

# #9434

## THE SUN

LANDMARK MEDIA

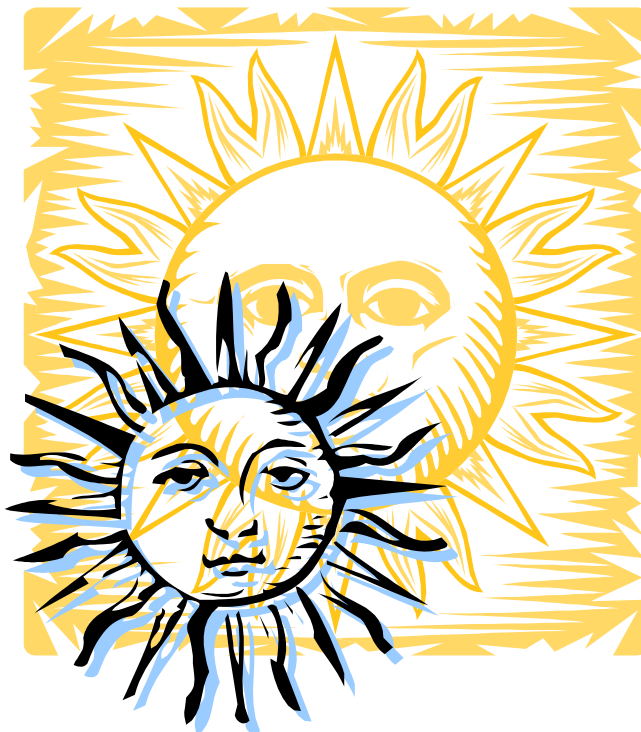
1999

Grade Levels: 9-13+

52 minutes

### DESCRIPTION

Our middle-aged sun has fascinated people throughout history, but only since the rocket age have scientists been able to document its life and the forces that sustain it. Explores sunspots, solar cycles, the birth of a solar storm, and the use of specialized spacecraft outside earth's ionosphere.



### ACADEMIC STANDARDS

#### Subject Area: Science

- Standard: Understands the composition and structure of the universe and the Earth's place in it
  - Benchmark: Knows the ongoing processes involved in star formation and destruction (e.g., stars condense by gravity out of clouds of molecules of the lightest elements; nuclear fusion of light elements into heavier ones occurs in the stars' extremely hot, dense cores, releasing great amounts of energy; some stars eventually explode, producing clouds of material from which new stars and planets condense)
  - Benchmark: Knows common characteristics of stars in the universe (e.g., types of stars include red and blue giants, white dwarfs, neutron stars; stars differ in size, temperature, and age, but they all appear to be made up of the same elements and to behave according to the same principles; most stars exist in systems of two or more stars orbiting around a common point)
  - Benchmark: Knows ways in which technology has increased our understanding of the universe (e.g., visual, radio, and x-ray telescopes collect information about the universe from electromagnetic waves; space probes gather information from distant parts of the Solar System; mathematical models and computer simulations are used to study evidence from many sources in order to form a scientific account of events in the universe)

### INSTRUCTIONAL GOALS

1. To review how the sun was born.
2. To trace the history of learning about the sun from the primitive belief of Indians to the use of the x-ray telescope on space shuttles.
3. To dramatize how the sun will die.

## VOCABULARY

1. cosmic
2. thermonuclear reactor
3. isotopic
4. supernova
5. nuclear fusion
6. celestial
7. corona
8. ionosphere
9. x-ray telescope
10. magnetosphere
11. helioseismometer
12. solar flare
13. neutrinos
14. trajectory
15. photons



## BEFORE SHOWING

1. Display early illustrations of the sun as scientists understood it. What characteristics were most obvious?
2. Review the various kinds of stars and how they are formed.
3. Discuss ways in which the sun is important to life.
4. Discuss ways in which the sun is harmful to life.

