National Aeronautics and Space Administration

Our Sun:

How well do you know it?

The Sun and sunflower are made up out of pieces of actual images of the Sun taken by the STEREO spacecraft. Turn the poster over to see how you can make your own.

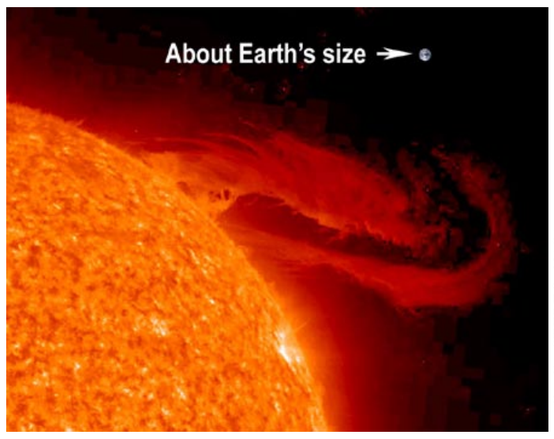
www.nasa.gov

Learning More about our Sun

It's Big, Big, Really Big!

The Sun is very BIG compared to the Earth. Over a million Earths could fit inside the Sun. Or you could line up over 100 Earths across its middle. However, compared to other stars, our Sun is only a medium-sized star, meaning that some stars are much larger than the Sun and some are much smaller.

The Sun looks bigger than other stars because it is so much closer to the Earth. The further away an object is, the smaller it appears, even if it is very big.



Credit: STEREO, NASA

Earth size compared to part of the Sun

Experiment: The Distant Truth

Materials: 2 large yellow balls (the same size to represent two stars), with one marked A, the other B (ideally, the students will have not seen the balls up close); open area outside (preferably) for set-up

Procedure:

1. Small groups of participants should line up at a designated horizontal start line.
2. One volunteer for star A should stand 30 paces from the start line.
3. One volunteer for star B should stand 45 paces from the start line.
4. Measuring explained: Participants in each group offer their ideas about which ball is larger.

Ruler Option: Students familiar with rulers may use a ruler and measure with their thumbs perhapsthe the observed size of the stars.

Analyzing Data:

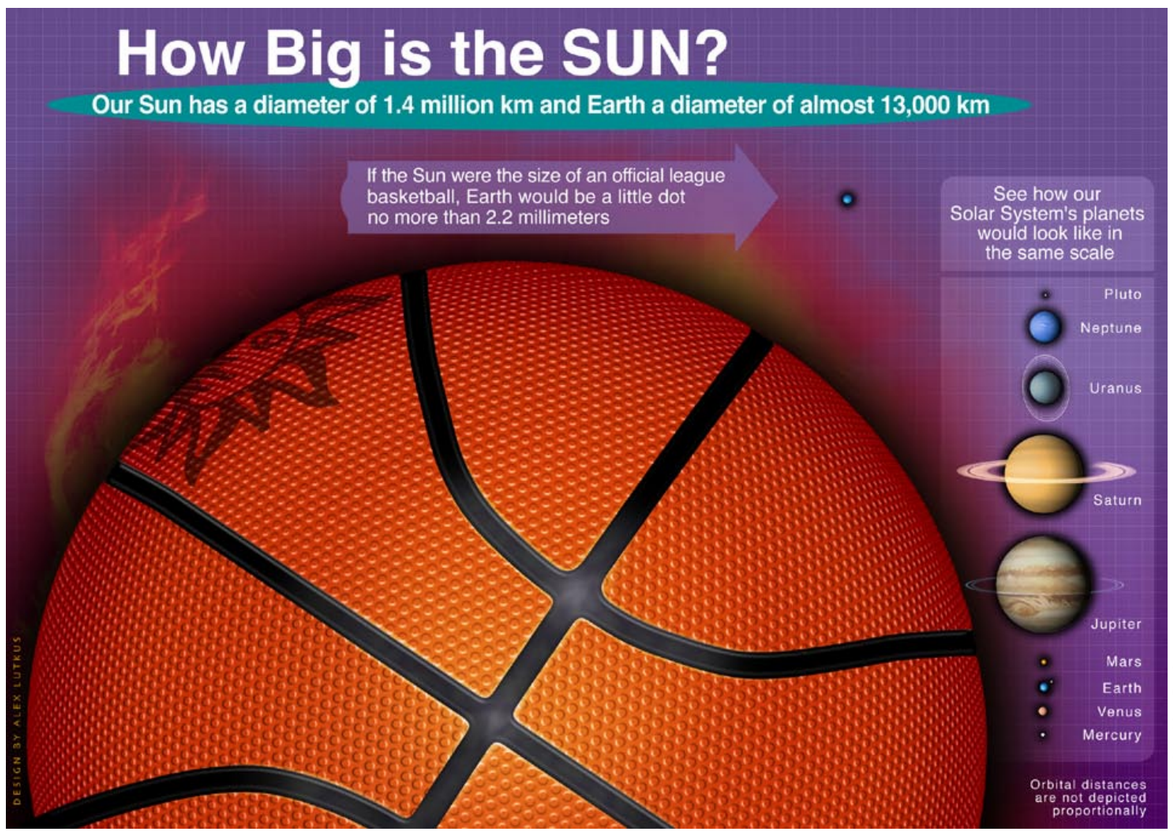
Q. Which star was closer to the start line? Which star appeared bigger?

