THE SUN

ACTIVITY B-1

GRADE LEVEL: 4-5

What's This Activity About?

Thousands of years ago, people around the world believed that our Sun was a god, and just hundreds of years ago, our local star was thought of as a giant celestial bonfire. This activity is a nice introduction to the Sun for earlier grades, and it does a good job of illustrating the process of scientific inquiry. Students learn about the Sun's size (scaled to the Earth), its distance, its temperature, composition, and energy output.

What Will Students Do?

Students start by observing a candle and discuss what properties it shares with our Sun. Students then do a scaling activity to dramatically demonstrate the difference in sizes between the Sun and Earth. Then, students make a mini-solar "oven" and discuss how people use solar energy.

Tips and Suggestions

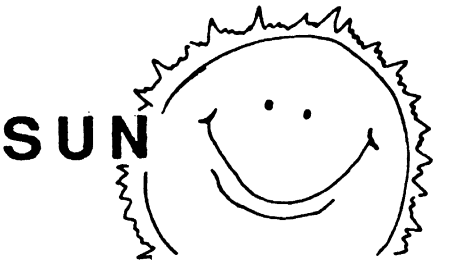
- Asking students what the Sun might be, and what properties it has, is an excellent way to illustrate how the process of science works—start with observations and infer or deduce conclusions based on those observations.
- Encourage students to consider why other "suns" are so faint in comparison to our local star.
- Although our Sun is not like a candle, the comparison as sources of heat and light is still appropriate for earlier grades. You can reinforce the difference between the Sun and a candle by asking students to consider how much time candles can last, compared with the time we know our Sun has existed.
- Note the typographic error on page 9. The Earth is about 100 Sun diameters away from the "Sun."

What Will Students Learn?

Concepts
- Sizes of stars and planets
- Stellar energy

Inquiry Skills
- Comparing
- Measuring

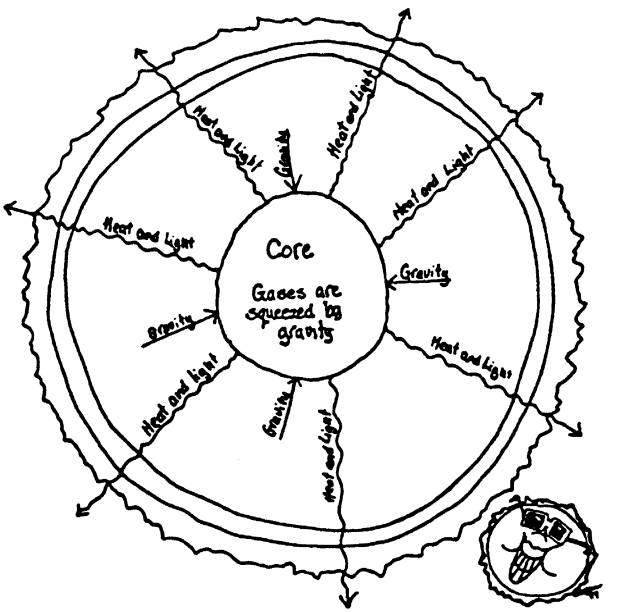
Big Ideas
- Energy
- Scale
- Models and Simulations



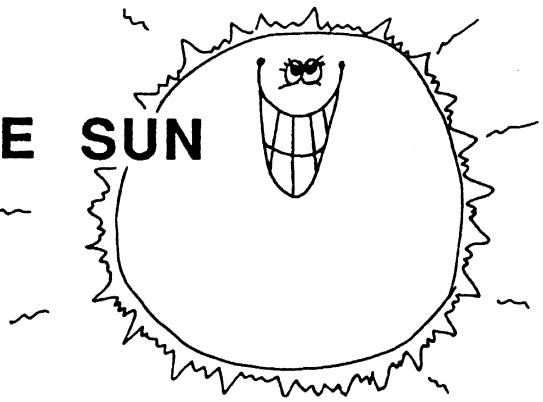
Our sun, a medium-sized star, is a huge globe of glowing gases. The reason the sun is such an impressive star to us is that it is much closer to us than other stars. It is only about 93 million miles away.

Hydrogen and helium are the main ingredients of the sun. The center of the sun is its "nuclear reactor" which produces energy by converting hydrogen to helium. The released energy rises to the surface after many years and radiates into space. This solar energy is our sunshine. Only a small part of the sun's total radiation reaches the earth. Its travel time from the sun is 8 1/2 minutes.

Nothing is more important to us on earth than the sun. Without the sun's heat and light, our earth would be a lifeless ball of ice-coated rock. The sun gives energy to the growing green plants that provide the food and oxygen for life on earth. We have long recognized the importance of the sun and watched it. Early man worshipped the sun. Scientists have studied the sun with telescopes for 200 years analyzing the light and heat.



THE SUN



TOPIC

Sun

KEY CONCEPTS

The sun is made of hot glowing gases. It is far from earth. The sun is much larger than earth. The sun is the source of all our energy.

MATERIALS

Kit
Candle
The Sun Book
Matches
Tape measure

Classroom
Yellow butcher paper
String and chalk (to draw circle)

BACKGROUND INFORMATION

Our sun, although huge to us, is just a medium-sized star. Its diameter is 109 times bigger than that of the earth, and it is 93 million miles away. Stars are composed of hot gases.

Scientists believe that the sun was formed from a huge mass of hydrogen and helium gas. Gravity compressed the gases causing the temperature to rise. When it got hot enough a thermonuclear reaction took place, and the sun began to glow. It is about 4.5 billion years old and will continue to burn for about that long.

The sun releases enormous amounts of energy in the form of heat and light. The earth receives only about one two-billionth of the total energy released by the sun.

PROCEDURE

1. Light a candle. Ask the children to make observations (candle gives off light and heat, has a flame, has colors, etc.) Ask them to think about the sun. How is the candle like the sun? (gives off light, heat, etc.)

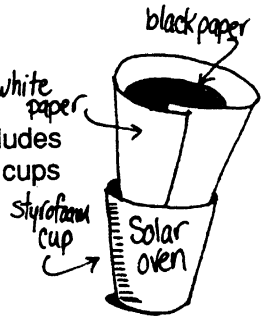
2. Explain to the students that the sun consists of hot glowing gases. It is a sphere and is much larger than earth. We can see only the outer layer of the sun. But deep in the center, gravity is squeezing the hydrogen gas together so hard that it creates explosions which release huge amounts of heat and light. These energies are passed to the surface of the sun and radiate out into space in all directions. Light energy travels across space to earth. When it strikes the earth, the energy heats the land.

3. Read The Sun by Seymour Simon. Ask the students why we need the sun and how we use the energy from the sun, e.g., light, heat, needed to grow plants (beginning of food cycle); controls the water cycle, the reason for winds and ocean currents. Record their ideas on a chart. Add to the chart as they learn more about the sun. The sheet "Why do We Need the Sun?" is provided as a recording sheet or for a transparency for class recording.

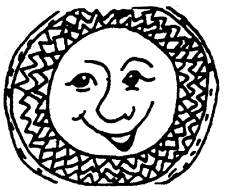
4. Construct models of the sun and earth to show the students. It is important to show the class an accurate model of the sun and earth both in size and distance. The diameter of the sun is 109 times that of the earth. A paper model can be made. Draw a circle with a .5 cm diameter for the earth (.5 x 109 = 54.5) and a circle with a 55 cm diameter for the sun. Other models are a large beach ball (sun) and a pea (earth) or a large yellow ball (sun) and the head of a pin (earth). If you want to add the moon, remember that its diameter is only 1/4 of earth's diameter. "How Far to the Sun?" can be used as a student recording sheet or as class directions on the overhead projector.

5. If the sun is so hot and so big, why don't we burn up? The sun is 93 million miles from earth. Take the class outside with their models of the earth and sun. The earth is about 100 sun diameters away from the earth. Begin at the model of the earth and use your model of the sun to measure out the distance of 100 sun diameters. If you are using the paper models, then the earth will be (100 x 55 cm = 5,500 cm) 55 meters away from the sun. The distance and size is very impressive to students. It is an accurate model that is sure to stay with them through later studies of Space Science.

EXTENSION



Use the energy from the sun to cook. The "Mini-Solar Oven" sheet includes directions for constructing simple solar ovens. Collect used styrofoam cups from meetings.



SUBJECT INTEGRATION

Art

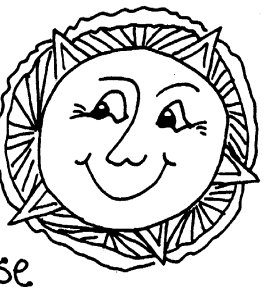
The sun and symbols of the sun have been art images over history. Create your own sun design. Have the students decorate circles of butcher paper. Staple two circles together, stuff, and hang above or beside their desks.

EVALUATION

Have students write about their reactions to "How Far to the Sun?". They should write about their understanding of the difference in size of the earth and sun.

