National Aeronautics and Space Administration

NASA Heliophysics

Teacher-Created Lessons

By teachers for teachers

NASA Heliophysics Education Activation Team

Introduction to Solar and Lunar Eclipses
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Lesson Overview

Level: Grades 6-8 Time: 1-2 class periods

Students will watch the video Eclipses Explained and complete the video question worksheet. Students will then explore the NASA eclipse website. Using the eclipse model pieces students will cut and paste the Moon, Sun, and Earth into the proper order for each type of eclipse. Students will use a ruler to draw the shadow cones that occur during a solar eclipse and a lunar eclipse. Students will then do an activity to demonstrate why solar and lunar eclipses do not happen every month.

Educator Background Knowledge

Educators will need to have a basic knowledge of solar and lunar eclipses and can visit the specific NASA websites for background knowledge on eclipses focusing on the key vocabulary: https://solarsystem.nasa.gov/eclipses/home/.

Learning Goals

Using videos and NASA websites students (in small groups) will investigate and be able to create a model of a solar eclipse and a lunar eclipse.

Learning Objectives

1. Students will identify the location of the Sun, Earth, and the Moon during a solar eclipse and a lunar eclipse.

Framework for Heliophysics Education

NASA Question: What are the impacts of the Sun on humanity? Big Idea: The Sun is really big and its gravity influences all objects in the solar system.

NGSS Performance Expectations

- MS-ESS1-1: Earth's Place in the Universe: Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the Sun and moon and seasons.

Targeted STEM Skills

- Teamwork, Collaboration, Communication, Intellectual Curiosity, Planning, Problem Solving, and Decision Making.

Materials:

- Laptops/Tablets to watch video and explore website
- blank paper (enough for each student to have 2 sheets)
- Each student will need access to the following supplies:
- scissors
- glue
- ruler
- pen/pencil

Handouts

- KWL Chart
- Eclipse Video Questions Student Worksheet (see Handouts)
- Eclipse Model Pieces

Links to Digital Resources for Teachers

- Why Don't Eclipses Happen Every Month Activity Directions: https://solarsystem.nasa.gov/resources/2714/why-dont-eclipses-happen-every-month/

Links to Digital Resources for Students

- Eclipses Explained: https://illinois.pbslearningmedia.org/resource/buac18-sci-ess-eclipsesexplain/eclipses-explained/
- NASA Eclipse Information: https://solarsystem.nasa.gov/eclipses/about-eclipses/types/

Key Vocabulary

umbra, penumbra, solar eclipse, lunar eclipse

Material Preparation

- Teachers will need to provide copies of the video question handout and the eclipse model pieces handout for each of their students. There will be additional materials needed to complete the extension activity, **Why Don't Eclipses Happen Every Month**. Use the link for this activity for a complete list of the materials needed.

5E Steps

Engage

Ask students what they know about eclipses to create a class KWL graphic organizer on the board. List what they think they know about solar and lunar eclipses, and additional questions they have about them.

Pass out the student worksheet with the video questions and give the students a moment to look through the questions so they have an idea of what they are listening for as they watch the video.

Show the video: **Eclipses Explained**, to introduce the basic facts and features about a solar and lunar eclipse.
https://illinois.pbslearningmedia.org/resource/buac18-sci-ess-eclipsesexplain/eclipses-explained/

Explore

In small groups or individually have students spend time reading through the NASA eclipse website: **Types of Solar Eclipses:**
https://solarsystem.nasa.gov/eclipses/about-eclipses/types/.

Encourage students to pay particular attention to the animations of the solar and lunar eclipse on this site.

Explain

Students will use blank pieces of paper and the **Eclipse Model Pieces** (see Handouts) to correctly illustrate the position of the Sun, Earth, and Moon during a solar eclipse and a lunar eclipse. They will use scissors and glue to cut out and place the model pieces in the correct order for a lunar eclipse on one piece of paper and then a solar eclipse on the other piece of paper. Have students add a title and label the parts of each of their models. Using a ruler and pencil/pen have students draw in the shadow cones that cause each type of eclipse.

