Astronomical Distances

Overview:

You are going to make a scale model to represent the distances in our solar system. The distances in space are immense and difficult to imagine. A scale model is often used to visually illustrate something (in this case the distances in our solar system) to help make it more comprehensible.

The scale will be 1 cm= 10,000,000 km

Materials:

Meter stick Calculator Metric ruler Adding Machine Tape Colored pencils

Part 1:

1. Convert from average distance (km) to scale distance (cm). RECORD on **Table 1**.
2. Draw, color, and label the Sun on one end of your adding machine tape.
3. Measure from the SUN each time to show distances to each celestial body.
   ***NOTE**: DO NOT put Eris on your adding machine tape – stop after Pluto!*
4. Sketch in color and label each.
5. Make sure your names and period are on your machine tape!

Example: Mercury

$$\frac{1\text{cm}}{10{,}000{,}000\text{km}} = \frac{X\text{cm}}{58{,}000{,}000\text{km}} \sim 5.8\text{cm}$$

Table 1

Scale: 1 cm= 10,000,000 km		
Celestial Body	**Average Distance from the sun (km)**	**Scale distance from the sun (cm)**
Sun	0	0
Mercury	58,000,000	
Venus	108,000,000	
Earth	150,000,000	
Mars	228,000,000	
Ceres (dwarf planet)	420,000,000	
Jupiter	778,000,000	
Saturn	1,430,500,000	
Uranus	2,870,000,000	
Neptune	4,500,000,000	
Pluto	5,900,000,000	
Eris (dwarf planet) ***Do not put this on your adding machine tape!*	14,000,000,000	

*****WHEN Finished – Check your adding machine tape with the KEY!***

Part 2:

6. The distance from the Earth to the Sun is another measurement used in astronomy. This distance is called an astronomical unit (AU). An astronomical unit is equal to 150,000,000 km.
   a. Convert the average distance from km to AU and RECORD your answers on **Table 2 under "Average Distance from the sun (AU)".**

   b. For Mercury: Set up your equation & Show your work below…
   Mercury = 58,000,000km

Table 2

Celestial Body	Average Distance from the sun (km)	Average Distance from the sun (AU)
Sun	0	0
Mercury	58,000,000	
Venus	108,000,000	
Earth	150,000,000	
Mars	228,000,000	
Ceres (dwarf planet)	420,000,000	
Jupiter	778,000,000	
Saturn	1,430,500,000	
Uranus	2,870,000,000	
Neptune	4,500,000,000	
Pluto	5,900,000,000	
Eris (dwarf planet)	14,000,000,000	

7. What is an AU?

8. Why do you suppose scientist choose to measure distances in space with astronomical units? (Explain!)

Part 3:

9. Convert average distance (km) to scientific notation for each celestial body. RECORD in **Table 3 under "Scientific Notation".** *(pg. 738 in your textbook and your notes are helpful!)*

Table 3

Celestial Body	Average Distance from the sun (km)	Scientific notation
Sun	0	0
Mercury	58,000,000	
Venus	108,000,000	
Earth	150,000,000	
Mars	228,000,000	
Ceres (dwarf planet)	420,000,000	
Jupiter	778,000,000	
Saturn	1,430,500,000	
Uranus	2,870,000,000	
Neptune	4,500,000,000	
Pluto	5,900,000,000	
Eris (dwarf planet)	14,000,000,000	

10. What is the difference between a dwarf planet and a true planet? *(Look this up!)*

Part 4:

11. The distance light can travel in one year is called a light year (ly). A light year is equal to 9,000,000,000,000 km.
    - **a.** Convert the average distance from km to ly and RECORD your answer ***in scientific notation*** on **Table 2 under "Average Distance from the Sun (ly)".**

    - b. For Mercury: Set up your equation & Show your work below…
      Mercury = 58,000,000km

Table 4

Celestial Body	**Average Distance from the sun (km)**	**Average Distance from the sun (ly)**	***Convert your answer in Light years into Scientific Notation***
Sun	0	0	
Mercury	58,000,000		
Venus	108,000,000		
Earth	150,000,000		
Mars	228,000,000		
Ceres (dwarf planet)	420,000,000		
Jupiter	778,000,000		
Saturn	1,430,500,000		
Uranus	2,870,000,000		
Neptune	4,500,000,000		
Pluto	5,900,000,000		
Eris (dwarf planet)	14,000,000,000		

12. What is a Light Year?

13. Why would scientists want to use this form of distance? (Explain!)