<u>Paper Tape Solar System</u>

Name: ____________________ Block: ____

<u>Purpose</u>: Investigate Solar System distances and understand the units of measure.

<u>Background</u>: Distances in space are hard for humans to understand. Objects in space are tremendous distances apart from each other. Using the measurements we are used to on Earth would give Astronomers (scientists that study outer space) impossibly large numbers to work with.

Imagine for a moment that you have been given the task of measuring the distance between several items on Earth. The items are: 1) distance between lines on a paper; 2) distance between classrooms in the school; and 3) distance between the school and your house. Do you think you would use the same measurement for each one? Probably not! For the lines on paper, you might use millimeters. For the distance between classrooms, you might use meters. For the distance from your house to the school, you might use kilometers.

Space works the same way as the examples above. Astronomers have different units of measurement based on how far away objects are. An **Astronomical Unit (AU)** is defined as the distance between the Sun and the Earth, equal to 149,597,870.691 km! A **Light Year (ly)** is the distance a beam of light would travel in 1 year, equal to 9.4607×10^{12} km (or 9,460,730,472,580.8 km) or 63,241.077 AU! A **Parsec (pc)** is a unit of measure based on the geometry of Earth's orbit and is equal to 3.0856776×10^{13} km, or 206,264.81 AU, or 3.2615638 ly!

<u>Solar System Construction</u>:

<u>Materials needed</u>:

1 m of paper tape (adding machine or cash register)
Pen or pencil

<u>Construction Procedure:</u>

1) At one edge of the tape write the word "Sun". Write the word parallel with the short edge of the tape to take up as little space as possible.

2) At the other edge of the tape, draw the smallest dot possible and label it **Pluto**. Even though Pluto is now a dwarf planet, it is still useful as a reference point.

3) Fold the tape in half and crease it. Unfold the tape and draw a circle about the size of a nickel centered on the crease. Label the circle **Uranus**.

4) Fold the tape in half again (into quarters) on the crease. Fold the tape in half <u>one more time</u>. Unfold and lay the tape flat. On the new crease closest to the Sun, draw a circle a bit bigger than a quarter and label it **Saturn** (you may even want to draw the rings). On the crease farthest from the Sun, draw a circle about the size of a nickel and label it **Neptune**.

5) Fold the paper back into quarters and then fold in half again (into eighths). Unfold the paper and at the new fold closest to the Sun, draw a circle about the size of a half-dollar and label it **Jupiter**.

6) Fold the Sun to the Jupiter crease. Unfold the paper and draw a line along the crease, label it **Asteroid Belt.**

7) Fold the Sun to the Asteroid Belt. Unfold the paper and on the Sun side of the fold draw a circle about the size of a nerd candy, label this **Earth.** On the Pluto side of the fold, draw a slightly smaller circle and label it **Mars**.

8) Fold the Sun to the Earth. Unfold the paper and halfway between the Sun and the new fold, draw a small dot and label it **Mercury.** Halfway between the Earth and the new fold, draw a circle the same size as Earth and label it **Venus**.

Investigation:

Fill in the data chart below using your text book, pages 386 – 389 and the web page: http://www.kidsastronomy.com/the_planets.htm

Planet	**Distance fm Sun (AU)**	**Type of Planet**	**Mass compared to Earth**	**Unique Features**
Mercury	0.38 AU	Rocky	5%	Looks similar to Earth's moon. Has no atmosphere.
Venus				
Earth	1 AU	Rocky	100%	Contains only known life
Mars				
Jupiter				
Saturn				
Uranus				
Neptune				

Questions:

1) Why do you think that Venus looks brighter in the sky than Jupiter? Jupiter is much larger than Venus…should it not be brighter? (Hint: AU)

2) Is there a pattern in the type of planets in our solar system? If so, what is it?

3) Why are humans investigating a Mars colony instead of a Venus colony?

4) On the scale of your paper solar system (1 m = ~40 AU), how far would you need to draw the nearest star to Earth if that star was 4 ly away? Show your work.
(Hint: 1 ly = 63241 AU)