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# LESSON PLAN

## THE SUN AND OTHER STARS

## GRADES 3-5

### SUMMARY

The focus of this lesson is on the appearance of stars based on their size and distance from Earth. Central to this concept is recognizing our sun is a star as well. Students begin to comprehend the vast scale of the universe by comparing the brightness and sizes of stars in the night sky to our sun.

### DURATION

One clear dark evening preceding the lesson, two 45-minute classroom periods, one clear dark evening after the lesson.

### PRE-ASSESSMENT QUESTIONS

Please see Discussion Questions located under the video. These can be discussed as a group or answered individually in student science notebooks.

### MATERIALS

- Dark, clear night
- Two identical paper plates
- A long hallway
- Tape measure
- Science notebooks
- Pencils

**DIY Activity**

- Two sheets of paper
- Scissors
- Constellation charts PDF file (below video)
- Printer

### ENGAGE

Arrange a stargazing event for students and parents on a clear, dark night. You could bring in a local astronomy club or simply look for identifiable constellations such as the Big Dipper or Southern Cross (depending on which hemisphere you live in). If this is not possible, send the following note home with students several days or weeks prior to the lesson:

*Dear Parents,*

*Our class is studying the sun and other stars. To kick off the lesson, it would help if all students could have the opportunity to observe at least one constellation (a group of stars that forms a recognizable shape). For this activity our focus will be*

*on what some people call the Big Dipper (Northern Hemisphere) or Southern Cross (Southern Hemisphere). You may have heard it called other names. If so, please explain this to your child, to share in class.*

*Since school takes place during the day, we hope that you will help your child in his/her observations of the night sky. The following instructions will help you to locate the constellation in the night sky. Your child should observe the stars and make as accurate a sketch as possible showing the arrangement of the stars in the constellation, and other nearby stars and their relative size and/or brightness.*

***BIG DIPPER***

1. *Find a dark area from which to view the night sky.*
2. *Look to the northern part of the sky. If its spring or summer look high in the northern sky. If its fall or winter look closer to the horizon.*
3. *Look for seven relatively bright stars that form the shape of a dipper or ladle. Four stars form a bowl and three more form the handle.*
4. *If you would like to try to locate the North Star, follow the line formed by the two stars that form the part of the ladle that would be used to scoop. These point directly to a bright star called Polaris, or the North Star.*
5. *If you would like to try to locate the little dipper, find the North Star and then look around it—Polaris is the last star in the Little Dipper's handle.*

***SOUTHERN CROSS***

1. *The Southern Cross or Crux constellation is a group of 4 bright stars that form a kite like shape. There are also two other stars nearby that serve as pointers—follow them to the Southern Cross.*
2. *Look to the South from any location in the Southern Hemisphere and the Southern Cross should be visible. It is fairly high in the sky during late summer and early fall.*

*Thank you for your assistance in our lesson! Your child will soon be ready to report back about how this activity ties in to what they are learning about the Earth's place in our Universe.*

## EXPLORE

After all students have had a chance to view the relative size and brightness of stars in the night sky and record their observations, gather the class (with their drawings) and ask them to discuss what they saw. Gently guide the conversation toward the varying brightness of the different stars they saw.

Ask students:

- Did all the stars in the constellation have the same brightness? (No)
- Did all the stars in the sky appear to be the same brightness? (No)
- What might be causing some stars to appear brighter than others?
  (Possible answers include size, distance, or what they are made out of.)

Guide the conversation toward size. Ask students, how can two objects of the same size can *appear* to be different sizes? For example, what if you had two objects (show students two paper plates) and a long hallway? How might you demonstrate how size is affected by distance? Take the class to the hallway and explore how large the plates appear at various distances from the students.

## EXPLAIN

### WATCH THE *GENERATION GENIUS SUN AND OTHER STARS* VIDEO AS A GROUP

Then facilitate a conversation using the Discussion Questions.

## ELABORATE

Students now have an understanding that our sun is a star and is much closer to Earth than other stars. It therefore appears much larger and brighter. To connect their understanding about stars to what they have or are learning about Earth's rotation and orbit, use the DIY Activity for each student to create their own planisphere just like Zoë's from the video. At home, encourage students to use their planisphere with their parents to help them locate constellations that can only be seen at certain times of year in the night sky (the Big Dipper or Southern Cross are nearly always visible).

## EVALUATE

In their science notebooks have students individually finish CER (claim, evidence, reasoning) charts using evidence from the demonstration they took part in during the Explore portion of the lesson.

| **Claim** | **Evidence (the evidence gathered)** | **Reasoning (why you think the claim is correct based on the evidence)** |
|---|---|---|
| Some stars appear bigger and brighter than others due to their relative distances from Earth. | | |

| **Claim** | **Evidence** | **Reasoning** |
|---|---|---|
| Some stars appear brighter than others due to their relative distances from Earth. | *When two identical paper plates were held at two different distances the closer plate appeared to be larger than the plate further away.* | *The plates and hallway served as a model representing two stars of the same size. Though the two paper plates were known to be the same size, the one closer to the students appeared much larger than the plate at the end of the hallway.* |

## EXTENSIONS

Attempt to build a scale model of two stars (like the Sun, which is about 93 million miles, or 0.00001581 light years away, and Alpha Centauri, the next closest star to Earth which is about 4.83 light years away) using the two paper plates. This will help the students start to comprehend the immensity of the distances in the universe.