

Why Are the Stars Disappearing?



Welcome to NSTA's Daily Do

Teachers and families across the country are facing a new reality of providing opportunities for students to **do** science through distance and home learning. The **Daily Do** is one of the ways NSTA is supporting teachers and families with this endeavor. Each weekday, NSTA will share a sensemaking task teachers and families can use to engage their students in authentic, relevant science learning. We encourage families to make time for family science learning (science is a social process!) and are dedicated to helping students and their families find balance between learning science and the day-to-day responsibilities they have to stay healthy and safe.

What is Sensemaking?

Sensemaking is actively trying to figure out how the world works (science) or how to design solutions to problems (engineering). Students **do** science and engineering through the science and engineering practices. Engaging in these practices necessitates students be part of a learning community to be able to share ideas, evaluate competing ideas, give and receive critique, and reach consensus. Whether this community of learners is made up of classmates or family members, students and adults build and refine science and engineering knowledge together.

Introduction

Today's task, *Why are the stars disappearing?*, creates an opportunity for students to look at examples of how what we are able to see in the night sky (planets, stars, nebulae, etc.) depends on the amount of light present from human activities on Earth. Students engage in science and engineering practices to figure out why the stars seem to be disappearing from the night sky.

This task has been designed in order to be used by students, parents, and teachers in distance and home learning. While students could complete this task independently, we encourage students to work virtually with peers or in the home with family members.

Presentation of Phenomena (What am I exploring today?)

There are many observable objects in the night sky. However, in many places, it seems like the stars are disappearing. In today's Daily Do, we explore the effect light from human activities (known as *artificial light*) has on our ability to see objects in the night sky.

Guidance: The goal is to get students thinking about what can and can not be seen in the night sky. Presenting a phenomenon and asking students to generate questions about it creates a **need** to figure out the answer to those questions. This is authentic engagement and a powerful learning process (unlike "learning about" light pollution by just telling students it exists).

Experiencing the Phenomenon:

Have students observe the first picture, the Golden Gate Bridge at night (below). Ask students what they notice. Our goal here is to promote careful observation of the picture, not being able to identify or know things about this specific landmark. Next, show them the second picture, which is the Golden Gate Bridge with less artificial light. Again, ask students to make careful observations about what they see. Then show the pictures side by side and have students document any questions they have about the differences they see in the two pictures. ALL student questions are okay at this point. Our goal is to motivate curiosity and not distinguish between "good questions" and "bad questions" or "right questions" and "wrong questions". Common questions will arise for most students, which is what this task builds on.





Investigative Questions (What questions do I have about what I just saw?)

Investigative questions are common questions kids may ask after they are introduced to the phenomenon. Although questions may vary, many students are curious about why there is such a difference in the night sky.

Guidance: It is important to allow time for thinking. Many students have ideas and questions but need time to formulate them into words. Some students may also benefit from writing things down before they share. As adults, we may be tempted to give them questions we feel might be important to explore, however, we need to refrain from this and allow our students to practice asking their own questions. Our goal here is for students to consider all of the different factors they may have noticed before but never really thought about.

Common Questions:

- Are the stars disappearing?
- Are they just not out yet in the first picture?
- Why can we see so many more stars when the sky is darker?
- If it is night, shouldn't we always be able to see the same things?
- Why does one sky look more gray and the other looks darker?
- Is this picture real?
- Do the lights from the town light up the sky even way up?

We want to focus on one question in particular at this point:

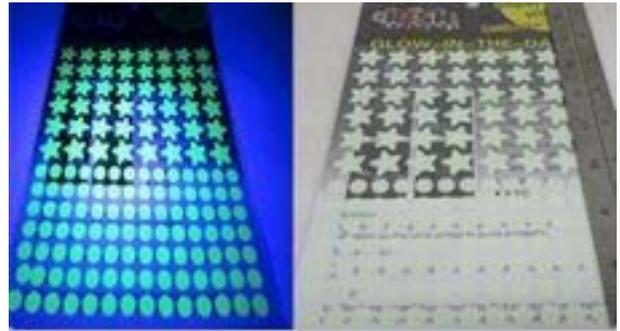
- Are the stars disappearing?
- Are they just not out yet in the first picture?
- **Why can we see so many more stars when the sky is darker?**
- If it is night, shouldn't we always be able to see the same things?
- Why does one sky look more gray and the other looks darker?

- Is this picture real?
- Do the lights from the town light up the sky even way up?

Guidance: Depending on where students live and prior experiences they may or may not be familiar with all of the objects that can be seen in the night sky. If students have limited experience with the night sky consider taking some time to explore celestial bodies and make some observations about what can be seen in a night sky with little to no artificial light.

Conducting an Investigation

Have students investigate how well they can see glowing objects in various amounts of light. This can be done in several different ways depending on what resources you have available. Some examples of this activity include making observations of glow-in-the-dark objects and/or glow sticks in bright light, dim light, and in the dark. This can also be done with a light box by placing the glow in the dark items in a box and making observations with the lid off (full light) with the lid on, but with a cut-out "door" open allowing some light in, then with the cut-out door closed no light.



Guidance on creating the light box: Take a shoebox with a removable lid (or similar). Line the inside of the box and lid with white paper. Add white glow in the dark stickers (like the ones pictured) around the sides, bottom, and inside lid of the box. Cut an eye hole in the center of one end of the box. Cut a door (flap) on the opposite end to allow light into the box when open. In the example below, this door is on the side of the box near the end opposite the eye hole. Before doing this investigation, allow the stickers to absorb light by placing the boxes under bright lights or sunlight.

