

### SCALING THE SOLAR SYSTEM TO THE BIG BEACH BALL SUN

To get an "intuitive" sense of the relative sizes of the sun and planets, and their separations, you are to scale down the solar system so that the sun can be represented by a (large ... 1m diameter) beach ball. Define the sun's diameter as 100 cm. and use a *scaling factor* given by

$$\Delta_{\text{scale}} = \frac{\text{Scaled Size}}{\text{True Size}} = \frac{77.00 \text{ cm}}{1,400,000 \text{ km}} = 5.5 \times 10^{-5} \frac{\text{cm}}{\text{km}} \quad \left( = 5.5 \begin{matrix} \boxed{\times 10^x} \\ \boxed{\text{EE}} \end{matrix} \begin{matrix} \boxed{(-)} \\ \boxed{5} \end{matrix} \right) \quad \text{Use the scientific notation key for your calculator!}$$

since (True Size) × Δ<sub>scale</sub> = (Scaled Size). For the solar system objects and the star nearest Sol (Proxima Centauri) **calculate their scaled diameters and scaled distances to fill in the table below.** Also name a common object that approximates the size of each solar system body.<sup>33</sup>

NAME	DIAMETER			DISTANCE FROM SOL					
	TRUE km	SCALED cm	REPRESENTATIVE SPHERICAL OBJECT	TRUE km	cm	m	yards	miles	Earth diam's
SOL	1,400,000	77.0	BIG Beach Ball						
MERCURY	4,800			58 × 10 <sup>6</sup>					
VENUS	12,000			108 × 10 <sup>6</sup>					
EARTH	12,800			150 × 10 <sup>6</sup>					
MARS	6,800			228 × 10 <sup>6</sup>					
JUPITER	140,000			778 × 10 <sup>6</sup>					
SATURN	120,000			1427 × 10 <sup>6</sup>					
URANUS	51,000			2871 × 10 <sup>6</sup>					
NEPTUNE	49,600			4497 × 10 <sup>6</sup>					
PROXIMA CENTAURI	200,000			4.03 × 10 <sup>13</sup>					

The Following conversion factors will be helpful

1 meter = 1.11 yards

and 1 yard = 5.68 × 10<sup>-4</sup> miles

The diameter of the Earth is 7926 miles

and 1 ly = 5.88 × 10<sup>12</sup> miles (about 6 trillion miles ... a *l o n g* way!)