EAS 100
SCALE MODEL OF THE SOLAR SYSTEM

(1 to 1 Billion scale; 1 meter in the model represents 1,000,000 kilometers)

The scale model of the solar system is designed to:

1) Demonstrate the concept of scale (in this case 1 to 1 Billion or 1:1,000,000,000) which is characteristic of physical models, maps, cross-sectional diagrams and many graphs.

2) Illustrate the scale, size and nature of the solar system and the position of the Earth in the solar system.

3) Demonstrate the vast size of the solar system (the actual dimensions are a billion times larger than the model dimensions) and emphasize the observation that the solar system is mostly empty space — the planets (including the Earth) are actually very small and unusual features of the solar system.

The key feature of the solar system model is the use of a single scale factor (1:1 Billion) for illustrating both the sizes of the Sun and planets and the distances of the planets from the Sun. In the following table, the actual dimensions (distances and diameters) of the Sun and planets (and the Earth's moon) are shown in addition to the dimensions at a scale of 1 to 1 Billion. The scale model sizes can be easily illustrated with scale models (spheres of the appropriate sizes) or diagrams (such as on the attached page) of the planets and their positions relative to the Sun in the scale model can be effectively visualized by positioning the model planets at the given distances (58 meters for Mercury to 5.9 km for Pluto) away from the model Sun which is 1.39 meters in diameter. On this scale, The Earth is about 150 meters from the Sun and is 1.2 cm in diameter. The Earth's moon is 0.35 cm in diameter and is 40 cm away from the Earth. For convenience, the scale model distances for the planets are also given in miles so that a car odometer can be used to measure out the distances of the planets from the position of the model Sun. By driving along a road from an initial location, noting the distances on the table, and looking at the scaled sizes on the attached diagram, one can easily obtain an accurate visualization of the solar system.

Sun or Planet	Distance From Sun (km)		Scaled Distance From Sun (m) (1:1 Billion)	Diameter (km)	Scaled Diameter (cm) (1:1 Billion)
Sun	0		0	1,392,000	139
Mercury	57,900,000		57.9 (0.05 mi)*	4,880	0.49
Venus	108,200,000		108.2 (0.07)	12,100	1.21
Earth	149,600,000		149.6 (0.09)	12,756	1.28
(Earth's Moon)	400,000	(from Earth)	0.4 (from Earth)	3,476	0.35
Mars	227,900,000		227.9 (0.14)	6,794	0.68
Jupiter	778,300,000		778.3 (0.48)	143,000	14.3
Saturn	1,427,000,000		1427 (0.89)	120,000	12.0
Uranus	2,871,000,000		2871 (1.78)	51,800	5.18
Neptune	4,497,000,000		4497 (2.79)	49,528	4.95
Pluto	5,914,000,000		5914 (3.67)	2,330	0.23

*Scaled distances in miles are given in parentheses so that a car odometer can be used to measure approximate distances from the location of the Sun in the Scale Model of the Solar System.

(To obtain correct scale, enlarge on 11x17 inch paper to make Jupiter 14.3 cm in diameter)

Scale Model of the Solar System

Sun, planets and Earth's moon are shown at a scale of 1 to 1 Billion (1 meter on the model represents 1,000,000 kilometers in the actual solar system). Sizes (diameters) are shown at 1:1 Billion scale. Distances between the Sun and the planets are <u>not</u> shown to scale on this diagram.