

The Sun

Background Information

A star is a ball of hot, burning gases. The sun is the closest star to Earth (about 150,000,000 km/93,000,000 miles) away. Therefore, it looks bigger and brighter to those on Earth than other stars. The diameter of the Sun is 109 times the diameter of the Earth and the distance is 93 million miles between Earth and the Sun.

Earth spins on an imaginary line called an axis. A complete rotation takes about 24 hours (one day). The part of Earth facing the sun has daylight; the part facing away from the sun has night.

Earth revolves around the sun as it rotates on its axis.

One complete orbit, or revolution, of Earth around the sun takes about 365 days (one year). It actually takes 364 1/4 days to revolve around the sun. One-fourth of a day is equal to six hours. If you take a 24 hour day and divide it by six, you get four. Therefore, an extra day is added to the calendar every four years. Every fourth year is a leap year, which has 366 days.

The moon's diameter is about one-fourth that of Earth's.

Objectives

By the end of this activity, students will be able to:

- state science concepts and reasoning
- communicate effectively using science concepts and reasoning
- calculate and construct a model of the sun and earth in relative size

Instruction Time

45 minutes

Materials

- Candle
- Astronomer Journal pages 5-6
- Pea
- Beach ball
- Paper
- String
- Scissors
- Rulers with centimeters

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Procedure – What is the Sun?

1. Display and light a candle. Tell students to think of ways a candle is like the Sun.
2. Have students create an individual K-W-L chart or do this as a whole-class activity.
 - a. K — What the students know about the Sun.
 - b. W — What they want to learn about the Sun.
 - c. L — What they have learned about the Sun.

Procedure – How BIG is the Sun? (Short)

Grades K-3

1. Ask students to estimate the size of the Sun relative to the size of Earth and the distance between the two.
2. Show the relative sizes of Earth and the Sun by comparing a pea to a beach ball.
3. Explain that the Sun and Earth are very far apart. The distance could be compared to placing the beach ball at one end of a football field and the pea midfield on the 50-yard line.

OR

Grades 4-6

1. Have students construct models of Earth and Sun that show relative sizes. The diameter (or circumference) ratio is 109 to 1. If a student draws a circle with a diameter of 0.5 cm to represent Earth, a circle with a diameter of 54.5 cm would represent the Sun. The mean distance between the Sun and Earth is 93 million miles or 107 Sun diameters (34 Sun circumferences).
2. Using the paper models above, place Earth and the Sun 49.8 yards apart (one in the end zone and one on the 50-yard line of a football field).

Procedure – How BIG is the Sun? (Long)

1. Ask students to estimate the diameter of Earth, sun, and moon.
2. Explain to the students that you are going to help them to understand the sizes of Earth, sun, and moon by making a “scale model;” a model that will be smaller than the real thing, but that will maintain the size relationship between the three objects.
3. On page 6 of the Astronaut Journal, there is a circle with a diameter of 4 inches. Tell the students that this will represent Earth. Now, ask them how big a paper circle you need to represent the moon. Have the students cut out a circle the size they think the moon should be and compare their estimates.
4. Give them the approximate diameters of the real moon and Earth.
 - a. moon, about 2,000 miles (3,250 km)
 - b. Earth, about 8,000 miles (13,000 km)

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Procedure – How BIG is the Sun? (Long) - continued

5. Ask again, “For a 4” paper Earth, how big should we make our paper Moon?” If they don’t see the relationship, point out that 2,000 miles is one-fourth as big as 8,000 miles. Therefore, the paper moon should be 1” (2.5 cm) in diameter.
6. Cut out a paper moon of that size.
7. Now ask the students “For a 4” paper Earth, how big should we make our paper sun?” Have students estimate how big to make the sun before reviewing the size of the actual sun.
8. Approximate diameter of the real sun = about 800,000 miles (1,300,000 km)
9. Have them change their estimates based on this information.
10. How many times bigger will the paper sun need to be than the paper Earth of 4”?
 - a. 800,000 divided by 8,000 is the same as 800 divided by 8 = 100
 - b. So....if your paper Earth is 4”, the paper sun will be 400” (1,000 cm).
400” divided by 36” gives you about 11 yards
11. You don’t have paper big enough to make that circle! Instead, use 5 1/2 yards of string to draw an 11 yard circle with chalk on the playground. Tie one end of the string to a piece of chalk. Have another student hold the other end. The student with the chalk will pull the string tight and draw a circle on the cement. Then, trace the paper Earth and the paper Moon with chalk for comparison.

Expected Results & Explanations

Upon completion of this activity students should understand that while the Earth appears big, it is quite small in comparison to the Sun (1:109). This activity should also lead to the understanding that the Earth is larger than the Moon (1:4).