Name ______________________________Date__________ Period______________

Graphing Homework #______

All natural orbits are ellipses. This elliptical shape causes variations in a number of measurements as a planet orbits the sun. When a planet is closer to the Sun there is a larger gravitational pull on the planet. This increases the orbital speed. The point in the orbit where a planet is closest to the sun is called perihelion. For the Earth, perihelion occurs around January 3rd. As a planet moves farther away from the sun the velocity of the planet decreases. The most distance point in a planetary orbit is called aphelion. For the Earth, aphelion happens around July 4th.

Another change that can be seen is a change in apparent diameter. When an object gets closer, it appears to look larger in size. As the same object moves away, it will appear smaller. Since the Earth orbits the sun once every year, there are cyclic relationships between the date and all 3 of these measurements.

Ellipses are easy to construct using a loop of string and pins. The data below was collected by a student using different sized loops of string. The student kept the distance between the pins constant at 2 cm. String size was changed and the length of the major axis was measured. These values were than used to calculate the eccentricity of each of the constructed ellipses.

When is the orbital velocity of a planet fastest? ________

____

Name 3 things that change when a planet revolves around the sun in an elliptical orbit. ________________________

____

How far apart were the pins in this experiment? ________

What is the name for the point in a planets orbit when it is closest to the Sun? ____________________________

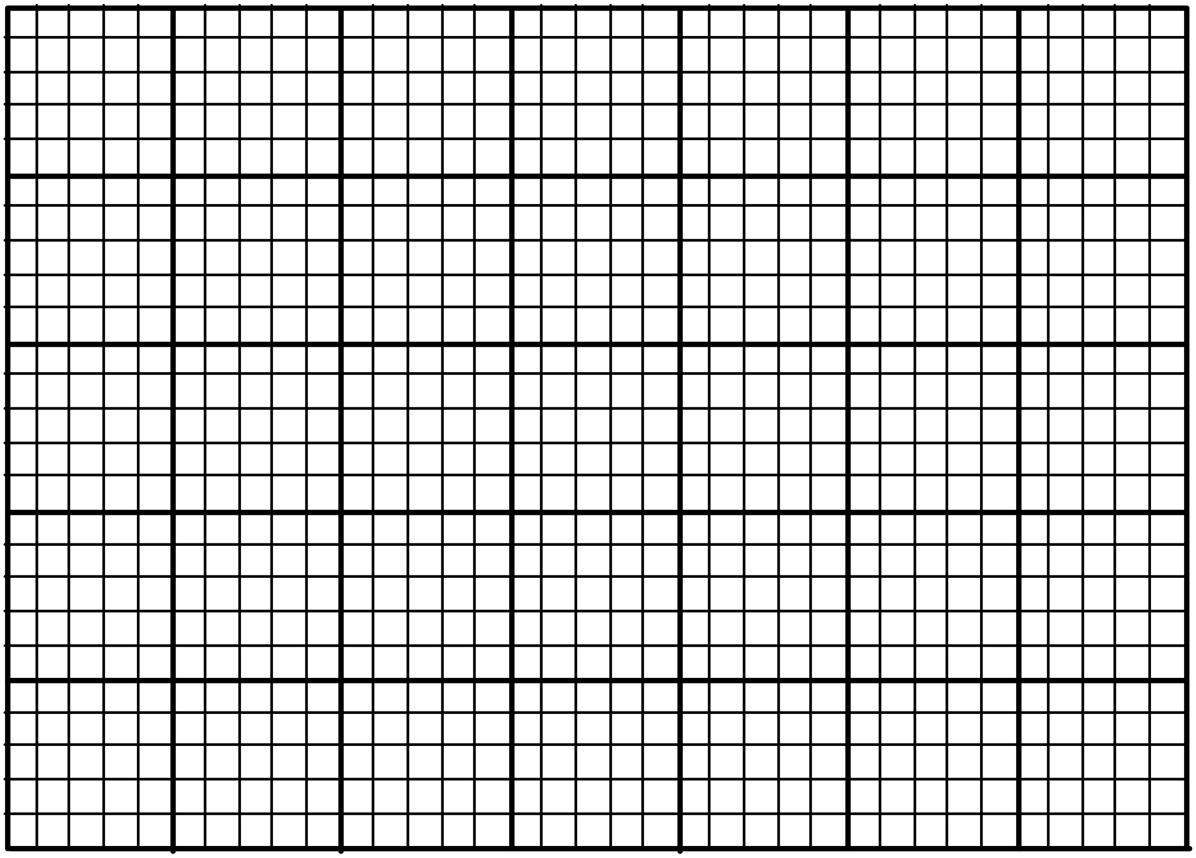
What is the name for the point in a planets orbit when it is most distant from the Sun?

Length of String (cm)	Length of Major Axis (cm)	Eccentricity (3 decimal places)
2	**4**	**0.500**
5	**8**	**0.250**
7	**12**	**0.167**
8	**14**	**0.143**
9	**16**	**0.125**
11	**20**	**0.100**

Create a line graph from the data table on the Graph Paper on the back.

- create a uniform scale for Length of String on the x - axis (2 points)
- Label the x - axis with both a label and a unit. (2 points)
- create a uniform scale for Eccentricity on the y axis. (2 points)
- label the y - axis. (1 point)
- plot all six points on your graph (2 points)
- connect the points to draw your line (1 point)
- put an appropriate title on top of your graph. (1 point)

(2 points)	x- axis	y - axis
Range		
Boxes		
Divide		
Round up		



Answer the questions below in Complete Sentences (2 points each)

1) As the length of the sting was increased, what happened to the value for eccentricity of the ellipse?

2) Use the graph to estimate the eccentricity if the student used a 6 cm string.

3) What happened to the length of the major axis when the string length increased?

4) If the pins had been 3 cm apart instead of 2 cm, how would the values for eccentricity have been changed?

5) On your graph, sketch and label a new line where the eccentricity would be if the distance had only been 1 cm.