

Name: _____ School: _____

Grade or Level: _____ Lesson Plan #: _____ Date: _____

How Big is our Solar System?

Abstract

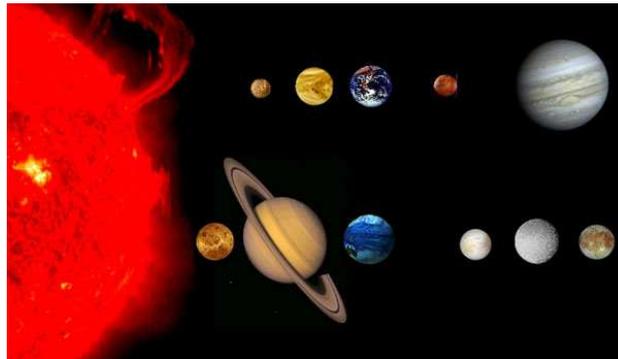
How big is the Earth? When it comes to the solar system, the earth is just a small part of a much larger system of planets. How much larger are the largest planets? How much smaller is the smallest planet?

Objective

In this demonstration the class will investigate the relative sizes and distances of the planets and sun in relation to one another. Upon completion of this demonstration the students will be able to understand and use the concept of a scale model; be able to visualize and describe the relative size of the solar system and what comprises the solar system; How the sun affects the planets and how the sun would appear from the farthest planets.

Introduction

Everyone has seen photos and diagrams of the solar system, however it is very hard to grasp the vastness of the solar system and what a small percentage the planets make up of the solar system.



Related URL's: www.space-exploratorium.com/solar-system.htm

Curricular Connections: (QCC/IEP/Local or National Standards):

Pre-teaching for Background Knowledge

To do this demonstration you should know what the following terms mean. Have an adult help you search the internet, or take you to your local library to find out more!

- Sun
- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Saturn
- Neptune
- Minor Planets or Asteroid Belt
- Scale Model
- Gravity
- How far is a mile

Questions

- Which planet is the smallest?
- Which planet is the largest?
- Which planet is the farthest from the sun?
- What planet is closest to the Sun?
- What would the sun look like on this planet?
- If the distance from the Sun to the most distant planet is the length of a football field, what object would represent the size of Earth?
- In order of distance from the Sun, what are the names of the planets in our solar system?

Materials and Equipment

- One large (50") umbrella
- One BB
- One mini-marshmallow or other round object 0.4 - 0.5 inches in diameter
- One pea
- One G40 frosted globe light bulb
- One grapefruit approximately 4" in diameter
- One golf ball
- One ping pong ball
- One box of 50 or more straight pins

Experimental Procedure

Make a football field sized model of the solar system, using an umbrella for the sun. Place it on one goal line. Using a scale of 1 yard to 30 million miles, Mercury would be about slightly over the 1-yard line. Now determine the position of the other planets. (Note: Although the yard lines on a football field go from 0 to 50 and back to 0, treat them as 100 continuous yard lines). Have a student stand at each planet location, holding their planet sized object above their head so everyone can see the relative distances of the planets to the sun and their relative sizes. Have the remaining students stand at the location of the asteroid belt, lined up from side-line to side-line in a staggered fashion, holding their straight pins, point up. For the Sun, have a student hold up the umbrella pointing toward the opposite goal line.

Scale Model of the Planets in the Solar System					
Object	True Diameter in miles	Diameter in inches	Diameter in objects	True Distance to the Sun in miles	Distance to Sun in yards (30 million miles/yard)
Sun	864,327	50.00	large umbrella (50")	0	0
Mercury	3,032	0.174	BB	35,983,610	1.20
Venus	7,521	0.430	mini-marshmallow	67,232,360	2.24
Earth	7,926	0.436	mini-marshmallow	92,957,100	3.09
Mars	4,222	0.242	pea	141,635,300	4.72
Asteroid Belt Minor Planets	Dust to 150	0 - .001	tip of a pin	250,983,900	8.37
Jupiter	88,846	5.00	G40 globe light bulb	483,632,000	16.12
Saturn	74,898	4.12	grapefruit	888,188,000	29.60
Uranus	31,763	1.68	golf ball	1,783,950,000	59.46
Neptune	30,778	1.63	ping pong ball	2,798,842,000	93.29

From this very vivid representation, students will be able to visualize the size of the Earth and other planets relative to the Sun. In addition, the students will be able to understand the distance from the Sun of each planet.

Students will be asked to name the planets in order from the Sun. A helpful memorization tool is the phrase: "**M**y **V**ery **E**ducated **M**other **J**ust **S**erved **U**s **N**uts"

Project Lesson Assessment

When this project is completed the students should be able to answer these questions:

1. Which planet is the smallest?
2. Which planet is the largest?
3. Which planet is the farthest from the Sun?
4. Which planet is closest to the Sun?
5. In order of distance from the Sun, what are the names of the planets in our Solar system?
6. If the distance from the Sun to the most distant planet is the length of a football field, what object would represent the size of Earth?

Assessment Data:

	# at 30%	# at 30 to 70%	# at 70%+
Which planet is the smallest?			
Which planet is the largest?			
Which planet is the farthest from the Sun?			
Which planet is the closest to the Sun?			
In order of distance from the Sun, what are the names of the planets in our Solar system?			
If the distance from the Sun to the most distant planet is the length of a football field, what object would represent the size of Earth?			

Teacher Assessment Results Summary:

Does this lesson need to be re-taught? ____YES ____NO

What portion of the lesson was most effective and why?

What portion of the lesson was least effective?

What would most improve the learning of that portion of the lesson?

What I will do to re-teach this portion:

When I teach this full lesson next time, I will:
