

Big Sun, Small Moon?

Why do the Sun and Moon look like they're the same size in the sky?

Description

If you've ever seen a picture of a solar eclipse, you may have noticed that the Moon comes very close to covering the entire Sun. Use a coin and a plate to investigate why the Sun and Moon look like they're the same size, though the Sun is much bigger.

Age Level: 7 and up



Materials

- large coin, such as a quarter
- large round dinner plate

Any two round, stiff objects of different size will work. Instead of a plate and coin, you can create your own Sun and Moon out of construction paper. You will need a partner to help you with this activity.



Time

Preparation: 5 minutes

Activity: 5 minutes

Cleanup: 2 minutes

Safety

Do not look directly at the Sun!

Step 1

Hold both the coin and the plate at arm's length. The plate will look much larger than the coin.



Step 2

While you hold the coin at arm's length, have your friend hold the plate and walk backwards away from you four steps. When your friend stops, close one of your eyes and look at both the coin and the plate as though they're next to each other. Does the plate look smaller than before, compared to the coin?



Step 3

First, predict how far away your partner will have to walk until the coin and plate appear the same size to you. Then have your partner walk backwards away from you until the coin and plate look the same size. How far away did your partner have to walk? Was your prediction correct?



What's Going on?

If you've ever seen a picture of a solar eclipse, you may have noticed that the Moon comes very close to covering the entire Sun. However, the Sun is 400 times larger than the Moon! So how can these objects appear to be the same size? Objects that are farther away always look smaller, but a small object and a big object can look the same size if they are the right distances away from you. In fact, the Sun is about 400 times farther away from Earth than the Moon!



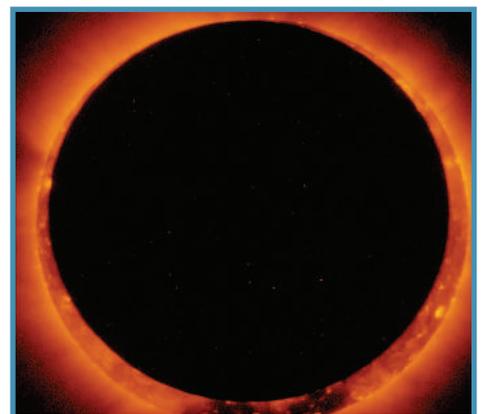
Measure things far away

Close one eye and look at an object far away. Stretch out both arms until your fingertips just frame the object. Note how far apart your arms are. Now look at an object that looks bigger and again move your fingers until you frame the object. Your arms should be further apart. Astronomers do something very similar to measure the size of stars, planets, and other bodies appear to us. They call this term "angular diameter" (or "angular size") for the angle that's formed by the apparent size of an object you observe from Earth. The angle between your arms is the angular diameter.

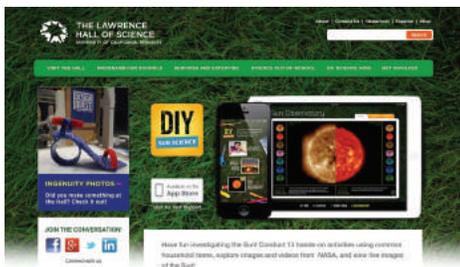


Size of the Moon & Sun

The Sun and Moon have roughly the same angular diameter. In fact, sometimes the Moon appears slightly larger than the Sun and sometimes the Sun appears slightly larger than the Moon. This is because the Moon's noncircular orbit around Earth sometimes brings it closer and sometimes farther away from Earth. It's just a coincidence that the Sun and Moon appear to be the same size when viewed from Earth. If you were on another planet, its "moons" could have a very different angular size compared with our Sun!



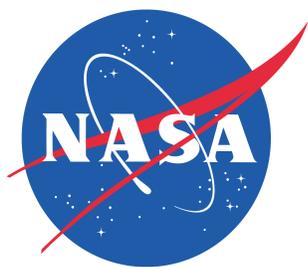
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Credits



This project was supported by NASA under award number NNX10AE05G. Any opinions, findings, conclusions or recommendations expressed in this program are those of the author and do not reflect the views of NASA.



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The DIY Sun Science app allows families and educators to investigate and learn about the Sun at home, at school, or anywhere you go! The app features thirteen hands-on investigations, as well as images and videos.

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Activity inspired by "Eclipse: How can the little Moon hide the giant Sun?" NASA/Sun-Earth Day.
Image 6, NASA. Image 8, NASA/Hinode/XRT.