution. Discuss at which points during a rotation we on Earth can see the stars and why this is so. Students should recognize that during the day, the brightness of the Sun hides us from seeing any constellations that might be present.

Next, have the Earth revolve around the Sun. As the Earth makes its yearly journey, notice as a class which constellations we could see most clearly at different points of the year. Have students engage in a class-wide conversation throughout the demonstration about why all constellations wouldn’t be visible during all parts of the year.

Explain: Post the following prompt: Why are only certain constellations able to be seen at different times of the year? While the class has already discussed this question as a whole group, now partners will make sure they can explain it, too. Have students pair up and provide each team with a set of word cards. The word card set should include *constellations*, *revolve (revolution)*, *Earth*, *Sun*, *orbit*. Have students use the word cards to organize their thoughts and produce a scientific and specific explanation. Once students have discussed their ideas, students should return to their own seats and write a paragraph that responds to the posted prompt. They may use the word cards if needed to guide their writing or as reminders for what was discussed with their partners.

If you think students still have misconceptions, a final step could be taken in which students read their paragraphs to a different partner for feedback on their responses. Students are encouraged to make any necessary changes during this time.

Elaborate/Extend: Visit

<https://hubblesite.org/resource-gallery/learning-resources/tonights-sky> for a short video about the constellations present in the night sky during

the given month you are teaching the unit. The video includes the background on why the constellations were named as they were and zooms in on some galaxies and other points of interest that can also be seen in the night sky.

Conduct a group discussion about what might be seen in the night sky if constellations were to be named today. Would people still see animals and mythical creatures or are there other things important in our culture today that might be included?

Evaluate: Use the paragraphs written during the explain stage for evaluation of student understanding for this lesson.

Lesson Three--Constellations Literature Connection

Engage: Read students a book about the myths behind the constellations. Two recommended stories by Jacqueline Mitton would be: **Zoo in the Sky: A Book of Animal Constellations** or **Once Upon a Starry Night: A Book of Constellations**.

Explore: Pass out blank star charts or a picture of the night sky to the class. Encourage students to look at the stars and create their own constellations. Each student should connect the stars on the chart or photograph they have been given to show their idea. Students should share with neighbors what image they saw in the stars and why they chose it.

Explain: After all students have chosen a constellation, explain that they will be crafting a narrative to explain how that object came to be in the sky. Refer to the stories by Jacqueline Mitton as samples. Students are not writing an explanatory essay about why they picked the object; they are creating myths to explain why the constellation is there.

Review the parts of a story--the beginning, middle, and end, along with character development, creating a problem, and finding a solution. Use the English Language Arts materials available at your school to review key elements and help students create drafts of their stories. Depending on the time you wish to take for this activity, students may be crafting short stories, or full-length narratives. The narratives could also be written or typed, and accompanied by clip art or drawings as desired.

Elaborate/Extend: Using the Jet Propulsion Laboratory lesson plan "Inflatable Planetarium--Stories in the Sky," <https://www.jpl.nasa.gov/edu/teach/activity/inflatable-planetarium/>, plan a "planetarium trip" for your class. Students will have already created

	<p>their own constellations and corresponding stories, differing from suggested directions, but the lesson plan can be used to create the planetarium experience itself.</p> <p>Evaluate: Using rubrics, have students grade themselves on the success of their stories and then give them your own grade. A suggested rubric by Read, Write, Think is provided here: http://www.readwritethink.org/files/resources/lesson_images/lesson116/NarrativeRubric.pdf or your school may have a rubric already in place. Wrap up the lesson by having a publishing party where students can enjoy listening to each others' stories during class.</p> <p>Post-Assessment</p> <p>Pass out the drawings students completed at the beginning of the unit. Have students look at their brainstorming and using a different writing tool than at the beginning, cross out any facts they thought they knew that turned out to be untrue. Using that tool, they should also add on to any information they have learned more about and add new thoughts to the list based on what they learned during the unit.</p> <p>Have students also examine the drawing side of their pre-assessment and write a brief statement on whether or not the drawing is accurate based on the unit objectives. If they spot inaccuracies, students should include how they would fix them. Alternatively, instead of writing this response, students could be asked to draw a new picture with accurate details from the unit.</p>
<p>Summarize: Evaluate/Reflect</p>	<p>While the first two lessons are fairly straightforward, the challenge for Lesson Three would be ensuring the success of the inflatable planetarium. Having access to the gymnasium for the purposes of making and testing the planetarium and then having your class come and use it could be quite a scheduling challenge. Finding adult volunteers available at the needed times could also be difficult. An alternative plan if the challenges proved to be too difficult would be to have students punch out their constellation designs into black paper and in a darkened room, display the papers in front of small light sources.</p>

Attached resource:
STEMscopedia article for Lesson One

Observing the Stars

Reflect

Think about the night sky. What can you see? Stars might be one of the first things to come to mind. There are too many stars for scientists to count them all. There are probably billions and billions of stars in the universe.

