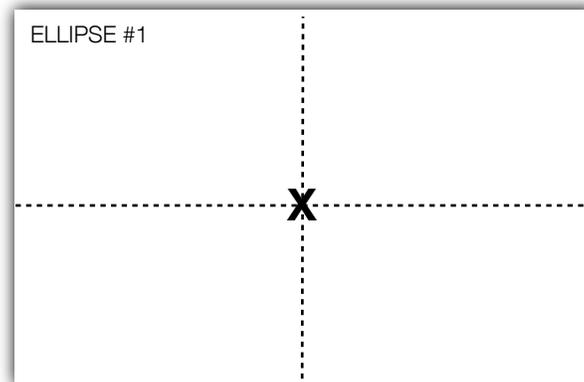


Constructing an Ellipse

Procedure:

1. Take a blank piece of paper and fold it in half in both directions (see figure A).
2. In the top left-hand corner, label this sheet "Ellipse #1" (see figure A).
3. Place an "X" where the two creases intersect (see figure A).



(figure A)

4. Measure to the left of the "X" 5 cm and make a dot. Label this dot "F₁".
5. Measure to the right of the "X" 5 cm and make a dot. Label this dot "F₂".
6. Place your paper on the board. Push a pin through point "F₁" into the board so that it is held securely.
7. Repeat step 6 with another pin for point "F₂".
8. Place your loop of string around the two pins.
9. Place your pencil on the inside of the loop.
10. Hold the string fully extended with your pencil and use it as a guide to draw an ellipse.
11. Remove the pins from the paper and place your ellipse on the table (push the pins back in the board so they don't get lost).
12. With a ruler, measure the distance from point "F₁" to point "F₂". Record your measurement to the nearest tenth of a centimeter. Record your answer like this:

Foci Distance = [your measurement]

13. With a ruler, measure the distance from one edge of the ellipse to the other **through the two foci** (the major axis). Record your measurement to the nearest tenth of a centimeter. Record your answer like this:

Major Axis = [your measurement]

14. Write out the eccentricity formula (found on page 1 of the Earth Science Reference Tables).
15. Substitute your measurements into the formula and solve. Round your answer to the nearest thousandth.
16. Repeat steps 1-15 three more times on separate sheets of paper using the measurements given below for steps 4 and 5.
 - ▶ Ellipse #2: Measure 3 cm
 - ▶ Ellipse #3: Measure 1 cm
 - ▶ Ellipse #4: Measure 0 cm

Name: _____

Period: _____

Conclusion Questions:

1. How does the shape of the ellipse change as the foci get closer together?

2. How does the eccentricity of an ellipse change as the foci get closer together?

3. Describe the appearance of an ellipse that has an eccentricity of 0.

4. Describe the appearance of an ellipse that has an eccentricity of 1.

5. Which of the ellipses that you drew is **most eccentric**?

6. Which of the ellipses that you drew is **least elliptical**?

7. Which planet in our solar system has the least eccentric orbit (tip: use your ESRT)?

8. Which planet in our solar system has the most elliptical orbit?

9. Describe how the orbits of Jupiter and Neptune are different?

10. What object is located at one of the foci of all planetary orbits in our solar system? _____
11. What object in our solar system has the most eccentric orbit? _____
12. On Ellipses #1, label one of the two foci "**Sun.**" Label the location of "**perihelion**" and "**aphelion**" and label where the planet is traveling "**fastest**" and "**slowest**".