

Make a model of the Solar System

Name: _____

Date: _____

Student worksheet

Directions: Answer the questions below in preparation for making the scale model.

1. On a separate sheet of paper, make a sketch of what a scale model of the solar system might look like. Include:

- The Sun
- The planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune

Give some thought to the size of each planet and how far they are from the Sun.

Directions: Use the data in Table 1 to make eight planets for a scale model of the solar system.

Table 1: Radii of the planets of the solar system		
Planet	Actual Radius (km)	Model Radius (_____)
Mercury	2,440	
Venus	6,052	
Earth	6,378	
Mars	3,387	
Jupiter	71,492	
Saturn	60,268	
Uranus	25,559	
Neptune	24,764	

2. I am responsible for the following model planets:

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3. Planets are approximately spherical. The radii of the planets of the solar system are listed in Table 1. In your group, choose a scale factor so you can make all the planets for your scale model with the play dough and the balloons provided. The formulas are listed below for reference.

$$\text{Scale factor} = \frac{\text{Model distance}}{\text{Real distance}}$$

$$\text{Model distance} = \text{Real distance} \times \text{Scale factor}$$

Scale factor of the solar system model: _____

4. As a group, discuss how you can calculate the radii of the model planets. Then calculate the radii of the model planets for which you are responsible. Show your work in the space below.
5. Share your results with your group and write the radii of all the model planets in the last column of Table 1. Do not forget to add the unit!
6. As a group, discuss how you will make the model planets with the materials provided. Then, make the model planets for which you are responsible.
7. As a group, lay all eight model planets out. Evaluate if the models look like they are correctly scaled in size. Discuss as a group how you can know.

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8. The radius of the Sun is **$6.96 \times 10^5 \text{ km}$** . In your group, calculate the radius of the Sun in your model. Which object could be a good model for the Sun in your shrunken model? Show your work in the space below.

Directions: Answer the questions below in preparation for placing the model planets in the scale model.

9. Write down the definitions of ***orbital distance*** and ***astronomical unit*** (AU) and fill in the conversion factor between AU and km.

Orbital Distance:

Astronomical Unit (AU):

1 AU = _____ km

10. As a group, calculate what the distance of 1 AU is in your model. Show your work in the space below.

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Directions: Use the data in Table 2 to place the eight model planets in your scale model of the solar system.

TABLE 2: ORBITAL DISTANCE OF THE PLANETS OF THE SOLAR SYSTEM		
Planet	Actual Orbital Distance (AU)	Model Orbital Distance (____)
Mercury	0.387	
Venus	0.723	
Earth	1	
Mars	1.524	
Jupiter	5.203	
Saturn	9.537	
Uranus	19.191	
Neptune	30.069	

11. As a group, discuss how you can calculate the orbital distance of the planets in your model. Then calculate orbital distances of the planets for which you are responsible. Show your work in the space below.
12. Share your results with your group and write the orbital distances of all the model planets in the last column of Table 2. Do not forget to add the unit!
13. Now you are going to visualize the scaled-down version of the solar system. As a group, use an online or a printed map to find landmarks or places that are approximately at the correct distance and are well-known to most students in the class. An area of 10 miles by 10 miles should suffice. Discuss where you would need to place the Sun and each of the planets so the model is to scale.