Looking at the stars in the night sky, sometimes it is difficult to tell which ones are closer to Earth and which ones are farther away. Sometimes it is easy to forget the closest star to Earth, because it is only visible during the day—the Sun.

Why does the Sun look so different from other stars in the sky? Is it so much bigger or so much brighter? What do you think?



A *star* is an object in the sky made of hot gases—so hot that they glow with light!

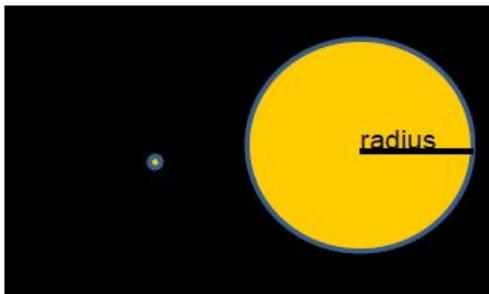
The Sun is so big and bright because it is so much closer to Earth than any other star in the universe.



Look Out!

Size and Distance

Scientists often describe a star's size by comparing it to the size of the Sun. The **radius** of the Sun is the distance between the middle of the Sun and its edge. The Sun's radius is called 1 solar radius. A star with a measurement of 0.75 solar radius is three-fourths the size of the Sun.

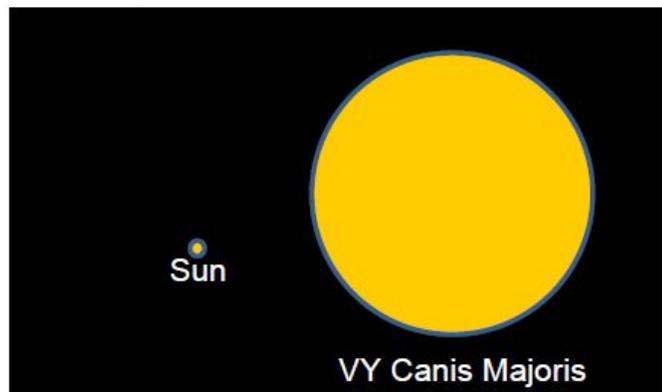


radius - the distance from the center of a sphere to its surface

The size of stars can appear larger if they are closer to Earth than other stars. Although the Sun appears much larger than the stars we see at night, it is not the largest star. The farther away a star is from Earth, the smaller it will appear. A star that is very far away from Earth will appear dimmer than a star that is closer to Earth. This is true even though the farther star may actually be the brighter star. The Sun is the closest star to Earth, which makes it appear to be the largest and the brightest.

Look Out!

It is easy to think of our Sun as being a really big star, because it is so big compared to Earth. Also, it *seems* so much bigger than all the other stars in the sky. Actually, our Sun is a medium-sized star. The picture below shows the size of our Sun compared to one of the largest stars, VY Canis Majoris (if you could put them side by side). You can see that our Sun is not nearly as large as it appears when we are looking at it from here on Earth. The Sun looks so much larger because it is so much closer to us than VY Canis Majoris.



Because stars are so far apart, we have a special unit of distance we use to measure them. The distance of a star from Earth is measured in light-years. A **light-year** is equal to the distance that light travels (through space) in 1 year. A light-year is equal to about 5,878,499,810,000 miles, or 9,500,000,000,000 km. Can you see why it is easier to measure in light-years? A light-year is huge!

What is a light-year?

It is the distance light can travel, when moving in a straight line, in 1 year. The universe is so big that distances are easier to measure in light-years.

	The Sun	VY Canis Majoris
Distance to Earth	149,600,000 km (0.1496 billion km)	~ 4,900 light-years (46,550,000 billion km)
Solar Radius	1 solar radius	> 1,800 solar radii

What Do You Think?

Look at the table below, which shows information about four different stars. Use the table to answer the questions that follow.

Star	Distance in Light-Years
Sirius	8.6
Alpha Centauri	4.3
Betelgeuse	1,400
Achernar	69

- Which star looks the brightest from Earth? How do you know?
- Rank the stars in order from brightest to dimmest when viewed from Earth. How did you figure out the order?