Acadiana Sky

A Scale Model of the Solar System

Originally developed for the Lafayette Science Museum, Lafayette, LA

Use the following information to construct a model of the solar system in the classroom or school yard. All planetary distances are given in Astronomical Unites (AU), and hence are multiples of the earth's distance from the sun. All planetary distances are *average* distances from the sun; since none of the planets travel in truly circular orbits, their distances vary somewhat. The sun's diameter is also given in AU, while the diameters of the planets are related to the sun's diameter and to each other. To make a model, select an arbitrary distance for the space between Earth and the sun, and multiply that distance by each planet's AU from the sun to get their relative positions in the model. An example follows the table.

Celestial Body	**Average Distance from the Sun (AU)***	**Diameter**
Sun	X	0.009 AU
Mercury	0.39	1/3 Earth
Venus	0.72	just less than Earth
Earth	1.00	0.01 Sun
Mars	1.52	½ Earth
Jupiter	5.20	0.1 Sun
Saturn	9.54	just less than Jupiter
Uranus	19.19	4 Earths
Neptune	30.09	4 Earths
Alpha Centauri**	272,000	0.01 AU

*1 AU is the distance from the earth to the sun, about 93,000,000 miles.
**Alpha Centauri is the nearest star to the sun. See example for more information.

Example

If Earth is 10' from the sun (1 AU represented by 10'), then

Mercury is 0.39 X 10' = 3.9' from the sun;
Venus is 0.72 X 10' = 7.2' from the sun;
Earth is 1.00 X 10' = 10' from the sun;
Mars is 1.52 X 10' = 15.2' from the sun;
Jupiter is 5.20 X 10' = 52.0' from the sun;
Saturn is 9.54 X 10' = 95.4' from the sun;
Uranus is 19.19 X 10' = 191.9' from the sun;
and Neptune is 30.09 X 10' = 300.09’ from the sun.

Now figure out the sizes of these objects. Since the diameter of the sun is 0.009 AU across, on this scale it is 0.009 X 10' = 0.09' across, or about 1.08" (which can be represented by a 1” Styrofoam ball, or a US quarter or US Presidential dollar coin). Since Jupiter is about 0.l times the size of the sun, it would be about 0.l” across; Saturn is almost immeasurably smaller on this scale. Both could be represented by a plastic bead or ball bearing about 3/32" in diameter. Earth is slightly less than 0.0l times the diameter of the sun, which on this scale would be about a hundredth of an inch; it could be represented by a *small* grain of sand. Venus is almost the same size. Mercury would be a dust speck. Mars would be about half the size of Earth, while Uranus and Neptune might be represented by something about 1/32 inch in diameter (about half again as big as the period at the end of this sentence).

Remember, these little dots and dust specks will be spread out across almost 400', which represents only half the solar system—the other sides of the orbits spread out the same distance on the other side of the sun! You’ll need a football field to lay this out. If this is a problem, by choosing a smaller scale (for instance, 1 AU represented by 1' instead of 10'), the model will be much smaller, fitting easily into a large room, gym, or hallway. Of course, the planets will be nearly microscopic...

Let’s consider the closest star to the sun, Alpha Centauri. It’s actually a *triple* star, meaning three stars orbiting each other. The two biggest ones, called Alpha Centauri A and Alpha Centauri B, are slightly bigger than the sun; the third (called Proxima Centauri because it is the component currently closest to the sun), is a red dwarf about half the diameter of Jupiter (its mass, however, is about 100 times greater than that of Jupiter, enough to allow the object to generate its energy by nuclear fusion, which is why it is a star rather than a planet). Alpha Centauri A and B orbit each other every 80 years, while Proxima orbits the other two about every half million years. On the scale of our model (10' representing 1 AU), Alpha Centauri A and B would be a pair of whatever objects were used to represent the sun about 230' apart, 515 *miles* away. Proxima Centauri would be a tiny bead between 1/32" and 2/32" in diameter, about 20 miles closer than the other two stars.