A 1000 Yard Solar System Model

There is one other party that may profitably take the planet-walk, and that is yourself, alone. Reading the following description is no substitute: you must go out and take the steps and look at the distances, if the awe is to set in. First, collect the objects you need. They are:

Sun-any ball, diameter 8.00 inches
Mercury-a mustard seed
Venus-a peppercorn
Earth-a peppercorn, with a poppyseed moon
Mars-a coriander seed
Jupiter-a large malted milk ball
Saturn-a gumball
Uranus-a Skittle
Neptune-a second Skittle
Pluto- a poppyseed

The first astonishment is the contrast between the great round looming Sun and the tiny planets. (And note a proof of the difference between reading and seeing: if it were not for the picture, the figures such as "8 inches" and ".08 inch" would create little impression.) Look at the second peppercorn–our "huge" Earth–up beside the truly huge curve of the Sun.

Having set out the objects with which the model is to be made, the next thing is to ask: "How much space do we need to make it?" Children may think that the table-top will suffice, or a fraction of it, or merely moving the objects apart a little. Adults think in terms of the room or a fraction of the room, or perhaps the corridor outside. To arrive at the answer, we have to introduce scale.

This peppercorn is the Earth we live on.

The Earth is eight thousand miles wide! The peppercorn is eight hundredths of an inch wide. What about the Sun? It is eight hundred thousand miles wide. The ball representing it is eight inches wide. So, one inch in the model represents a hundred thousand miles in reality.

This means that one yard (36 inches) represents 3,600,000 miles. Take a pace: this distance across the floor is an enormous space-journey called "three million six hundred thousand miles."

Now, what is the distance between the Earth and the Sun? It is 93 million miles. In the model, this will be 26 yards.

Hand the Sun and the planets to members of the class, making sure that each knows the name of the object he or she is carrying, so as to be able to produce it when called upon.

Put the Sun ball down, and march away as follows. (After the first few planets, you will want to appoint someone else to do the actual pacing-call this person the "Spacecraft" or "Pacecraft"-so that you are free to talk.)

10 paces. Call out "Mercury, where are you?" and have the Mercury-bearer put down his card and mustard seed.
Another **9 paces.** Venus puts down her card and peppercorn.
Another **7 paces.** Earth

The correctness of the scale can be proved to skeptics (of a certain maturity) on the spot. The apparent size of the Sun ball, 26 paces away, is now the same as that of the real Sun-half a degree or arc, or half the width of your little finger held at arm's length. (If both the size of an object and its distance have been scaled down by the same factor, then the angle it subtends must remain the same.)

Another **14 paces.** Mars

Now come the gasps, at the first substantially larger leap:

Another **95 paces** to Jupiter
Here is the "giant planet"-but it is a malted milk ball, more than a city block from its nearest neighbor in space! From now on, amazement itself cannot keep pace, as the intervals grow extravagantly:

 Another **112 paces.** Saturn
 Another **249 paces.** Uranus
 Another **281 paces.** Neptune
 Another **242 paces.** Pluto