



Solar Eclipse

Professor: Dr. Teresa Lampe, Interviews with Dr. Chris Sirola and Caroline Sorey

Grade: All ages

MSCCR Science Standard:

E.5.8B.2 Develop and use a model of the Earth-Sun-Moon system to analyze the cyclic patterns of lunar phases, solar and lunar eclipses, and seasons.

E.6.8.6 Design models representing motions within the Sun-Earth-Moon system to explain phenomena observed from the Earth's surface (positions of celestial bodies, day and year, moon phases, solar and lunar eclipses, and tides).

Learning Objectives:

- Using models, the student will demonstrate the alignment of the sun, moon and earth that results in a solar eclipse.
- Students will view a solar eclipse.

ENGAGE:

Supplies:

Sun beach ball, Earth beach ball, moon stress ball, flashlight (for

Instructions: *(If this activity is done inside, use the flashlight.)*

Part 1: Modeling a Solar Eclipse Demonstration

1. Have two students help.
2. Have one student hold the Earth beach ball and have one student hold the moon stress ball.
3. Have the students position the moon ball between the sun in the sky and the Earth ball.
4. Have the student with the moon ball take two big steps away from the student with the earth ball.
5. Have students move the moon ball around until it casts a shadow on the surface of the Earth ball.
6. This represents a solar eclipse.
7. Ask students the following questions:
 - a. Does the shadow cover the entire surface of the Earth?
 - b. Are all parts of the shadow equally dark?
 - c. During a real eclipse, what do you think people in the dark shadow see when they look toward the Sun?

Part 2: Modeling the Path of a Solar Eclipse

1. Have the students make the shadow move across the Earth.
2. This represents the path of a solar eclipse.
3. Ask students the following questions:
 - a. Are all people on the surface of the Earth in the path of the solar eclipse?
 - b. What do you think people outside the dark area see when they look toward the sun?

EXPLORE:

Part 1: Small Moon-Big Sun

1. Ask students if they've ever used their hands to block sunlight. Have students demonstrate how they do this.
2. This activity will help students understand how the small Moon can block the huge Sun.
3. Have two volunteers come to the front of the room.
4. Have the student with the Sun ball stand in place.
5. Tell the student with the Moon ball that their head will represent the Earth.

6. Have the other student hold the Moon ball in front of their eyes at arm's length and back up until the moon ball completely blocks the sun ball.
7. Optional: Have students swap until everyone has had a chance to use the Moon ball.
8. This demonstrates how the small moon can cover the huge Sun.

Alternative Activity:

https://lawrencehallofscience.org/wpcontent/uploads/2022/06/diy_ss_bigsun_smallmoon.pdf

Part 2: Why don't eclipses happen every month?

1. Hold the sun ball in front of the students.
2. Explain that everything must be lined up just right for a solar eclipse to occur.
3. Have two volunteers come to the front of the room.
4. Have the student with the Sun ball stand in place.
5. Tell the student with the Moon ball that their head will represent the Earth.
6. Have the student with the Moon ball model a partial solar eclipse by positioning their Moon so that only part of the Sun is blocked.
7. Optional: Have students swap until everyone has had a chance to the Moon ball.
8. Explain that because the Moon's orbit is at a 5-degree angle to the plane of the Sun and Earth, that takes it slightly higher or lower than where the Sun appears in the sky.
9. Ask students: "If the Moon is higher or lower, does it block the Sun?"

EXPLAIN

PowerPoint slides

ELABORATE

Show this timelapse video of what happens on Earth during a solar eclipse: <https://vimeo.com/536412123>

Ask students to describe what they are seeing in the video. (Answer: It is broad daylight then goes dark like nighttime, then back to broad daylight very quickly. The sun is completely blocked out for a while.)

EVALUATE

Use the solar eclipse quiz to evaluate student learning. (printable in folder)

EXTEND

1. View the April 8, 2024, solar eclipse through eclipse viewing glasses or a pinhole camera.
2. Have students research historical solar eclipses
3. Discuss the omens and myths sometimes associated with eclipses?

Useful Websites for more information:

- Brian Cox's film "The Wonders of the Solar System" shows the solar eclipse of 2009 in Varanasi, India. <https://www.youtube.com/watch?v=eOvWioz4PoQ>
- The Yardstick Eclipse: https://astrosociety.org/file_download/inline/083a7833-c1a7-4270-aa5a-d48e036e424a