Name ___Solution___

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

$$\Delta_{scale} = \frac{\text{Scaled Size}}{\text{True Size}} = \frac{77.00 \text{ cm}}{1,400,000 \text{ km}} = 5.5 \times 10^{-5} \tfrac{cm}{km} \quad \left(= 5.5 \boxed{\frac{x10^x}{EE}} \boxed{(-)} 5 \right)$$

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 | SCALED | REPRESENTATIVE | TRUE | SCALED: (TRUE × Δ_{scale}) | | | | |
	km	cm	SPHERICAL OBJECT	km	cm	m	yards	miles	Earth diam's
SOL	1,400,000	77.0	BIG Beach Ball						
MERCURY	4,800	0.26	Peppercorn	58 x 10⁶	3190	31.9	35		
VENUS	12,000	0.66	Blueberry	108 x 10⁶	5940	59.4	66		
EARTH	12,800	0.70	Blueberry	150 x 10⁶	8250	82.5	92		
MARS	6,800	0.37	Small Pea	228 x 10⁶	12540	125.4	139		
JUPITER	140,000	7.70	Grapefruit	778 x 10⁶	42790	427.9	475	0.27	
SATURN	120,000	6.60	Grapefruit	1427 x 10⁶	78485	784.9	872	0.50	
URANUS	51,000	2.81	Golf Ball	2871 x 10⁶	157905	1579.1	1755	1.00	
NEPTUNE	49,600	2.73	Golf Ball	4497 x 10⁶	247335	2473.4	2748	1.56	
PROXIMA CENTAURI	200,000	11.0	Spaghetti Squash (inch larger than a softball)	4.03 x 10¹³	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 x 10⁻⁴ miles

The diameter of the Earth is 7926 miles and 1 ly = 5.88x10¹² miles (about 6 trillion miles … a *l o n g* way!)