



FACILITATOR GUIDE

Big Sun, Small Moon

Learning objectives

This activity explores the following ideas:

- We can see a solar eclipse from Earth because the Sun and Moon appear to be the same size in the sky.
- The further away an object is, the smaller it appears.
- NASA researchers learn new things by studying the Sun during a total solar eclipse.

Materials

- Tennis ball
- Beach ball
- Pump
- Solar Eclipse poster
- Activity and facilitator guides

The Explore Science toolkit comes complete with all necessary materials for this activity. Materials are also readily available to create or restock activity kits. The balls used in this activity are available online or at discount stores. Graphic files (including the poster) can be downloaded from www.nisenet.org.

Notes to the presenter

Be sure your beach ball is fully inflated before doing this activity.

While you can place the larger beach ball on the table and have participants walk the smaller ball away, visitors will benefit from the help of a friend in this activity. Encourage guests who arrive alone to work with another person. The two people can move away from each other and take turns holding the different balls.

The concepts in this activity are appropriate for all ages. Even younger participants may have noticed that the size of things seems to change depending on how far away you are. Introduce visitors to the concept of *apparent size* by asking if anyone has ever looked at a building from far away. Did the structure look large or small? Did the building appear to get smaller or larger as they moved toward it? Participants may also be familiar with the use of *forced perspective* in photography to make objects appear smaller or larger than they really are—just like the photo in the guide.

Additional materials and resources related to the 2017 solar eclipse are available in the Event Planning and Promotional Guide and in the Eclipse Planning mini-kit included in the toolkit. This resource package is also available for download from www.nisenet.org.

Important note: The balls in this activity are NOT to scale and do not represent a size or distance comparison between the Moon and the Sun.

Difficult concepts

With this activity, it's important to reinforce the idea that these objects only *appear* to be about the same size from Earth. The Sun and Moon are *remarkably* different. The Sun's diameter is 400 times wider than the Moon's, and it is also much, much larger in terms of volume and mass.

Seeing a total eclipse from Earth is an unusual coincidence. Not only do the Sun, Earth, and Moon all have to line up, but the similar apparent size of the Sun and the Moon allow the Moon's shadow to block the Sun. The Moon and Sun share a similar apparent size only at this particular moment in history. Over time, the Moon's orbit around the Earth will continue to get bigger and bigger, and the Moon will slowly appear smaller and smaller. The Earth's distance from the Sun is relatively more static.

Even when all three bodies are in alignment, we don't always see a total solar eclipse. The Moon has an elliptical orbit, so the Moon's distance from Earth varies slightly over the course of a single month. The Moon's apparent size in our sky is always changing. If an eclipse happens when the Moon is at its farthest point away from the Earth in its orbit, it doesn't look big enough to block the Sun—this is called an *annular eclipse*.

Staff training resources

Refer to the *Tips for Leading Hands-on Activities* sheet in your activity materials.

- An activity training video is available at vimeo.com/191168289.
- A content training video is available at vimeo.com/191171673.

The NISE Network has a curated list of programs, media, and professional development resources in the NASA Wavelength Digital Library that directly relate to the toolkit. These resources can be viewed and downloaded from nasawavelength.org/users/nisenet.

Credits and rights

Versions of this activity exist in many forms. This activity was inspired by the DIY Sun Science Big Sun, Small Moon activity, developed by Lawrence Hall of Science, UC Berkeley. Retrieved from: http://static.lawrencehallofscience.org/diy_sun_science/downloads/diy_ss_bigsun_smallmoon.pdf

Image of plasma around the sun during a solar eclipse, used under a public domain license, Luc Viatour, Wikimedia Commons.

Forced perspective photograph of men on the salt flats used under license from iStock. Stock images are not covered under the terms of Creative Commons.



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