# Scale Model of the Solar System

Your group has a variety of objects to represent the planets of the solar system. We are all using a yellow beach ball that is 20 cm in diameter to represent the Sun. The Sun is actually 1,400,000 km in diameter.

We are going to create a scale model of the solar system that accurately represents the sizes of all the planets and the distances separating them. We are using the same scale for the planets as for the Sun. Using the Table below, calculate the scaled sizes for all the planets, and select an object to represent each of the planets.

| Planet | Actual Diameter in Kilometers | Diameter in Scale Model | Object Representing Planet in Scale Model |
|---|---|---|---|
| Sun | 1,400,000 km | 20 cm | Yellow beach ball |
| Mercury | 5,000 km | | |
| Venus | 12,000 km | | |
| Earth | 13,000 km | | |
| Mars | 7,000 km | | |
| Jupiter | 143,000 km | | |
| Saturn | 120,000 km | | |
| Uranus | 51,000 km | | |
| Neptune | 49,000 km | | |
| Pluto | 2,200 km | | |

We will share as a whole group our scaled diameters and the objects selected to represent the planets. Then, we must decide how far to place these model planets from the yellow beach ball. Using the Table below and the same scale, calculate the distances for all the planets.

| Planet | Actual Distance in Kilometers | Scaled Distance Between Planets | Scaled Distance of Planet from the Sun |
|---|---|---|---|
| Mercury | 58,000,000 km from Sun | N/A | |
| Venus | 50,000,000 km from Mercury | | |
| Earth | 41,000,000 km from Venus | | |
| Mars | 78,000,000 km from Earth | | |
| Jupiter | 550,000,000 km from Mars | | |
| Saturn | 649,000,000 km from Jupiter | | |
| Uranus | 1,443,000,000 km from Saturn | | |
| Neptune | 1,627,000,000 km from Uranus | | |
| Pluto | 1,404,0000,000 km from Neptune | | |

Groups share the objects they have chosen for the different planets, and the distances for each planet. We will write the name of each planet on an index card. As a whole group, we will decide how many large steps to take from the Sun to Mercury, with each large step being one meter. We will write that number of steps on the Mercury card. For Venus, we will decide how many large steps to take from Mercury to Venus, and write that number on the Venus card. We will continue for the rest of the planets.

Everyone goes outside to set up one class model of the solar system using the beach ball Sun and the objects that have been chosen. We will pace off the steps from the Sun, and look back from each planet towards the Sun. Of course, we will remember that the planets do not line up in a straight line from the Sun.

Proxima Centauri, the star closest to our solar system, is 40,000,000,000,000 (40 trillion or $40 \times 10^{12}$) km away. Where would it be using the same scale as we just used for the solar system?

The distance from our solar system to the center of the Milky Way galaxy is about 30,000 light years which is approximately $30 \times 10^{16}$ kilometers. How far away would it be in our model using the same scale as we have used previously for the solar system?