Name_____ Lab _____
Period _____ Date _____

Lab 7: Dimensions of the Solar System

In this lab you will:

1. compute the orbit distances and sizes of the planets on a scale model
2. make a model of the solar system that shows the relative orbit distances and sizes of the planets

Materials:

130 cm of register tape	compass
sharp pencil	150 cm of string
meter stick	

Procedure

1. Obtain your materials from your instructor
2. On your register tape, draw a line across the tape 10cm from the end. Write your name and the scales you will be using in this 10cm space.
   The scales are; **1cm = 50,000,000 km for the orbit distances**
   and **1cm = 22,000 km for the diameter of the planets**
3. Mark a + sign in the center of the line you just drew. This mark will represent the sun. On the same side as you wrote your name, label this + sign ***SUN.***
4. The 2nd column in the data table shows the real distances of each of the planets from the sun. **On your model, every 1cm will equal 50 million km in space!** You can find the orbit distances for your model by dividing each real distance found in the 2nd column by 50. Round of to the nearest 0.1cm and write your answers in column 3 of the data table. *Example for Earth*: Actual distance = 50 On model distance $\frac{150}{50} = 3$ cm
5. Use a meter stick to measure all the distances you calculated for each planet's orbit from the sun. Mark the position of each planet in the middle of the tape.
6. Place the point of a compass on the mark representing the sun (+ sign). Adjust the compass so that the pencil end of the compass rests on the mark you made for Mercury. Draw the arc of the orbit for Mercury. Repeat this step for Venus, Earth, Mars, and Jupiter.
7. Draw orbital arcs for the rest of the planets by tying a piece of string to a pencil. **Tie it close to the tip of the pencil.** Put the pencil tip on the mark you made for Saturn. Pull the string tight, and hold the other end down on the mark you made for the sun. Keeping the string tight, draw the arc for Saturn. Repeat for the rest of the planets.
8. Find the model diameter of each planet by **dividing the real diameter in column 4 of the data table by 22.** Round to the nearest 0.1cm and record in column 5.
9. Calculate radius for each planet by dividing the diameter by 2. Record in column 6.
10. Starting on the orbit arc, draw the radius (line) for each planet. The inner planets will be crowded, so place only some of these planets in the center of their arc.
11. Adjust the compass so that the point rests on the orbit arc and the pencil rests on the other end of the radius line. Draw and label each planet. **Answer questions.**

Data Table:

Name of planet	Actual distance from sun (in million km)	On model distance from sun (in cm)	Actual diameter of planet (in thousand km)	Model diameter of planet (in cm)	Model radius of planet (in cm)
Mercury	**58**		**4.9**		
Venus	**108**		**12.1**		
Earth	**150**		**12.8**		
Mars	**228**		**6.9**		
Jupiter	**778**		**142.8**		
Saturn	**1427**		**120.0**		
Uranus	**2870**		**51.8**		
Neptune	**4497**		**49.5**		
Pluto	**5900**		**2.4**		

Analysis and Conclusions:

1. Based on your model, describe how do the sizes of the inner planets compare to the size of the outer planets. Which planet is an exception to your answer?

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   _____

2. Describe how the distances between the orbits of the inner planets compare to the distances between the orbits of the outer planets.

   _____

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3. How is your model of the orbit of Pluto incorrect? (refer to Ch. 23 pg.420)

   _____

4. How many times further is the orbit of Pluto than the Earth?

   _____

5. How many times larger than the Earth is the planet Uranus?

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BONUS:

Calculate the orbit distance of Pluto using the same scale you used to calculate its diameter. Multiply Pluto's actual distance from the sun by 1000 and divide the answer by 22. Round off the answer to the nearest 1 cm. How long a strip of register tape would you need to fit Pluto's orbit?