# Lab 7
# The Orbit of Mercury

Names:

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## Exercise #1: Fill-in the Data Table.

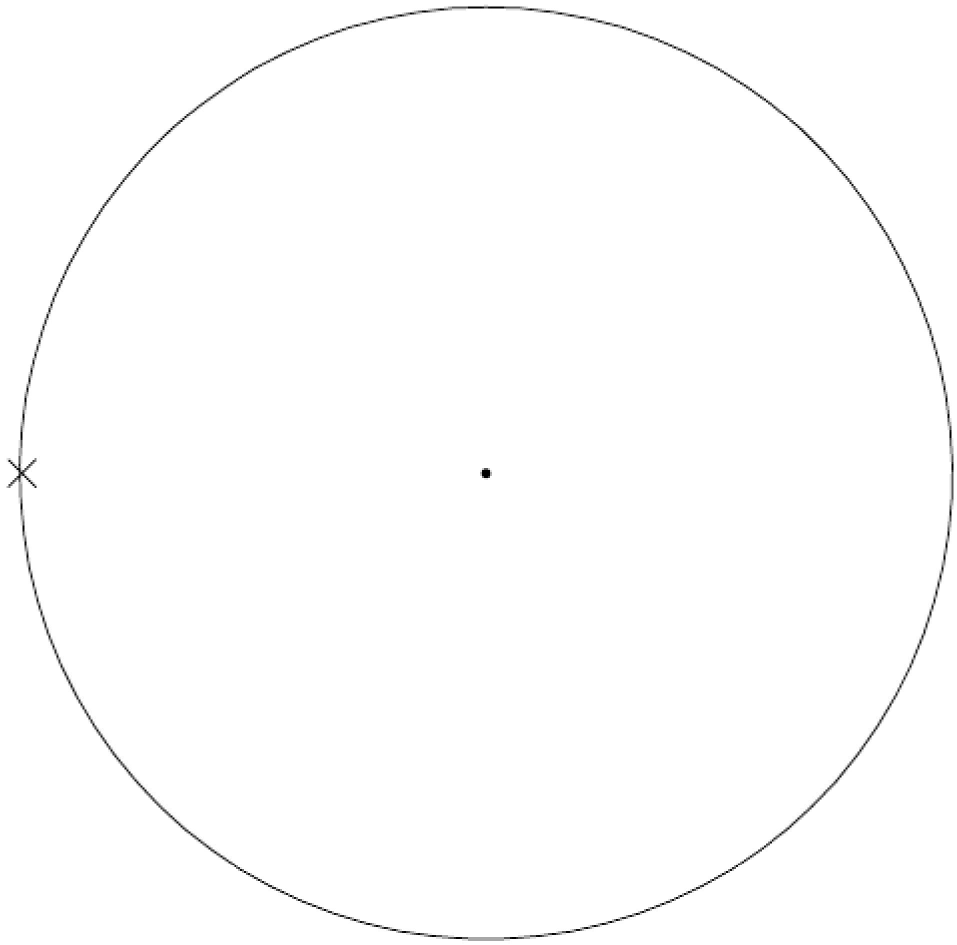
Table 7.1: Elongation Data For Mercury

| # | Date | Elongation Angle | Julian Date | Days | Degrees |
|---|---|---|---|---|---|
| 1 | Sep. 1, 2002 | 27.2°E | 2452518 | - | - |
| 2 | Oct. 13, 2002 | 18.1°W | 2452560 | 42 | 42 |
| 3 | Dec. 26, 2002 | 19.9°E | 2452634 | | |
| 4 | Feb. 4, 2003 | 25.4°W | 2452674 | | |
| 5 | Apr. 16, 2003 | 19.8°E | 2452745 | | |
| 6 | Jun. 3, 2003 | 24.4°W | 2452793 | | |
| 7 | Aug. 14, 2003 | 27.4°E | 2452865 | | |
| 8 | Sep. 27 2003 | 17.9°W | 2452909 | | |
| 9 | Dec. 09, 2003 | 20.9°E | 2452982 | | |
| 10 | Jan. 17, 2004 | 23.9°W | 2453021 | | |
| 11 | Mar. 29, 2004 | 18.8°E | 2453093 | | |
| 12 | May 14, 2004 | 26.0°W | 2453139 | | |
| 13 | Jul. 27, 2004 | 27.1°E | 2453213 | | |

(10 points)

## Exercise #2: Plotting your data.

(28 points).



## Exercise #3: Connecting the dots.

1) Is Mercury's orbit circular? Describe its shape. (4 points)

## Exercise #4: Finding the semi-major axis of Mercury's orbit.

2) Mercury's semi-major axis: ________________(mm).

Earth's semi-major axis: _______________________(mm).

Divide the semi-major axis of Mercury by that of the Earth: ___________________AU.
(4 points)

3) Perihelion (p) = ___________________ mm.

Aphelion (q) = ____________________mm.

e = (q − p)/(p + q) = ___________________
(4 points)

4) The eccentricity for the Earth's orbit is e = 0.017. How does your value of the eccentricity for Mercury compare to that of the Earth? Does the fact that we used a circle for the Earth's orbit now seem justifiable? (5 points)

## Exercise #5: The orbital period of Mercury

Estimate how long you think it would take Mercury to complete one orbit around the Sun: _________________________ days. (2 points)

Kepler's third law says that the orbital period squared is proportional to the cube of the semi-major axis: $P^2$ $a^3$ .

$a^3 = a \times a \times a =$ _______________________

$P = \sqrt{a^3} =$ ______________________

$P_{orb}$ (Mercury) = _________________ days. (4 points)

5) How does the orbital period you just calculated using Kepler's laws compare to the one you estimated from your plot at the beginning of this exercise? (4 points)