Lesson 1.6

The Brightness of Starlight
The Investigation Question, *If stars are all around us, why can’t we always see them?*, continues to guide the activities of this lesson. To begin, students use the Think-Write-Pair-Share routine to discuss their ideas about the size and distance of the sun and other stars from Earth and the apparent brightness of the stars we see. Students reflect on the idea that objects look smaller and less bright when they are farther away and apply this idea to what the stars look like from Earth. Students return to *Handbook of Stars and Constellations* and watch a video to learn why stars aren’t visible during daytime. Finally, students are introduced to the Word Relationships routine and make sentences about concepts covered in the unit so far. The purpose of this lesson is for students to construct an understanding of the impact of the sun’s brightness on our ability to see stars during the daytime.

**Anchor Phenomenon:** Different sections of an ancient artifact show what the sky looked like from one location and depict different stars.  
**Everyday Phenomenon:** There are stars all around us, but we cannot always see them.

**Students learn:**

- The sun looks bigger and brighter because it is much closer to Earth than other stars.
- The sun is the only star we can see in the daytime because the sun looks so bright.
- Evidence is information that supports an answer to a question.
Returning to the Reference Book

Students read a section of *Handbook of Stars and Constellations* so they can understand why most stars are not visible during the daytime.

Instructional Guide

1. Refer to the previous activity.

   We know that our star, the sun, looks bigger and brighter than other stars because it’s so much closer to Earth, but we still haven’t answered our question about why we don’t see other stars in daytime. What ideas do you have about this?
   [Accept all responses.]

2. Encourage students to support their answers.

   When scientists answer a science question, they use evidence, which is information that supports or proves their answers. Information from investigations, ideas from texts, digital models (the Sim), and physical models are some examples of sources that make good evidence. The more evidence a scientist has, the more confident other people will be that the answer is correct. If there is little or no evidence to support an answer, it will be difficult for other people to believe that the answer is correct.

3. Provide an example of multiple sources of evidence. Write “What is the closest star to Earth?” on the board. Call on a student to answer the question. [The sun.] Ask the class to give you some sources for evidence that support this answer. If students do not bring them up, remind them of the following sources:

   • **Book**: Students read in *How Big Is Big? How Far Is Far?* (page 19) that the sun is the closest star to Earth and that it is much closer than any other stars.
   
   • **Sim**: Students observed in the Sim that the sun is the closest star to Earth.

   • **Physical models**: The classroom models (Great Square of Pegasus and Earth/Sun/Sirius Size and Distance) supported the idea that the sun is the closest star to Earth.
4. Designate pairs and distribute one *Handbook of Stars and Constellations* to each pair. Have students turn to Contents (page 3).

If I wanted to use this book to help me to figure out whether the sun being so near to Earth has something to do with why we can’t always see other stars, which section should I read? [The Sun, a Special Star, on page 6.]

5. Have pairs turn to and read The Sun, a Special Star, on page 6. Encourage students to use the reading strategy of visualizing to help them understand what they are reading.

As you read the section on page 6, look at the photograph of the sun and visualize, or make a picture in your mind, to help you understand why it is not always possible to see other stars.

6. Students reflect on and discuss Handbook reading. Call on students to share any new ideas, based on what they read.

Many of you said that the reason we can’t see other stars during the daytime is because the light from the sun overwhelms the light from all other stars. What does that mean? [Accept all responses, but announce that they will see a video that demonstrates the idea.]

Teacher Support

Background

Science Note: Why Stars Are Not Visible During Daytime

During the daytime, stars other than the sun are not visible. This is due to the bright light of the sun being scattered within the atmosphere. Because the light of the sun is scattered throughout the atmosphere, the stars cannot be seen, whereas on a clear night, we can see through the atmosphere and observe the stars. A common misconception is that the stars are not visible during the daytime because the sun blocks them from view by coming between them and the observer, but in fact, the sun only physically blocks stars in the small portion of the sky (where the disc of the sun is currently located), and it is scattered light that blocks the vast majority of stars. In this unit, we talk about the stars not being visible during the day because the sun overwhelms their light, which give students a sense of the stars’ visibility being dependent on the presence or absence of the sun in the sky, without including details of atmospheric physics.

Instructional Suggestion

Supporting Discussions: Suggested Strategies

As you lead this discussion, keep in mind the following tips:

- Redirect comments or questions that are directed to you by asking other students to respond.
Instructional Suggestion

Providing More Experience: Informational Text

A major goal of this program is to deepen students’ awareness of and experience with the genres of science text that they are likely to encounter in school and in their lives outside of school. The student books and related investigations in this program are designed to provide supportive instruction around informational text. Depending on the level of experience your students have with different genres of text, you may wish to spend more time or less time discussing the how to find information in *Handbook of Stars and Constellations*. You may need to model for students how using the index, titles, and headings helps you find the information you are seeking.

- Elicit additional information by asking questions:
  - *What’s your evidence?*
  - *Do you have evidence that can help you answer that question?*
  - *Does anyone else have evidence that will help us understand this?*

- When asking open-ended questions, try not to answer students’ questions or confirm or deny students’ explanations so you keep the discussion going.

- Allow questions to remain unresolved if students don’t yet know enough to discover the answers for themselves.

- Point out resources on the classroom wall that can help students use scientific language.

- Model the use of scientific language by repeating students’ comments or questions, but incorporate scientific terms.
Returning to the Reference Book

Students read a section of Handbook of Stars and Constellations so they can understand why most stars are not visible during the daytime.

Instructional Guide

1. Refer to the previous activity.

¿Sabemos que nuestra estrella, el sol, se ve más grande y más brillante que otras estrellas porque está mucho más cerca de la Tierra, pero aún no hemos respondido nuestra pregunta sobre por qué no vemos otras estrellas en las horas diurnas. ¿Qué ideas tienen sobre esto? [Acepta todas las respuestas].

2. Encourage students to support their answers.

Cuando los científicos responden una pregunta científica, usan evidencia, lo cual es información que respalda o comprueba sus respuestas. La información de las investigaciones, ideas de textos, modelos digitales (la Simulación) y modelos físicos son algunos ejemplos de fuentes que nos dan buena evidencia. Mientras más evidencia tiene un científico, más convencidas estarán otras personas de que la respuesta es correcta. Si hay poca o ninguna evidencia para respaldar una respuesta, será difícil que otras personas crean que la respuesta es correcta.

3. Provide an example of multiple sources of evidence. Write “What is the closest star to Earth?” on the board. Call on a student to answer the question. [The sun.] Ask the class to give you some sources for evidence that support this answer. If students do not bring them up, remind them of the following sources:

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