

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

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

since (True Size) × Δ_{scale} = (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.³³

NAME	DIAMETER			DISTANCE FROM SOL					
	TRUE km	SCALED cm	REPRESENTATIVE <i>SPHERICAL</i> OBJECT	TRUE km	cm	m	yards	miles	Earth diam's
SOL	1,400,000	77.0	BIG Beach Ball						
MERCURY	4,800	0.26	Peppercorn	58 × 10 ⁶	3190	31.9	35		
VENUS	12,000	0.66	Blueberry	108 × 10 ⁶	5940	59.4	66		
EARTH	12,800	0.70	Blueberry	150 × 10 ⁶	8250	82.5	92		
MARS	6,800	0.37	Small Pea	228 × 10 ⁶	12540	125.4	139		
JUPITER	140,000	7.70	Grapefruit	778 × 10 ⁶	42790	427.9	475	0.27	
SATURN	120,000	6.60	Grapefruit	1427 × 10 ⁶	78485	784.9	872	0.50	
URANUS	51,000	2.81	Golf Ball	2871 × 10 ⁶	157905	1579.1	1755	1.00	
NEPTUNE	49,600	2.73	Golf Ball	4497 × 10 ⁶	247335	2473.4	2748	1.56	
PROXIMA CENTAURI	200,000	11.0	Spaghetti Squash (inch larger than a softball)	4.03 × 10 ¹³	2.21.E+09	2.21E+07	2.46E+07	1.40E+04	1.73

The Following conversion factors will be helpful

1 meter = 1.11 yards

and 1 yard = 5.68 × 10⁻⁴ miles

The diameter of the Earth is 7926 miles

and 1 ly = 5.88 × 10¹² miles (about 6 trillion miles ... a *l o n g* way!)