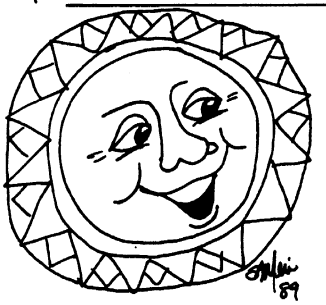
Astronomer: _____

Why do We Need the Sun?



Brainstorm a list of all the ways we use energy from the sun.

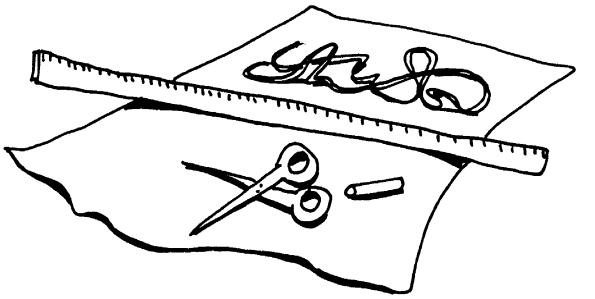
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____



Use the back if you have more ideas. Ask a friend, a parent, and other teachers to help add to your list.

How Far to the Sun?

You will need: paper
scissors
meter stick
string, chalk

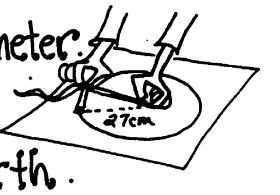


Do This:

1. Make a paper model of the sun and earth.

   Earth - Cut a paper circle this big. (Earth) (.5cm)

   Sun - Cut a paper circle 55cm in diameter. Use string and chalk to draw it.



2. Estimate how far the sun is from the earth. Place the two models that far apart.

   Measure the distance between

   My guess: _____

3. The earth is 93,000,000 miles from the sun. Start at the earth and walk the model of the sun 100 suns away.

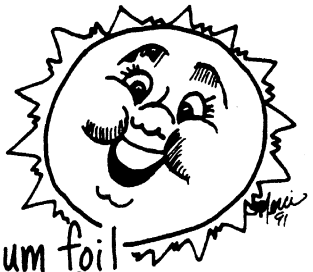
   Measure the distance between.

   My measurement: _____

4. Glue your earth to the sun. Wow!

5. If the sun is so much larger than earth, why does it look so small?

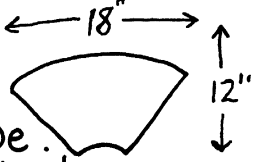
Mini-Solar Oven



You will need: (makes 1 oven)

1 - 12x18 white paper
1 - 6x9 black paper
aluminum foil
patterns for cones (tag)
2 styrofoam cups

Do This:



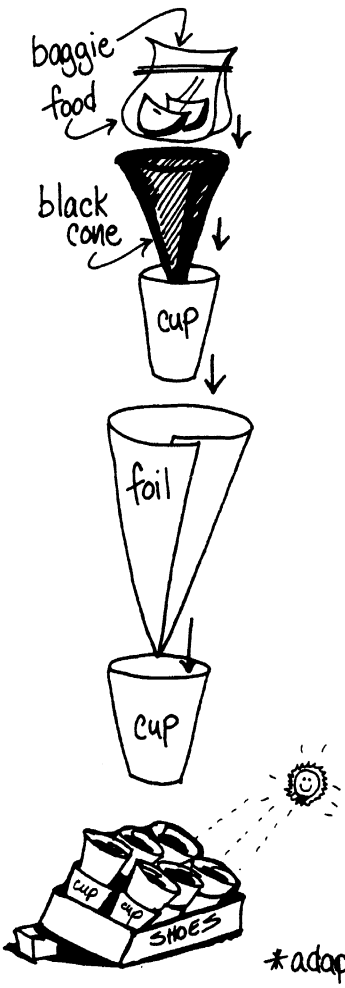
1. Use tagboard to make a pattern of this shape. Trace the tag pattern on white 12"x18" paper and cut out.

2. Cover both sides of the white shape with aluminum foil. Roll into a cone shape and put into the cup. Put the second cup inside. Push down all the way to hold the foil in place. This makes the oven's base.

3. Make another tag shape . Trace and cut out of black paper. Make a cone shape and put inside the second cup.

4. The solar oven is now ready to cook in the sunshine. Put food inside a plastic baggie and place inside the oven.

5. Place 4-6 ovens into a shoebox. Tilt to catch the most direct rays of the sun. Turn box to keep the sun shining inside the ovens.



6. Things to cook include: apple slices with raisins and cinnamon, sliced hot dogs, or vegetables with butter.

*adapted from Student Solar Oven by Jo Anne Bottini, "The Pocket Book"