



FACILITATOR GUIDE

Solar Eclipse

Learning objectives

This activity explores the following ideas:

- A solar eclipse occurs when the Moon moves between the Sun and Earth, casting a shadow on Earth.
- A solar eclipse is a rare and beautiful event.
- People have observed and tried to explain solar eclipses for thousands of years.

Materials

- Earth shaped beach ball
- Moon toy on a stick
- Pump
- Cone
- Optional: Flashlight (if doing the activity in doors)
- *Sizing up the Sun, Earth, and Moon* information sheet
- 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 can be downloaded from www.nisenet.org.

Notes to the presenter

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

This activity works well outside with the actual Sun as the light source. If it's cloudy or you need to be inside, a focusable flashlight can replace the Sun. Set the activity up in a dim area of your institution, or turn lights down low.

While you can place the Earth ball on the cone on the table and have participants walk the Moon 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 take turns holding the different balls and positioning the Moon between the light and Earth.

The concepts in this activity are appropriate for all ages. Even younger participants may have experienced a partial or complete solar or lunar eclipse. Allow visitors to experiment with the distance between the Moon ball and the Earth—and the light source if you're using a flashlight! You can also play with focusing the flashlight in different ways to get a crisper shadow.

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 an accurate size or distance comparison between the Moon, Earth, and Sun.

Difficult concepts

With this activity, it's important to reinforce the fact that these objects are just models for the Sun, Earth, and Moon. **They are NOT to scale.** 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. In real life, the Sun is 1,392,000 km across. The Earth is 12,742 km across. The Moon is 3,474 km across. You can use the information sheet in this activity to help people construct a more accurate sense of the scale of the Sun, Earth, and Moon.

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/191168397.
- 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 the Moon's shadow on Earth during the 2016 solar eclipse courtesy NASA.

Image of sun during a solar eclipse courtesy NASA/Cirtain.

Image of Sun and solar flares courtesy NASA.

Image of Earth courtesy NASA.

Illustrated silhouette of child by Emily Maletz for the NISE Network.

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