How Big Are Earth, Sun, and Moon?

Summary

These activities will help students understand where the sun is in the solar system and how big the earth, moon, and sun are.

Materials

For each group

Clear glass or beaker For each student
White boards
Markers
Eraser
Water
Rubbing alcohol
Teaspoon oil
Moon Boxes: clay, books, sun, moon, Earth orbit, Styrofoam ball three inches in diameter, flashlight, and hand lens or magnifying glass
Compass
White paper
5 1/2 yds. of yarn
Sidewalk chalk

- Earth and Moon Diagram (pdf)

Additional Resources

- *The Moon Book*
  , by Gail Gibbons; ISBN 0613128877
- *Handshake in Space*
  , by Sheri Tan; ISBN 1568995350
- *One Giant Leap*
  , by Dana Meachen Rau; ISBN 0613515765
- *What the Moon is Like*
  , by Franklyn M. Branley; ISBN 0064451852

Background for Teachers

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.
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 365 1/4 (365.25) 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, and 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.

Intended Learning Outcomes

3. Understand Science Concepts and Principles
4. Communicate Effectively Using Science Language and Reasoning

Instructional Procedures

Invitation to Learn

Pass out white boards and markers to each student. Have the students draw what they think exists in space. Walk around the room and assess each drawing. Make a list on the chalkboard of all the different responses. Students erase boards and draw what they think is in the center of our solar system. Again, walk around the room and make assessments. Discuss. Students erase boards and draw what else is out there besides Earth, the moon, and stars. Discuss.

Instructional Procedures

Where is the sun located in the solar system?

Pass out a beaker or clear glass to each group.

Fill the beaker half full with water.

Tilt the beaker slightly. Gently fill the beaker with rubbing alcohol. The alcohol is less dense than the water and therefore will float on the surface of the water. Slowly add a teaspoon of oil to the beaker. The oil will form spheres where the water and alcohol meet.

Questions to ask and discuss: What motion does Earth go through once a year? (It revolves around the sun once every year) Since Earth revolves around the sun, is Earth or the sun the center of the solar system? (Sun.) If the oil spheres represent the planets in the solar system, where would the sun be located? (In the center of the beaker.) How many planets are in our solar system? (Nine.) Like Earth, all the planets revolve around the sun. Do you think it takes all the planets one year (365 days) to make this journey? (No.)

How big is Earth, moon, and sun?

Ask students to estimate the diameter of Earth, sun, and moon.

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.

Using the *Earth and Moon Diagram*, show them a circle of paper that is 4"(10 cm) in diameter. 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.

Give them the approximate diameters of the real moon and Earth.

moon, about 2,000 miles (3,250 km)

Earth, about 8,000 miles (13,000 km)

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.

Cut out a paper moon of that size.

Have students estimate how big to make the sun before reviewing the size of the actual sun.

Approximate diameter of the real sun.

sun, about 800,000 miles (1,300,000 km)

Have them change their estimates based on this information.

How many times bigger will the paper sun need to be than the paper moon of 1"?

800,000 divided by 2,000

is the same as

800 divided by 2 = 400

So....if your paper moon is 1", the paper sun will be 400" (1,000 cm).

400" divided by 36" gives you about 11 yards

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.

Extensions

Estimation

Pass out gray or white Styrofoam balls and hand lens to each group. Have students make observations. Explain to the students this represents the moon. The moon is a gray sphere covered with many craters. Read *What the Moon Is Like* by Franklyn M. Branley. Discuss what the moon is like.

Color, cut out, and assemble ABC Moon Book (pdf) created by Susan Tenhor and Colleen Davis.

Family Connections

Conduct the same experiment at home (water, rubbing alcohol, and oil).

Check out a moon box to share with family.

Moon Boxes

Bowl with flour

Rocks of different sizes

Flashlight

Mirror

Styrofoam ball

- My Book About The Moon student activity book (pdf)

How many people have walked on the moon? (Twelve astronauts have walked on the moon, the last in 1972.)

Here are the names of those astronauts listed chronologically by the date of their walk.

July 20, 1969	Nov. 19, 1969
Neil Armstrong	Charles (Pete) Conrad
Edwin "Buzz" Aldrin	Alan Bean
Feb. 5, 1971	July 30, 1971
Alan Shepard	James Irwin
Edgar Mitchell	David Scott
Apr. 21-23, 1971	Dec. 11-13, 1972
Charles Duke	Harrison Schmitt
John Young	Eugene Cernan

Assessment Plan

Have students use clay from their moon boxes and make a scale model of Earth and the moon. (Remember, the moon is 1/4 the size of Earth.)

Pass out white boards again and have them draw answers to the same questions asked at the beginning of the lesson.

Authors

Utah LessonPlans