Extend

Students can explore why eclipses do not happen every month by completing the activity, **Why Don't Eclipses Happen Every Month?** at this link: https://solarsystem.nasa.gov/resources/2714/why-dont-eclipses-happen-every-month/

Evaluate

Refer back to the classes KWL Chart and fill in what students have learned about solar and lunar eclipses and see if all of their questions have been answered.

Evaluate individual student paper models of the two types of eclipses to ensure they understand the relationship between the Sun, Earth, and Moon during a solar and lunar eclipse. Also check individual paper models for understanding of the *shadow cone* produced during each type of eclipse.

Resources

- KWL Chart
- Student Worksheet
- Eclipse Model Pieces

Links to Digital Resources for Teachers

- Why Don't Eclipses Happen Every Month Activity Directions: https://solarsystem.nasa.gov/resources/2714/why-dont-eclipses-happen-every-month/

Links to Digital Resources for Students

- Solar Eclipses Explained Video Link: https://florida.pbslearningmedia.org/resource/buac18-sci-ess-eclipsesexplain/eclipses-explained/
- NASA Eclipse Information Website link: https://solarsystem.nasa.gov/eclipses/about-eclipses/types/
- Why Don't Eclipses Happen Every Month? https://solarsystem.nasa.gov/resources/2714/why-dont-eclipses-happen-every-month/

Handouts

These begin on the next page.

K-W-L Chart

TOPIC:_____

What I **K**now	What I **W**ant to Know	What I **L**earned

Eclipses Explained: Video Worksheet

Name: _____ Date:_____

"Solar Eclipses Explained" Video
https://illinois.pbslearningmedia.org/resource/buac18-sci-ess-eclipsesexplain/eclipses-explained/

Questions:

1. When a solar eclipse occurs where is the Moon?
2. How often does a total solar eclipse happen?
3. How often does a partial solar eclipse happen?
4. During a lunar eclipse where is the Moon?
5. What is the easiest way to remember the difference between a lunar eclipse and a solar eclipse?
6. Why is a solar eclipse a rare event that only a few can see?
7. Where do you have to be to see a solar eclipse?
8. How often does the same spot on Earth get to see a total solar eclipse?
9. What are the two parts of the Moon's shadow?
10. What part of the Moon's shadow completely blocks the Sun's light?
11. What shape is them Moon's shadow in space?
12. Is the Moon a perfect circle?

13. What NASA mission has helped provide a greater understanding about the Moon's surface?

Eclipses Explained: Video Worksheet Answer Key

1. When a solar eclipse occurs where is the Moon? Between the Earth and the Sun.

2. How often does a total solar eclipse happen? Once every year and a half somewhere on Earth.

3. How often does a partial solar eclipse happen? At least twice a year somewhere on Earth.

4. During a lunar eclipse where is the Moon? Behind the Earth with the Earth between the Moon and the Sun.

5. What is the easiest way to remember the difference between a lunar eclipse and a solar eclipse? Remember what gets darker. Solar eclipse, the Sun gets darker. Lunar eclipse, the Moon gets darker.

6. Why is a solar eclipse a rare event that only a few can see? Because the Moon's shadow on Earth is relatively small which limits the locations on Earth that can see it.

7. Where do you have to be to see a solar eclipse? On the sunny side of the planet and in the path of the Moon's shadow.

8. How often does the same spot on Earth get to see a total solar eclipse? Every 375 years

9. What are the two parts of the Moon's shadow? Umbra and Penumbra

10. What part of the Moon's shadow completely blocks the Sun's light? The umbra

11. What shape is the Moon's shadow in space? A cone extending 400,000 km behind the Moon

12. Is the Moon a perfect circle? No – has mountains and valleys on its surface.

13. What NASA mission has helped provide a greater understanding about the Moon's surface? Lunar Reconnaissance Orbiter

Eclipse Model Pieces





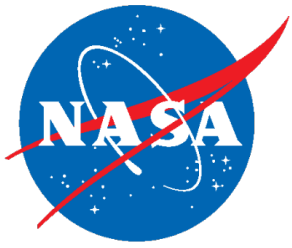








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