Name _____ Class _____ Date _____

Making Models Lab

It's a Long Way to Neptune!

Astronomers use astronomical units and light-years to measure large distances in space. In this lab, you will use astronomical units (AUs) to compare the distances between planets in our solar system. One astronomical unit is the distance from Earth to the sun, approximately 150,000,000 km.

You will also use astronomical units to place the orbital positions of these planets in a scale model and answer questions based on your model.

OBJECTIVES

Convert and **apply** data to create a model of the solar system and relative orbital positions of the planets.

Create an accurate scale representation of the solar system.

MATERIALS

- adding machine paper tape
- calculator
- meterstick

*1 A.U. = 3 cm

*Sun starts @ 0cm

SAFETY

PROCEDURE

1. Use the data in the following table as a guide to build your model.

DISTANCES OF PLANETS FROM THE SUN

Planet	Distance from the sun (AU)
Mercury	0.39 x3 =
Venus	0.72 x3 =
Earth	1.0 x3 =
Mars	1.52 x3 =
Jupiter	5.20 x3 =
Saturn	9.54 x3 =
Uranus	19.19 x3 =
Neptune	30.06 x3 =
Pluto	39.50 x3 =

2. Use the scale 1 AU = 2 cm for your model.
3. Fold a 2 m strip of adding machine paper tape exactly in half so it is divided into two 1 m sections.
4. Draw a solid line along the fold, and label the line "Sun."
5. Calculate the distance between the sun and Mercury according to the scale of your model. Show your work below.

6. Using your calculation for step 5, draw a vertical dotted line the appropriate distance to the right of the sun on your model. Label this line "Mercury."
7. Repeat step 5 for Venus. Show your work below.

8. Repeat step 6 for Venus, but label Venus on the side of the sun opposite to Mercury.
9. Continue plotting the planets, making sure that you alternate left and right of the sun. When you are finished, you will have four planets on one side of the sun and four planets on the opposite side.

ANALYSIS AND CONCLUSION

1. **Explain** Why do astronomers use the term *astronomical unit* when describing distances within the solar system?

2. **Making Inferences** Would the term *light-year*—the distance that light travels in a year, or 9.5 trillion kilometers—be useful in a model of the solar system?

3. **Drawing Conclusions** If we were living on Mars, not Earth, what distance might an astronomical unit represent? Why?

4. **Making Inferences** If your model were based on a Martian astronomical unit, would it also be an accurate representation of the actual distances? Explain.

5. **Making Comparisons** The objects in the Kuiper Belt are located between 30 AU and 100 AU from the sun. How much more tape would you need to add to *one* side of your model to include the entire Kuiper Belt?

6. **Applying Ideas** The asteroid belt is located between 2.1 AU and 3.3 AU from the sun. Indicate the location of the asteroid belt on your model with a series of dots.

7. **Drawing Conclusions** How would you describe the asteroid belt's position in relationship to Mars and Jupiter?

8. **Making Inferences** Why do you think the asteroid belt stays within the distances given in question 6?

9. **Evaluating Models** If everyone in your class used a different scale for astronomical units, would the models be useful? Why or why not?

10. **Evaluating Models** Place the strips of tape created by all the groups on the floor of the classroom. Arrange them like the spokes of a bicycle wheel, with the sun in the center of the hub. What do you observe? What does this indicate about the value of your models?