

- Have students discuss how life would change if the Earth and the sun moved either closer together or further apart. Use Mercury as a comparison point, providing reasons why the planet closest to the sun is devoid of life.
- As the main source of our solar system's heat, the sun differs from other celestial objects such as Mars and the moon in that studying it up close is next to impossible. Discuss the different ways in which scientists study and observe the sun.

Follow-up Activities

- Have students come up with various ways that the sun helps living things on the Earth. Researching the information, have students create a bulletin board featuring pictures and detailed paragraphs that illustrate this point.
- On a sunny day, have students take thermometer readings both inside and outside a closed automobile. Collect and compare the data from the class, and discuss the data in relation to the greenhouse comparison and the "solar oven" activity. Have the class make a list of things one shouldn't leave in a closed automobile (family pet, dairy products, children/babies etc.).
- Have students research the many cultures that have included the sun in their myths and legends over the centuries. In addition, have students compose their own stories explaining the powers of the sun.
- Research sunspots and the effect that they have on the Earth.

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.libraryvideo.com

- www.windows.umich.edu/sun/sun.html

This easy-to-comprehend site uses a friendly interface to provide all the details kids need to know about the sun, including sections on solar activity, the interior of the sun, word search games and a large image archive.

- kids.msfc.nasa.gov/Earth/Sundials/Sundials.asp

"NASA Kids" walks students through the workings of a sundial, including step-by-step instructions on how to create your own.

- www.exploratorium.edu/eclipse/index.html

San Francisco's Exploratorium presents a rich site detailing what, where and how to view a solar eclipse.

Suggested Print Resources

- Bourgeois, Paulette. *The Sun*. General Distribution Services, Inc., Buffalo, NY; 1997.

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- Branley, Franklyn Mansfield. *Eclipse: Darkness in Daytime*. Crowell, New York, NY; 1988.
- Daley, Michael J. *Amazing Sun Facts*. Learning Triangle Press, New York, NY; 1998.
- Simon, Seymour. *The Sun*. Morrow, New York, NY; 1986.
- Vogt, Gregory L. *The Sun*. Millbrook Press, Brookfield, CT; 1996.

TEACHER'S GUIDE CONSULTANT

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TITLES

- ALL ABOUT STARS
- ALL ABOUT THE PLANETS
- ALL ABOUT THE EARTH
- ALL ABOUT THE SUN
- ALL ABOUT THE MOON

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All About The Sun

Grades K-4

This guide is a supplement, designed for teachers to use when presenting the program *Space Science For Children: All About The Sun*.

Before Viewing: Research in learning suggests that it is important for the teacher to discover what the students know — or think they know — about a topic, at the start of a new unit, so that their accurate conceptions can be validated and reinforced, and their misconceptions identified and corrected. Therefore, after reviewing the pre-viewing discussion questions provided for your class, create a "Everything We Know About..." list. Preview key vocabulary words and have students raise additional questions they hope will be answered by this program. Most importantly, students should be told that as "science detectives" they must listen closely, so that after viewing the program, they will be able to tell whether or not the facts/beliefs they had put on their list were scientifically accurate.

After Viewing: After a brief discussion about the program, challenge your "science detectives" to prove or disprove the accuracy of the facts that they had put on their "Everything We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.



Program Summary

As the center of our solar system, the sun is not only the closest star to the Earth, but also the most important, providing energy in the form of heat and light which sustains life on our planet. Join a Space Camp shuttle crew — along with their trusty first mate, Fido the basset hound — on an exciting and informative mission to study the sun. Although similar to the other stars that dot the night sky, the sun's proximity to the Earth influences our weather and enables photosynthesis to occur in plants, thus beginning the food cycle that provides energy for all living things. While ancient astronomers believed that the sun revolved around the Earth, later scholars determined that the Earth and other planets revolved around the sun. This helped explain the concept of night and day (brought about by the Earth's rotation on its axis) as well as the year and seasons (brought about by the Earth's revolution around the sun). Students will learn about past solar missions, from the Skylab space station to probes such as Ulysses and SOHO. Solar activity including sunspots, prominences and solar flares are also examined. A closer look at the Earth's water cycle uncovers the sun's role in evaporation, condensation and precipitation, while an examination of ultraviolet and UV rays provides the Space Camp crew with something we can all identify with — sunburn.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

sun — A medium-sized star and the center of our solar system that provides our planet with light and heat.

