# Revolution of Jupiter's Moons

Turn in one copy of this lab with each group member's printed name and signature. By signing, you certify that you have actively participated in the exercise and have put forth effort in equal share to your fellow group members.

| Printed Name | Signature |
| --- | --- |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

1. Measure Jupiter's diameter in pixels. Be sure the scale is set to linear and that the min-max button is selected.

Jupiter's diameter in pixels: _____

**Table 1: Apparent Distances from Jupiter (in pixels)**

| File Name | Moon 1 | Moon 2 | Moon 3 | Moon 4 |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Enter the moon data for each of your images. It does not matter what order the moons are measured in. Remember: it is negative if the moon is to the left of Jupiter and positive if the moon is to the right of Jupiter.

2. What physical property does the amplitude of the sine curve represent? (The amplitude is how high it is from zero, or half the total height.)

3. What physical property does the wavelength of the sine curve represent? (The wavelength is the amount of time it takes to get back to the same position on the graph.)

4. Describe your fitting process. What was easy to determine? What made finding a good fit difficult?

5. We need the distance from Jupiter in astronomical units, instead of in pixels. Show how to get A.U. from your measurement of *pixels* using one point from your moon's data:

Note: In order of distance from Jupiter, the moons are: Io (closest), Europa, Ganymede and Callisto (farthest)

**Table 2: Data**

| Moon | a (km) | P (hours) |
|---|---|---|
| **Io** | | |
| **Europa** | | |
| **Ganymede** | | |
| **Callisto** | | |

**Table 3: Conversions**

| Moon | a (A.U.) | P (years) |
|---|---|---|
| **Io** | | |
| **Europa** | | |
| **Ganymede** | | |
| **Callisto** | | |

**Table 4: Calculating Jupiter's Mass**

| Moon | Mass of Jupiter (solar masses) |
|---|---|
| **Io** | |
| **Europa** | |
| **Ganymede** | |
| **Callisto** | |
| **Average** | |

1. Compare the answers you got for the mass of Jupiter from the different moons. Did you get similar or different answers?

2. The mass you finally found is in units of *solar masses*. In other words, Jupiter is about 1/1000$^{th}$ the mass of the sun. Do you think Jupiter is big enough for its mass to matter when using Kepler's 3$^{rd}$ Law to find the mass of the Sun? Why or why not?