Name: _____

Date: _____ Period: _____

Lab Activity: Ellipses

INTRODUCTION:

The earth revolves around the sun in an orbit which is a special geometric figure called an ellipse. An ellipse has two "center points". Each one is called a focus. The Sun is not in the exact middle of the earth's orbit, rather the Sun is found at one of the focal points.

OBJECTIVE:

You will create an series of ellipses and compare the shape of the Earth's orbit and orbits of other planets with the shape of a circle.

VOCABULARY:

Ellipses

Focus (foci)

Major Axis

Minor Axis

Circle

Eccentricity

Lab Activity: Ellipses

PROCEDURE A:

1. Tie the ends of a 27 cm length of string together to form a loop.
2. Using the “Ellipses Worksheet”, place two thumb tacks in each point labeled #1.
3. Loop the string around the thumb tacks and draw the ellipse by placing your pencil inside the loop and label this ellipse #1.
4. Measure the distance between the thumb tacks holes (foci). This is "d". Record this on your “Report Sheet”.
5. Measure the length of the major axis (L) and record this on the “Report Sheet”.
6. Move each thumb tack to the points labeled #2 and draw a new ellipse. Measure and record the distance between foci and the length of the major axis for ellipse #2.
7. Move each thumb tack to the points labeled #3 and draw a new ellipse. Measure and record the distance between foci and the length of the major axis for ellipse #3.
8. Move each thumb tack to the points labeled #4 and draw a new ellipse. Measure and record the distance between foci and the length of the major axis for ellipse #4.
9. Place one thumb tack at the pointed labeled #5 and draw a new ellipse. The distance between the foci is 0. Measure and record the length of the major axis for ellipse #5.
10. Using the given equation, calculate the eccentricity (e) of each of the five figures. Show ALL work on your report sheet. Round your answers to three decimal places.

$$e = \frac{d}{L}$$

Lab Activity: Ellipses

REPORT SHEET

Ellipse #1

Calculations:

d = _____

L = _____

e = _____

Ellipse #2

Calculations:

d = _____

L = _____

e = _____

Ellipse #3

Calculations:

d = _____

L = _____

e = _____

Ellipse #4

Calculations:

d = _____

L = _____

e = _____

Ellipse #5 (circle)

Calculations:

d = _____

L = _____

e = _____

Lab Activity: Ellipses

DISCUSSION QUESTIONS:

1. As you increase the distance between the foci, what change takes place in the eccentricity?

2. Which of the four ellipses you drew (not counting the circle) was the most eccentric?

3. Which of the four ellipses you drew (not counting the circle) was the least eccentric?

4. What is the minimum eccentricity an ellipse can have and the name of that geometric figure ?

5. How does the numerical value of "e" change as the shape of the ellipse approaches a straight line?

6. Where is the sun located on a diagram of the earth's orbit?

CONCLUSION: Describe the true shape of Earth’s orbit?

ELLIPSE WORKSHEET