Next, have Star B holder move up beside Star A. Re-do offering of ideas again as to sizes of the stars. They will see that the two stars are the SAME SIZE.

Q. If the balls/stars are the same size, what made one look larger and one look smaller? (Distance)

Making Connections: The Sun looks bigger than many stars observed at night mostly because it is much closer to the Earth.

Additional Resource: Sun-Earth size activity at **http://sunearthday.nasa.gov/2007/materials/solar_pizza.pdf**

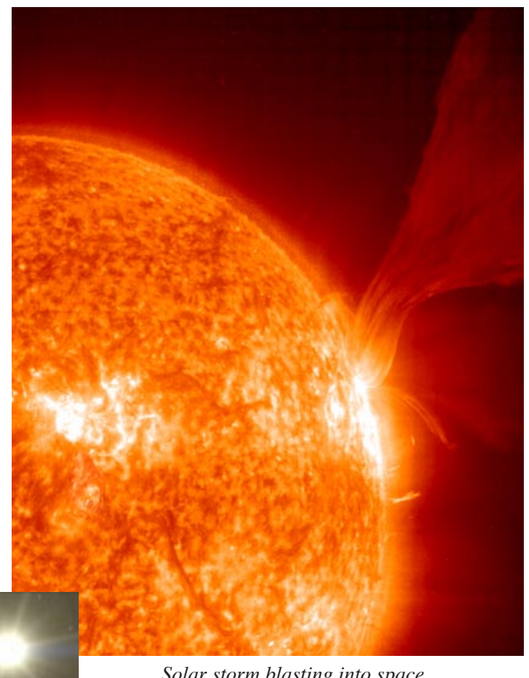


Credit: Alex Lutkus

NASA Exploring the Sun

Scientists at NASA are working hard to find ways to better observe and learn about how the Sun works. Sometimes the Sun blasts out solar storms, clouds of charged particles racing across space at a million miles (1.6 million km) per hour. These storms can upset satellites and electrical power. Right now NASA has over 15 spacecraft observing the Sun, the space between the Sun and Earth, and the impact of particles from the Sun on Earth's atmosphere and even Earth itself. One of the oldest is the Solar and Heliospheric Observatory (SOHO) spacecraft, launched in 1995. Its 12 instruments look at the Sun all day, every day and send their information back to us at Earth. We get updates in less than 15 minutes.

Another spacecraft, TRACE (launched in 1999), studies smaller areas of the Sun's surface in greater detail. RHESSI (launched in 2002) observes bright solar flares. STEREO (2006) observes the Sun from two separate spacecraft that can provide two different views of solar events. Hinode (2007) captures very detailed images and data on the Sun. And the Solar Dynamics Observatory (scheduled for 2009) takes over SOHO's role, but with new and better instruments. Together with other spacecraft and projects already in place, NASA will be able to understand the science of how the Sun works, its impacts on Earth, and even beyond. If human spaceflight is going to carry astronauts to the Moon, Mars, and even further out into space, we need to know much more about the Sun and predicting solar storms.


