**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Hour: \_\_\_\_**

**Planetary Motion**

**Introduction:** When you ride a merry-go-round, do you feel like you are moving faster if you sit on the outside or if you sit halfway to the inside?

**Objective:** The period of revolution for a planet is how long it takes the planet to orbit around the sun. In this activity, we will investigate how the distance a planet is from the sun affects its period of revolution.

The orbits of the planets of the solar system are not circular, but elliptical. Generally, an ellipse is formed when a curved line is drawn around two central points, the way a circle can be drawn using one central point. In our solar system the sun is one point, and the other does not exist. In this activity, we will examine this concept.

**Procedure:** Period of Revolution

1. Tie the 1-meter piece of string through the hole of the stopper.
2. Swing the stopper in an orbit above your head at a consistent speed.
3. Have a partner count 10- second time intervals while you or another partner count how many times the stopper “Revolved” during the 10 seconds.
4. Record your data in the chart below.
5. Repeat this procedure for a total of 3 times per length of string.
6. Total and average your data.
7. Then to calculate the number of revolutions per second, dived the average of each string length by 10. Using this, you can compare the rate at which the objects revolved at different distances.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **String Length** | **Trial 1** | **Trial 2** | **Trial 3** | **Total** | **Average** |
| **100 cm** |  |  |  |  |  |
| **80 cm** |  |  |  |  |  |
| **60 cm** |  |  |  |  |  |
| **40 cm** |  |  |  |  |  |
| **20 cm** |  |  |  |  |  |

**Questions:**

1. How does the string length affect the number of revolutions per second?
2. How might this idea be related to the planets orbiting the sun?
3. In which position on a merry-go-round are you actually traveling faster? Why?
4. What kept the object from flying away?
5. Why did it go in a circle and not in a straight line as you swung it around?
6. Imagine that the model you just used was an actual solar system. In space there is not a string holding the planets orbiting the sun. What force acts like the string in the solar system keeping the planets held together?
7. What part of your model represented the sun?
8. What part of your model represented the planet?
9. When the swinging object was really close (when the string was short), was the force of “gravity” strong or weak? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ How was this different when the string was lengthened?
10. Using the knowledge of how speeds change when distances increase, which planets do you think take less time to revolve around the sun?
11. What would happen to the orbit of the planets if the sun suddenly disappeared from space?