Lab: Planets in Orbit

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**Directions:** This lab needs to be written as a lab write-up and will be graded with the lab rubric. Each section must be titled and organized appropriately (ex. **Introduction**). You may choose your partner for this lab and only one lab write-up per group needs to be turned in.

**Introduction**

Scientists know that the eight planets in the solar system orbit the sun. They also know that the moon orbits the earth. There is a relationship between the time it takes for a planet to orbit the sun, or its period of revolution, and the gravitational force pulling on the planet. The same relationship is also used to put an artificial satellite in orbit. Study Isaac Newton and Johannes Kepler to have a deeper understanding of planetary motion.

For your investigation choose from one of the following questions below. Then write a testable hypothesis, an experiment to test hypothesis, collect data (observations), analyze data, and draw conclusions from your data.

**Questions:** 1. If the mass and distance of the planet remains constant, how does gravitational attraction affect the period of revolution?

2. If the distance and gravitational attraction remains constant, how does the mass of the planet affect the period of revolution?

3. If the mass and gravitational attraction remains constant, how does the distance of the planet affect the period of revolution?

**Hypothesis**

Write a hypothesis in *If…and….then* format. For example: *If I compare different distances of planets and my experiment is controlled then the period of revolution will decrease.*

**Materials**

Ping-pong balls, washers, one paper clip, fishing line, tape, metric ruler, triple-beam balance, scissors and straw.

**Methods**

Write a step-by-step procedure (methods) in order to test your hypothesis. The procedure must include independent variables, dependent variables and controls. **Teacher must initial your methods.**

**Observations (data collection)**

 **Create a data table to organize your observations. Below is an example of a data table.**

|  |  |  |  |
| --- | --- | --- | --- |
| Trial Number | Mass of washers or length of fishing line or mass of planet | Time for ten complete revolutions | Notes |
| 1 |  |  |  |
| 2 |  |  |  |
| 3 |  |  |  |
| Average |  |  |  |

**Analysis**

**Calculate the period or revolution for each trial then find the average of the three trials. To find the period of one revolution divide the time it took for 10 complete revolutions by 10.** For exemplary status graph your results.

**Conclusion**

**Answer these questions in your conclusion section of your lab write-up in complete sentences.**

1. Did you reject or accept your hypothesis? Use data to support you answer (answer should be one paragraph).
2. What is the independent variable of the experiment?
3. What is the dependent variable of the experiment?
4. List the control variables of the experiment.
5. Describe the factors that affect the period of revolution.
6. Why is Neptune’s sidereal period of orbit (164.79 earth years) greater than Uranus’s (84.01 earth years)?
7. Describe one way that Earth’s period of orbit could slow down making a year greater than 365 days.