

Exploring the Skies with the Mitchell Sisters

Learning about Solar and Lunar eclipses and the lives of Maria and Phebe Mitchell!

Grades: 1-3

Time: 1 hour

Materials: black construction paper, red paint, yellow paint, white paint, paintbrushes, small cup of water, paper towels, paper cutout of a circle, white crayon or colored pencil, Maria Mitchell journal entries, pictures of eclipses, pictures of Maria Mitchell and Phebe Mitchell Kendall, the book *Maria's Comet* by Deborah Hopkinson

Description

This lesson will introduce students to America's first female professional astronomer, Maria (pronounced ma-RYE- ah) Mitchell, and her sister, Phebe Mitchell Kendall. The students will learn about these two women and what they did during the 19th century. Specifically, they will learn about solar and lunar eclipses and those which Maria and Phebe saw. They will read passages from Maria's journals about viewing solar eclipses and about her sister Phebe. Students will also view images of eclipses, Maria Mitchell, and Phebe Mitchell Kendall. As a conclusion to this lesson, students will paint their own solar eclipse.

Objectives

- Learn about Maria Mitchell and her contributions to astronomy
- Learn about Phebe Mitchell and her dedication to sharing Maria's life with the world
- Learn what solar and lunar eclipses are
- Read passages from Maria's journal about Phebe and solar and lunar eclipses
- Paint a solar eclipse
- View images of eclipses, Maria, and Phebe

Curriculum Connection

History and Social Studies educational experiences in grades 1-3 will ensure that students:

- Analyze the purpose and the point of view of each source; distinguish opinion from fact
- Demonstrate civic dispositions
- Will learn to think historically
- Will introduce students to concepts and academic language that improve reading comprehension

English Language Arts and Literacy educational experiences in grades 1-3 will ensure that students:

- Will develop a rich academic vocabulary and broad background knowledge
- Will read well crafted texts
- Will ask and answer questions to help determine or clarify the meaning of words and phrases in a text
- Will distinguish between information provided by pictures or other illustrations and information provided by the words in a text

Visual Arts educational experiences in grades 1-3 will ensure that students:

- Will generate original art
- Will make connections among the arts, with other disciplines within the core curriculum
- Will explore with the use of color in wet media

The above goals align with this lesson and were selected from *the Massachusetts Curriculum Framework-2018 Grades pre-kindergarten to 12*. Go to:

<http://www.doe.mass.edu/frameworks/current.html> to download a copy of the entire publication.

Order of the Lesson Plan

1. Read the students the book *Maria's Comet* by Deborah Hopkinson as an introduction to the life of Maria Mitchell and her family.
2. Tell students more about the life of Maria Mitchell and her sister Phebe from the biography included on the lesson plan. During this time, show students pictures of Maria and her sister Phebe included on the images found with the lesson plan.
3. Explain to students what solar and lunar eclipses are while showing pictures of both occurrences.
4. Read students passages from Maria's journal. While reading the passage about the solar eclipse in Denver, show students pictures of Maria and her students looking at solar eclipses in Iowa and Denver.
5. Show students how to paint a solar eclipse!

All About Maria Mitchell and her sister Phebe Mitchell Kendall

Maria Mitchell is America's first professional female astronomer. She is famous because she discovered a telescopic comet, and because of this discovery, she was awarded a medal from

the King of Denmark. She was the first American and the first woman to receive this honor. Maria was the first female member of the American Academy of Arts and Sciences and she started the Association for the Advancement of Woman. She was born on August 1, 1818 on Nantucket Island, Massachusetts. She was the third eldest of 10 children born to parents William and Lydia Mitchell. From a young age, Maria was always interested in the study of the skies. At age 12, she helped her father, William, count the seconds of a solar eclipse. This helped to pinpoint the longitude and latitude of her house, which made it an official observatory!

While Maria studied reading, writing, and mathematics in school, her favorite subjects were always mathematics and astronomy. Maria was formally educated until age 16 and from then on she was self taught. Much of the information she learned came from the library on Nantucket –the Atheneum. Maria was the first librarian at the Atheneum. She was there for 20 years, during which she taught herself multiple languages and increased her knowledge of mathematics and astronomy. On October 1, 1847, Maria discovered a comet from the roof of the Pacific Bank, the family’s new residence. Maria’s father alerted the Danish government of this discovery and she was awarded a gold medal from the King of Denmark for her discovery of the comet.

Maria was the first professor ever hired at Vassar College for women when it opened in 1865. She originally turned down this offer because she did not have a college degree, so she thought she was not qualified enough to be a professor of mathematics and astronomy. She was a favorite professor of the students at the College. With her students, she traveled to view two solar eclipses; one in Burlington, Iowa and another in Denver, Colorado.

Her sister Phebe Kendall came with her to view the solar eclipse in Denver and drew the eclipse while Maria’s students counted the seconds and made their astronomical observations. Phebe and Maria were always very close and when Phebe married her husband, Joshua Kendall, in 1854 Maria missed her dearly. Phebe was an accomplished painter and even opened a painting school on Nantucket! Phebe, like Maria, was an intelligent woman. She was the first woman to serve on the Cambridge, Massachusetts School Board. Because Phebe and Maria were so close, several years after Maria’s death, Phebe published a book containing Maria’s letters and journals with added commentary. She wanted to share the accomplishments of Maria with the world!

What is a Solar and Lunar Eclipse

A total solar eclipse occurs every few years. During a total solar eclipse the skies become dark and it looks like night time during the day! This happens because the Moon moves between the Sun and the Earth and completely covers the Sun. This movement is why it gets so dark; because there’s no sunlight! A total solar eclipse does not last very long, only up to seven and a half minutes. During this time, animals begin to act strangely because it appears to be nighttime. Some birds go back to their nests to go to sleep, and some bugs and other animals, like bats that don’t come out until night, come out early! Maria looked at solar eclipses because they happen in space, the place astronomers like Maria study.

A total lunar eclipse is similar to a total solar eclipse but looks very different. A total lunar eclipse happens at night and occurs when the Moon moves through the Earth's shadow. A total lunar eclipse only happens when there is a full Moon and it turns the Moon red! Anyone can watch a total lunar eclipse without a telescope and without protective eyewear! Total solar eclipses can hurt people's eyes, so special glasses are required to see, but anyone can watch a total lunar eclipse without protective eyewear.

Painting Instructions

1. Trace a circle using a white pencil or crayon onto the center of the page.
2. Around half the circle, paint using red paint in long strokes to resemble light coming off of the eclipse.
3. On the unpainted half of the circle, use yellow paint in long strokes to resemble light coming off the eclipse.
4. Let the paint dry.
5. Once the paint is dry, use the white paint to paint short lines around the whole circle to show the sunlight coming from behind the Moon.
6. Let the paint dry. You have an eclipse!



What the children's solar eclipse will look like!