Starry Universe — Leader Guide

Description: Learners discover that the stars look uniform as seen from a distance.

Background: When we look at the night sky with the unaided eye, we mostly see stars in our galaxy, the Milky Way. The stars appear to be unevenly distributed. The National Science Standards call for learners to understand the nature of stars in our universe. Learners will discover that stars appear to be unevenly dispersed and have unequal brightness. But, as the distance from the observer to the stars increases, they appear to be more uniform. In this activity, learners will not only be working with a model of stars in the universe, but will also be modeling the work of scientists. It is important that you continue your role of asking questions, even though it is sometimes easier to give answers, as they work through this activity.

National Science Standards[1]

3-5 Nature of Science

Understands the nature of scientific inquiry

Plans and conducts simple investigations

K-2 Earth and Space Sciences

Understands the composition and structure of the universe and the Earth's place in it

Knows that the stars are innumerable, unevenly dispersed, and of unequal brightness

3-5 Earth and Space Sciences

Understands the composition and structure of the universe and the Earth's place in it

Knows that astronomical objects in space are massive in size and are separated from one another by vast distances (e.g., many stars are more massive than our Sun but so distant they look like points of light)

[1]Kendall, J.S. & Marzano, R.J. (2000). *Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education.* (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Materials

For each group:

- "Star Sheet" (preferably a color printout to reveal color differences among stars)
- Meter sticks for measuring distance between observer and partner
- Write-On Sheet, "Starry Universe"

Alternative Strategy

Instead of the Star Sheet provided, use images of constellations. Students can see the patterns come and go as they move forward and back during the activity. Links to Web sites with visuals of constellations are provided in the list of resources below.

Procedure:

1. Divide the learners into teams of two. Distribute materials and the Write-On Sheet, "Starry Universe" and "Star Sheet" to each team.

2. Ask learners to describe the image on the "Star Sheet" in their own words. Ask them to describe the brightness of the stars, the colors they see, and whether or not the stars are evenly spaced on the picture. (Check to see that learners have answered the first question on the Write-On Sheet before moving to the next procedure.)

3. Have one partner hold the sheet so that the other partner can see it. Tell the first partner to move away from the picture until he/she can no longer see different colors among the stars pictured. Measure this distance between the two partners and record on the board. Older learners can measure and record the distance on the Write-On Sheet.

Leader Tip

To provide an area with the distance required for this activity, it may be necessary to go outside or into a long hallway. Also, the leader could ask individuals to count the stars when they're standing close to the chart, as well as when they start moving back. This would help identify the point at which the stars become blurry for the participants.

4. Ask learners to repeat the process in step 3, and this time, the first partner should stop moving away from the picture when he/she can no longer see the stars at all.

5. Have the partners reverse roles and repeat this procedure.

6. Ask learners to describe how the image appeared differently as they moved away from it. Ask them to relate this to stars in the sky. How do stars that are closer to us appear? (Learners may suggest unevenly spread, visible or brighter.) How do stars that are farther away from us appear? (Learners may say that they are more evenly spread, dimmer or not visible at all.)

7. Ask learners whether they think that the stars are larger or smaller than our Sun. (Most learners will say that the stars are smaller since they appear as points of light in the night sky. Actually many stars are larger than our Sun which is a medium-sized star.)

This activity was adapted for Community Quest from an activity in the Genesis education module *Cosmic Chemistry: Cosmogony* found at: http://www.genesismission.org/educate/scimodule/Cosmogony.html

Resources for Extension and Enrichment Activities

http://amazing-space.stsci.edu/resources/explorations/light/
"Star Light, Star Bright" is an informative and interactive Web site where upper-elementary-aged learners can find out about the light, color, heat and wavelengths of stars.

http://domeofthesky.com/foyer.html
The Dome of the Sky is a virtual planetarium. Learners select a latitude and date to see a representation of visible stars. Explore the stars and constellations simply by clicking your mouse.

http://starchild.gsfc.nasa.gov/docs/StarChild/StarChild.html
"Star Child" is a NASA-sponsored Web site that features information, a variety of educational activities and interactive games that are appropriate for elementary-aged students.

http://starchild.gsfc.nasa.gov/docs/StarChild/universe_level2/javascript/star_art.html
In ancient history, various cultures created stories about patterns of stars seen in the sky. In this activity, learners are introduced to the stories about people and animals perceived among the stars. Then, participants are challenged to match the story with the "Star Art."

http://www.allthesky.com/constellations/const.html
Wonderful digital images of constellations. Click on "draw lines" and the outline of the constellation is displayed. Constellation images could be used in "Starry Universe" activity.

http://www.astro.wisc.edu/~dolan/constellations/constellations.html
This Web site features lists of stars and their characteristics (i.e. distance, magnitude), and interactive star charts with constellation lines and names.

http://www.lowell.edu/Public/Starlab/StarlabSupp.html
The Starlab Web site offers a variety of educational activities that tap into several different content areas, from creating and naming your own constellation, to applying a mathematical formula to estimate the number of visible stars in the sky, to sending an intergallactic postcard complete with each learner's gallactic address.

http://www.richlandclicks.org/Teacher/connections/grade4/star_frames.htm
A fun activity developed by an elementary school teacher in which students use glow-in-the-dark paint, plastic wrap and a wire hanger to create a visual of their favorite constellation.