probes — Unmanned vehicles and/or instruments sent into space to collect samples or take photos of areas where astronauts cannot travel.

star — A bright object seen in the night sky, made up of hot, glowing gases; the primary source of light and heat in the universe.

hydrogen — A gas that stars are made of, which, when heated, turns into helium, exploding and giving off heat and light energy.

helium — The gas into which hydrogen transforms in stars, exploding and giving off heat and light energy.

gravity — A force that pulls any two objects together.

space shuttle — NASA's reusable space vehicles that are powered by large rockets.

photosynthesis — The process by which green plants create nutrients from sunlight, air and water.

axis — An imaginary line that connects the North and South poles.

rotation — The spinning of a planet on its axis. On Earth, it takes a full day, or 24 hours, for one rotation, which results in night and day.

telescope — An instrument used to view distant objects in space.

sundial — An instrument that measures time and the perceived movement of the sun, using a shadow cast by the sun.

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solar system — The sun, the planets and their moons, as well as other objects that orbit the sun.

orbit — The continuous path of an object around another body; the moon orbits the Earth, as the Earth and the other planets orbit the sun. On full orbit is known as a revolution; the earth takes 365 days to revolve around the sun.

solar eclipse — A natural occurrence where the moon's orbit places it directly between the Earth and the sun, temporarily blocking out the view of the sun from the Earth. A solar eclipse happens approximately once every five years.

Skylab — One of the first solar missions, equipped with eight telescopes that were used to view the sun. Launched in 1973.

sunspots — Storms on the surface of the sun, marked by dark spots.

solar prominence — Explosions on the surface of the sun, causing enormous bursts of gas that arch upwards into space.

solar flares — A bright burst of light on the surface of the sun.

Ulysses — A space probe built by the European Space Agency, designed to study the sun. Launched in 1980.

SOHO — A space probe used to study the sun, built as a joint project between Japan, the United States and other countries. Launched in 1995.

chlorophyll — A pigment in all green plants which aids in photosynthesis.

ultraviolet rays — Invisible rays of light from the sun that are unhealthy, and can cause sunburn and damage our skin.

evaporation — The process by which heated water changes from a liquid to a gas.

condensation — The process by which cooled water vapor changes from a gas to a liquid.

precipitation — Water vapor that condenses and falls to Earth as rain, sleet, snow or hail.

water cycle — The continuing process of evaporation, condensation and precipitation that recycles Earth's water supply.

Pre-viewing Discussion

Before students generate their list of "Everything We Know About..." this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

1. What is the sun?
2. How does the sun effect our lives on Earth?
3. Where does the sun go at night?

After the class has completed their "Everything We Know About..." list, and before watching the show, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

The key questions raised in this program, and answered during the "Mission Report," are as follows:

1. Why is the sun so hot?
2. How big is the sun?
3. Why do we get sunburned?
4. Why is the sun so important?

Other questions you may wish to ask your class to assess their comprehension of additional points presented in this show are as follows:

1. Is the sun bigger than all the other stars in the universe? Why does it look that way?
2. What makes the sun shine?
3. How long has our sun been shining? How long do scientists expect it to last?
4. What are some of the things the sun does for us on the Earth?
5. Why does it look like the sun moves across the sky each day?
6. Explain how the sun and the Earth's rotation cause day and night.
7. Explain how the sun, the Earth's orbit, and the tilt of its axis cause the seasons.
8. When we say that the sun is at the center of the solar system, what do we mean?
9. What is a solar eclipse?
10. What causes sunburn? How can we avoid it?
11. What is the Earth's "water cycle?" Describe each stage and the role of the sun in this process.

Follow-up Discussion

The most important part of this segment is to examine both the facts and beliefs generated by the class in their "Everything We Know About..." list. Research indicates that students will retain their previous misconceptions — in preference to the new information — until they actively recognize and correct their own errors. Because of this, it is important to lead students to the correct ideas while identifying and correcting any misconceptions from the class list. After reviewing the list, encourage students to share the answers they got to the questions raised before viewing the program.

Raising a thought-provoking question is a good way to assess the overall depth of understanding. A couple of suggestions are listed below:

1. Discuss the following statement: All living things depend on the sun. Is this true? Have the class debate this point with relevant examples.

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