Earth Science

"Making a Scale Solar System"

You may think it is a long way to walk from your home to your school, or from your community to a location in another part of the country or world. But what about the distance between the Earth and objects in Outer Space? How far away is the Moon? the Sun? other planets? The nearest star?

Astronomers have created methods to measure interplanetary and interstellar distances. In this first activity about modeling the relative size of the Solar System, you will use facts from the "Solar System Data" chart on p. 15 of the Earth Science Reference Tables, a meter stick, and a roll of cash register tape.

1. The first step will be to decide on a useful scale. This means, how many km will 1 meter represent? Examine the "Mean Distance from Sun" in the "Solar System Data" chart.

   Which planet is furthest from the Sun?

   How far is it? million km

   You don't want a model that is too small or too large, so what scale might create a reasonable model? 1 m represents million km
   Explain why you select this scale:

2. Using your scale and rounding up to the next 1,000 km, determine how many meters of tape you will need. Measure off this length. Then find a convenient workspace.

3. Start by drawing a circle at one end. This is will represent the Sun.

4. Mercury is listed as 57.9 million km from the Sun (rounded to 58), so using your scale, determine how many cm this would be. For example, if you use 1 m = 1000 million km:

$$\frac{57.9}{1000} = \frac{5.8}{100}$$

Measure this from the end of the Sun-circle and draw a small circle to represent Mercury, as above.

5. Venus is 108.2 million km from the Sun, so it should be shown as 10.8 cm from the end of the Sun (Not from Mercury). Draw another circle to represent Venus.

   Continue adding the other planets. Be sure to label each.

   Note: You are making a scale for the relative distances, not the relative sizes, but you may want to show differences in the sizes. You may also wish to enhance your model with other information about each planet.

6. Compare your model with those created by other groups. What similarities do you see? What differences? What can explain the differences?

Extension Activity: Pluto is now considered a "dwarf planet," rather than the 9th planet as it was for many decades. Its mean distance is about 5,900 million km. Develop a way to add Pluto to your scale model.

Suggested answers

1. Which planet is furthest from the Sun? Neptune
   How far is it? **4,498.3** million km
   1 m represents **1,000** million km
   Explain why you select this scale: **convenient size for classroom**
2. How many meters of tape needed: **5** m