## DURING SHOWING

### Discussion Items and Questions

1. View the video more than once, with one showing uninterrupted.
2. What causes solar eclipses and how often do they occur?
3. What is the estimated temperature at the sun's core?
4. Where did the sun come from?
5. A meteorite hit the Earth near Allende, Mexico, in 1969. What clues did the meteorite give that the sun did not spawn the solar system?
6. What were some of the beliefs that the Anasazi had about the sun?
7. What did Sir Isaac Newton learn about the sun?
8. What was Galileo Galilei able to observe on the surface of the sun in the early 1600s?
9. How long are solar cycles? How long are magnetic cycles?
10. What causes sunspots?
11. In 1901, Guglielmo Marconi was able to send a weak radio signal from England to Newfoundland. How was this possible?
12. What kind of rocket was first used to try to measure x-rays being emitted by the sun?
13. What other methods were used to prove that the sun produced x-rays?
14. Which space mission in 1985 conducted experiments to learn about the sun?
15. Which joint American and Japanese space mission was able to make x-ray movies of the sun?

16. What was the mission of the SOHO spacecraft?
17. Which Canadian province had a blackout due to a solar storm?
18. What were the helioseismometers aboard SOHO used for?
19. What causes a solar cycle to occur?
20. What was the purpose of the TRACE mission?
21. What was the purpose of the Super-Kamiokande project in western Japan?
22. Why were the number of neutrino events per day smaller than predicted?
23. Historically, how has the Earth felt the effects of the fluctuations of the sun's heat?
24. Astronomers are aware of how the sun will die. What steps will the sun will go through before it fades away?

## AFTER SHOWING

### Applications and Activities

1. Research myths and folklore about the sun.
2. Design a time line about the sun's history.
3. Display photographs of eclipses of the sun.
4. Research the beliefs of the Anasazi and other early North American tribes about the sun.
5. Report on the following scientists' contributions to the study of the sun:
  - a. Sir Isaac Newton
  - b. Galileo Galilei
  - c. Wilhelm Roentgen
  - d. Guglielmo Marconi
  - e. Herbert Friedman
  - f. Gerry Wasserburg
  - g. Loren Acton
6. Set up a chart containing statistical information about the sun such as:
  - a. age
  - b. life expectancy
  - c. distances from the nine planets
  - d. temperature at the core
  - e. mass
7. List poems and other literary works that have themes based on the sun.
8. Using conversion formulas, change the metric units mentioned in the video to English units.
9. Research the distances of the sun from each of the nine planets. Using an appropriate scale, proportionally calculate the distances in centimeters and plot them on poster board.
10. Report on historical events or unusual happenings that have taken place during solar eruptions.



## RELATED RESOURCES



### Captioned Media Program

- Bill Nye the Science Guy: The Sun #3580
- History of Astronomy #3137
- Sun, Earth, Moon #3301



## **World Wide Web**

The following Web sites complement the contents of this guide; they were selected by professionals who have experience in teaching deaf and hard of hearing students. Every effort was made to select accurate, educationally relevant, and "kid safe" sites. However, teachers should preview them before use. The U.S. Department of Education, the National Association of the Deaf, and the Captioned Media Program do not endorse the sites and are not responsible for their content.

- **THE SUN--A MULTIMEDIA TOUR**

<http://www.michielb.nl/od95/>

Shows images and animations of sunspots, solar flares, magnetic fields, and solar eclipses. Includes information on the science of the sun and its importance in the solar system.

- **SOHO, EXPLORING THE SUN**

<http://sohowww.nascom.nasa.gov/>

Contains information about the SOHO mission and the latest images taken by SOHO. Includes links to educational resources and lesson guides related to this topic.

- **SUNSPOTS AND THE SOLAR CYCLE**

<http://www.sunspotcycle.com/>

Explains what the solar cycle is and how sunspots affect the Earth. Contains solar movies and animations, an illustrated history of sunspots, and a section on solar news.

- **THE SUN IN HISTORY**

[http://passporttoknowledge.com/sun/history/sun\\_history.html](http://passporttoknowledge.com/sun/history/sun_history.html)

Includes links to sites containing info about helioseismology, the missing neutrinos, space weather, the Quebec blackout, the SOHO mission, and other topics as mentioned in the video.