Credit: SOHO, NASA,ESA

Solar storm blasting into space

Illustration of the Solar Dynamics Observatory spacecraft

Our Day and Night

Without the Sun, there would be no life on Earth. The Sun warms our planet, creates wind, gives energy for plants to make their food, and lights our days. The Sun is always shining, but is only able to light half of the Earth at a time because the shape of the Earth is round like a ball.

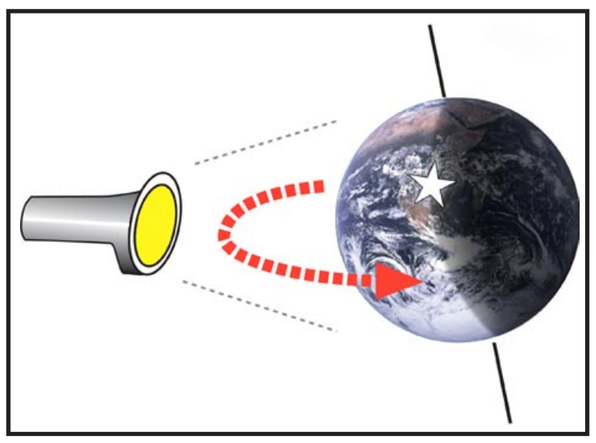
Whichever side of the Earth is facing the Sun has daytime, while the other side has night. The reason we have day and night is because the Earth rotates or spins like a top (but much more slowly). If the Earth didn't rotate, one side of the Earth would always have day and the other side have night.

Experiment: Investigating Day and Night!

Materials: globe (Earth); flashlight (Sun); dot sticker

Procedure:

Place the dot sticker on the globe top show where you live. Shine the flashlight on the sticker. This part of the Earth is having daytime. But the Earth is not still. It is always moving, although we can't feel it. Not only does the Earth revolve, which means to go around the Sun like the other planets, it also rotates, like a merry-go-round, causing day and night. Rotate the globe very slowly until the dot leaves the Sunlight. Time to watch the Sun go down. Keep going through the night. Then, when the sticker comes around again, it's time to wake-up. It's morning again! Hey! There went one whole day!



Notice that the Sun did not move. It is the spinning of the Earth that causes day and night! You might want to ask students how many hours one rotation takes in real life.

Think About It: What would happen if the Earth didn't rotate?


Credit: NASA

Photo of Earth taken from the Moon

This real photo of the Earth taken from the Moon by an astronaut helps us see the actual story of night and day. The part of the Moon in the photo is being lit by the Sun. And, as you can see, about half the Earth is also receiving light from the Sun. For the other half of us on Earth, it is night time.

Sun-Earth Connections

We live in the atmosphere of the Sun. It is the source of all our light and heat. Without it, there would be no life on Earth. Its power extends all the way out to the edge of our solar system and beyond. The surface of the Sun is surprisingly busy. It is changing all the time. Sometimes darker, cooler areas called sunspots appear. From these areas solar storms can blast clouds of particles out into space. If one of these is aimed towards us, then we can observe the effects on Earth.


Credit: SOHO, NASA,ESA

Several dark sunspots on the Sun's surface

Earth is lucky to have a magnetic field that creates a kind of magnetic shield around it. These storms carry their own energy with them. When particles hit our magnetic shield here at Earth, most of them are blocked. The storms can cause changes in Earth's magnetic field sending particles down into our atmosphere, often causing different elements in the air to glow in different colors many miles above the ground. These shimmering curtains of light in the night sky are called aurora. This is one way that we see a magnetic connection between the Sun and Earth. The storms can also upset communications and satellites. We know that aurora occur on some other planets as well.


Credit: jan Curtis

Green aurora glowing in Earth's night sky

Spacecraft observing these storms and measuring how Earth reacts to them. These spacecraft and their new instruments give us information never available before that lets us reveal the processes of nature. Scientists use the new information from them to try to explain how the Sun works and how it changes over time.


Credit: NASA

Aurora glowing near Saturn's north and south poles

Making your own "sun" flower

All you need are the pieces of sun images. To make one of your own like the one on the poster's other side, go here:

http://soho.nascom.nasa.gov/classroom

Just print out the pieces, cut them out with scissors, and tape them onto the background image.

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