

JOURNEY TO THE SUN

TEACHER GUIDE

LESSON 1

Grades: 6 - 8
Duration: 1-2 days
Standards: MS-ESS1-1



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EXPLORING ASTRONOMY



Funded by the National Science Foundation



www.nso.edu

OBJECTIVES

At the end of this lesson, students will be able to:

- Describe some ways in which early Polynesians used astronomy for voyaging.
- Explain why Hawai'i's geography has made it key for astronomy.
- Describe ways in which astronomy was practiced in early civilizations
- Explore the Sun's impact on society, both in history and present day.

STANDARDS

MS-ESS1-1

Patterns of the apparent motion of the sun, the moon, and stars in the sky can be observed, described, predicted, and explained with models.

KEY VOCABULARY

Astronomy

Observations

Predictions

MATERIALS

- Lesson packet: www.nso.edu/educators/jtts-curriculum
- Slideshow: "*Exploring Astronomy*"
- Video *How Maui Slowed the Sun* by Peter Gossage mp4
- Video *Mauna Kea Observatories*.mp4
- Prizes for Quick Share (optional)

BACKGROUND

This is the first of a series of lessons, developed by NSO for the Maui County School District, focusing on astronomy and the Sun. As such, it is meant primarily as an engagement piece to increase student excitement surrounding astronomy and solar observations.

Examples of astronomy in early Polynesia are included to highlight historical astronomy applications. Early Polynesians accomplished astonishing feats through their study of astronomy.

At the end of the short slideshow, students are presented with a research activity where they will explore the many ways in which astronomy was studied and used in early cultures. With this knowledge, they can then compare with modern astronomy to draw conclusions on how the discipline has changed over time, both in the tools used and the observations made.

DIRECTIONS

Using the slideshow provided, review with students the information provided on each slide.

Slide

2. This slide is an introduction to astronomy and early Polynesians as keen astronomers. In Queen Lili'uokalani's 1897 translation of the Kumulipo, she wrote "The ancient Hawaiians were astronomers".
4. Polynesians used their knowledge of astronomy and other natural indicators to complete astonishing voyages without any modern scientific instruments or charts.
5. One important tool for navigation was the memorization of the night's constellations. Early Polynesians identified, named, and memorized the star formations that they observed.
6. An example of early voyagers observing the sun specifically, is provided on this slide. Navigators look at the shape of the ocean and the character of the sea at sunrise and sunset to note any significant changes in characteristics such as wind or swell patterns. Additionally, sunrise and sunset are used as directional indicators.
7. An example of using night stars for navigation, is the use of the Hānaiakamalama (Southern Cross) star formation. Hānaiakamalama gets lower the farther north you go. Navigators memorize the positions of star formations to determine how far they are along their journey.
8. "Quick Share" can be used as a quick check for understanding. It is also meant as a way to get students excited about the knowledge that they've just gained.
9. Explain that because Hawai'i is located in the middle of the Pacific Ocean, far away from cities and sandy deserts, it has some of the clearest skies for observing celestial objects.
10. Play the embedded time lapse video of Mauna Kea observatories by Jason Chu.
11. Because the world's most powerful solar telescope is located on Maui, solar scientists will look to Maui as the center of solar research. This places Maui students at the center of opportunity for leading solar astronomy.
12. Play the Solar time-lapse videos.
13. Introduce the activities included with this lesson. Students may choose which activity to complete, or opt to do both.

REVIEW

- "How does astronomy compare between past and present?"
- "Do you think people relied more on solar information in the past or present?"

ACTIVITY - EXPLORING HISTORICAL ASTRONOMY

OBJECTIVES

1. Explore astronomy in early civilizations.
2. Present your findings to the class.

ANSWER THE FOLLOWING QUESTIONS:

1. What are some examples of early civilizations studying astronomy?
2. What types of observations did they make?
3. Did they make predictions based on their observations? If so, what are some examples?
4. How has astronomy influenced society in the past?
5. How does astronomy compare between past and present? How have tools and technology used to study astronomy changed?
6. In your opinion, did people rely on solar information more in the past or present? Explain.

SUGGESTIONS FOR PRESENTATION

- Poster
- Slideshow
- Skit
- Speech

ACTIVITY - RECORDING OBSERVATIONS THROUGH STORYTELLING

OBJECTIVES

Write a story, poem, or proverb to describe a natural phenomenon that you've observed.

MATERIALS

- *"Recording Observations Through Storytelling"* slide show
- *"How Maui Slowed the Sun"* Video

TEACHER GUIDE

Use the slideshow presentation titled *"Recording Observations Through Storytelling"* included in the online Lesson 1 packet.

In the presentation, students are shown a series of slides, which give examples of passing on information in the form of: Oli (chant), 'ōlelo no'ēau (proverbs), and mo'olelo (stories). The examples all describe early observations of the Sun and its cycle.

In the activity instructions on the last slide, students are tasked with writing a story, poem, or proverb to describe a natural phenomenon that they've observed.

IDEAS FOR STORIES

1. How the Sun / Stars / Planets got into the sky.
2. Why the Sun behaves as it does (Why is it hot? Why is it bright?)
3. How the Sun guides navigators on their journeys.

EXAMPLE OF A CULTURAL, HISTORICAL STORY OF THE SUN

Video: "How Maui Slowed the Sun" based on books written by New Zealand author Peter Gossage.



The National Solar Observatory (NSO) is the national center for ground-based solar physics in the United States and is operated by the Association of Universities for Research in Astronomy (AURA) under a cooperative agreement with the National Science Foundation Division of Astronomical Sciences.

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 to promote the progress of science. NSF supports basic research and people to create knowledge that transforms the future. Please refer to www.nsf.gov.



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