

Scale Model of Sun and Planet Sizes

Background

Many of the drawings or models of the solar system cannot be drawn to scale. The distances and sizes involved vary too much and are too great to represent in a textbook or poster. Consequently, an understanding of the distances and sizes involved in astronomy is not obtained. This activity will help you gain an understanding of the planet sizes in relation to each other and the Sun.

Objective

We are turning the ceiling into the solar system! Yellow paper will cover the ceiling tiles in the center of the classroom to represent the Sun. Each group will draw one planet to scale on a ceiling tile. The end result will be a model of the size of each planet drawn to scale with the Sun.

Scale

We will represent the Sun by a circle with a 5-foot radius. This will be done by taking a sliver of this 5ft circle Sun and putting it in the corner of the classroom. The outline is there for you to see.

Now that there is a scale for the Sun, we need to find the size of the eight planets. Here is a table showing the radius of each object.

Object	Radius (km)
Sun	6.955×10^5
Mercury	2.4397×10^3
Venus	6.0519×10^3
Earth	6.3710×10^3
Mars	3.4025×10^3

Object	Radius (km)
Jupiter	7.1492×10^4
Saturn	6.0268×10^4
Uranus	2.5559×10^4
Neptune	2.4764×10^4

The first thing to figure out is the scale factor. This is how much smaller our model will be than the actual solar system. Using the data for the Sun, the scale ratio is

$$6.955 \times 10^5 \text{ km} : 50 \text{ ft}$$

This isn't useful yet because the units are different. Therefore, you need to convert *km* to *ft* since our drawing will be in *ft*. You can do this knowing that $2.54 \text{ cm} = 1 \text{ inch}$ and using the following formula:

$$1 \text{ km} = 1 \text{ km} \times \frac{\text{m}}{1 \text{ km}} \times \frac{\text{cm}}{1 \text{ m}} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} \times \frac{1 \text{ ft}}{\text{inch}} = \text{_____} \text{ ft}$$

Let's call this number A, so $1 \text{ km} = A \text{ ft}$. Now, convert the left side of the scale ratio to feet using the formula:

$$6.955 \times 10^5 \text{ km} \times \frac{A \text{ ft}}{1 \text{ km}} = 6.955 \times 10^5 A \text{ ft} \times \frac{\text{km}}{\text{km}} = 6.955 \times 10^5 A \text{ ft} = \text{_____} \text{ ft}$$

