

# Origami Sun

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**Objective:** To make an origami sun, and to learn more about our nearest star.

**Grade Level:** 5-8  
**Subject(s):** Space Science  
**Prep Time:** < 10 minutes  
**Duration:** 40 minutes  
**Materials Category:** Classroom

National Education Standards	
Science	1b, 3b, 3c, 5a, 5c
Mathematics	
Technology (ISTE)	
Technology (ITEA)	
Geography	

### Materials:

- Copies of the origami pattern
- Scissors
- Colored pencils

### Related Links:

National Oceanic & Atmospheric Administration’s Space Environment Center—Origami Sun Project

<http://www.sec.noaa.gov/info/Origami.pdf>

### Supporting NASAexplores Article(s):

Staring at the Sun

[http://www.nasaexplores.com/show2\\_article.php?id=05-102](http://www.nasaexplores.com/show2_article.php?id=05-102)

Shielding Against Space Rays

[http://www.nasaexplores.com/show2\\_article.php?id=04-024](http://www.nasaexplores.com/show2_article.php?id=04-024)



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Teacher Sheet(s)

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## Pre-lesson Instructions

- Go to the Origami Sun Project Web site listed in the Related Links section. Print a copy of the origami patterns. There is a front and back to the pattern. Using a copy machine, make two-sided copies of the patterns. Each student will need an origami pattern. Make a few extra copies, just in case.
- Ensure that each student has a copy of the folding instructions.

## Background Information

The solar system can be a very dangerous place when you're far from home. One of the biggest problems is the large amount of radiation present in interplanetary space. The sun, and more distant celestial bodies, produce large amounts of radiation that fill the solar system. (Space radiation from outside our solar system is also known as galactic cosmic rays.) The particles that make up space radiation are traveling with so much energy that they can knock the electrons out of many atoms that they strike. While it's agreed that this radiation would have a negative effect on astronauts' health traveling to other worlds, no one knows exactly how harmful it would be. On Earth, we are protected from space radiation by the Earth atmosphere and magnetic field. Astronauts orbiting near the Earth on the Space Shuttle or the International Space Station also receive some protection from the radiation. The Earth's magnetic field extends far beyond the orbits of those spacecraft, deflecting radiation away from them and toward the North and South Poles.

In this lesson, students will learn more about the sun and the radiation it emits. They will also learn about the different cycles the sun goes through, as well as the different features that can appear on its surface.



## Guidelines

1. Read the related NASAexplores 5-8 article(s). Discuss the article as a class, and answer any questions the students may have.
2. Explain that in today's class, the students will be learning more about the sun and how it affects the Earth. Have students share what they learned about the sun in the article. *It produces harmful radiation.*
3. Hand out the Student Sheets.



4. Discuss the following terms that are related to the sun. Have the students fill in what they learn on the Student Sheets.
  - **Solar wind:** As the sun fuses atoms of hydrogen together to make helium, large quantities of energy are released. While a lot of this energy is emitted as light, some of it is sent out from the sun as energized particles. These particles make up the solar wind.
  - **Solar flare:** Solar flares are abrupt, violent explosions that sometimes occur in complex sunspot groups. These flares are accompanied by the release of gas, electrons, visible light, ultraviolet light and X-rays. When this radiation hits the Earth's magnetic field, it reacts to create the aurora.
  - **Sunspots:** Sunspots are dark, cool areas that appear on the photosphere. Sunspots always appear in pairs and are caused by intense magnetic fields. Sunspot activity occurs as part of an 11-year cycle called the solar cycle where there are periods of maximum and minimum activity.
  - **Prominence:** Prominences are arch-shaped clouds of gases that rise from the sun's surface and orient themselves along the magnetic lines from sunspot pairs. Prominences can last two to three months and can extend 30,000 miles (50,000 kilometers) or more above the sun's surface.
  - **Filaments:** Filaments are formed in magnetic loops that hold relatively cool, dense gas suspended above the surface of the sun. When you look down on top of them, they appear dark because the gas inside is cool compared to the hot photosphere below.
  - **Photosphere:** The photosphere is the lowest region of the sun's atmosphere and is the region that can be seen from Earth. The photosphere has an average temperature of 5,800 degrees Kelvin!
  - **Corona:** The corona is the most outer layer of the sun and extends several million miles outward from the photosphere. It can be seen best during a solar eclipse and in X-ray images of the sun. The average temperature of the corona is 2 million degrees Kelvin!
  - **Coronal hole:** The corona has dark areas called coronal holes. Coronal holes are relatively cool and are thought to be areas where particles of the solar wind escape. These holes are best seen using X-ray telescopes.
5. Hand out the sun origami patterns, along with the folding instructions.
6. Allow time for the students to complete the origami sun. Provide assistance as needed.



## Discussion / Wrap-up

- Have students share their origami suns with the class.
- Have the class answer the following questions based on the information on the origami sun.
  - What are four types of radiation from the sun (three are shown with arrows coming out of the Sun)? *X-rays, ultraviolet, radio and ion radiation*
  - What are some of the features that are on the surface of the sun or above it? *Prominence, coronal hole, magnetic field, flare, solar wind, filaments, sunspots, etc.*
  - What kinds of cycles does the sun have? *It has an 11-year weather cycle, and it rotates in 27 days.*
  - What flows out from the sun in all directions? *Solar wind*

## Extensions

- Have groups study the different features of the sun in more depth.



# Origami Sun

*Student Sheet(s)*

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## Features of the Sun

**Solar Wind:**

**Solar Flare:**

**Sunspots:**

**Prominences:**

**Filaments:**

**Photosphere:**

**Corona:**

**Coronal Hole:**