As students investigate what they can and can not see in various light, have them document their observations.

Guidance: It is not necessary (at this time) for students to figure out everything about the why they can or can not see the stars. This activity is meant to get students thinking about how artificial light affects the night sky, where this light comes from, and the effect this light might have on organisms that live outside.



Building Understanding - Leading to More Questions

After the investigation, have students share out their observations during a whole group discussion. Students should conclude that they could see the "stars" best when there is no light entering the box. But what does this mean? Why might figuring out this information be important?

Prompt students to think about how artificial light might affect us and other things around us. Have students take a few minutes in the "alone zone" to think about the question, "**Does having too much light at night affect more than just our ability to see the night sky?**" Have students share their ideas with a partner, and then with the class. Depending on where students live, their ideas will vary, however, shared ideas may include:

- Too much light could make it confusing for pilots landing planes.
- It might help animals that hunt at night.
- Too much light could keep people awake.
- It could keep scientists from seeing things in space.
- I don't think it makes a difference, but seeing the stars are cool.

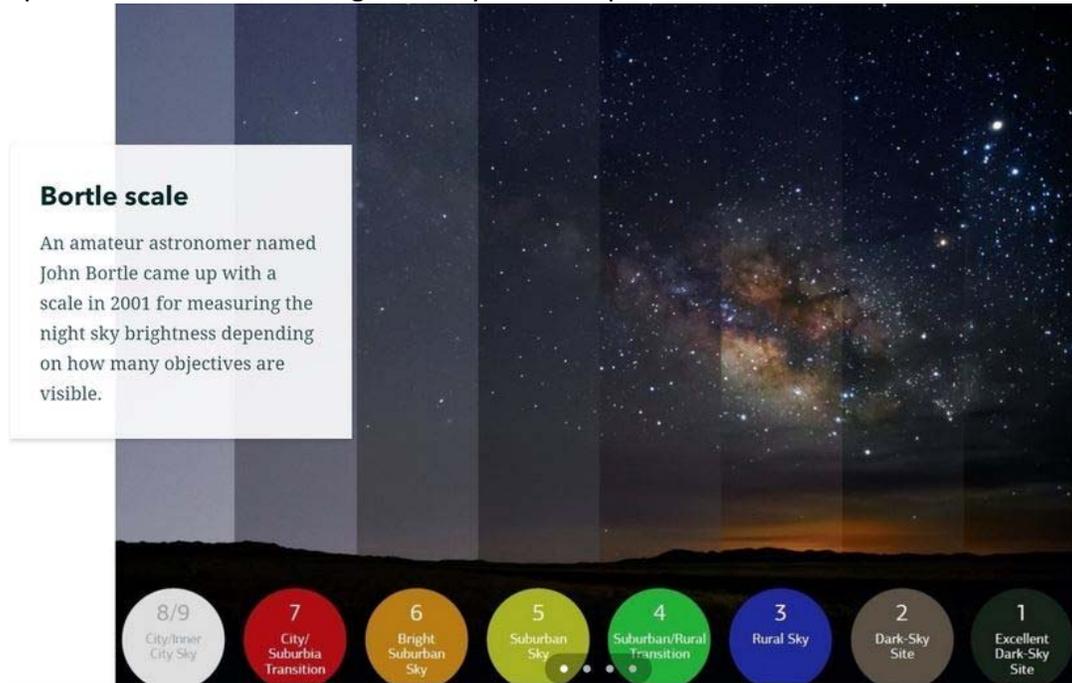
Next, have them brainstorm ideas about the following questions in small groups:

- Where does all the light come from?
- Do all places have this much light at night?
- Could this light have an effect on organisms that live outside?

Have students share their ideas around the questions. At this point, students have a lot of different ideas about where the light comes from and the effects it could have on organisms that live

outside. They also think that not all places have a lot of light during the night.

Next, show students the graphic below of the Bortle scale. Explain that what they have been investigating is called light pollution and it can be measured using the scale below. Tell students that light pollution has increased significantly over the past few decades.



Researching Light Pollution

Students have figured out that we see the night sky differently depending on how much light is in the area. Light pollution is something that affects cities and other areas where there is a lot of light. However, students are not sure if all this light really affects anything besides our ability to see the stars.

Ask students to read the article [Light Pollution - Is Light Out of Place.](#)

Guidance: If you are using this article for middle school you may want to assign it in sections. There are also some sections that you may want to skip as they are geared more for high school (for example, the chart that explains the different colors on the map and the section that deals with the production of melatonin) or you might need to spend some extra time helping students understand the information presented. For high school students, this article could be read individually, in sections, or in groups round-robin style.

Developing Explanations

When students are finished reading, have them work in small groups to create a poster to answer the lesson question, "Why are the stars disappearing?", to explain the different ways light pollution affects the environment and the organisms that live there. Students should explain that the stars are not actually disappearing but our ability to see the stars is being altered by light pollution. Students

should also include other factors they figured out about how light pollution occurs and how it affects humans and other living things.

Assessment Opportunity: When students are finished have them share their posters during a gallery walk. Use this as an opportunity for students to give peer feedback to other groups.

NSTA Collection of Resources Today's Daily Do

NSTA has created a [Why are the stars disappearing?](#) resource collection to support teachers and families using this task. If you're an NSTA member, you can add this collection to your library by clicking **Add to my library** (located near top of page).

Check Out Previous Daily Dos from NSTA

The NSTA Daily Do is an open educational resource (OER) and can be used by educators and families providing students distance and home science learning. Access the [entire collection of NSTA Daily Dos](#).