Name_____

Swing Thing

Purpose: 1) Identify characteristics that affect a pendulum's motion
2) Demonstrate that changes in motion can be measured and graphically represented

Materials:

Motion sensor	Meter stick	String
Scissors	Empty aluminum can with pull-tab	Funnel
Sand		

Procedure:

1. Set up your motion sensor.
2. Tie one end of the string to an empty aluminum can. Measure 50 cm of string and cut the string at this point.
3. Place the motion sensor on a table or desk. Position the pendulum about 1 meter from it. Be sure you are holding the string by its end.
4. Aim the sensor at the can. Pull the can back about 10 centimeters and release it so that it swings toward and away from the sensor. When you are ready to begin collecting data, start the sensor. Your plot should show a smooth, wave-like plot.

A pendulum completes a cycle as it moves from one extreme position to the other and back again. How many complete cycles are displayed on the screen?

The time required for the pendulum to complete a cycle is called the **period**. To find your pendulum's period, find the first peak and record the time (x-value).
First Peak:_____
Find the second peak and record the x-value.
Second Peak:_____

The period is the difference between the two time peaks. Find the period and record it.
Period:_____seconds

5. How do you think the period would be affected if a heavier can were used? Record your hypothesis (use an If, Then statement):

6. Put the funnel into the can's opening. Add some sand to the can so that it is about half-filled. Repeat the experiment with the heavier can. Record your results.

First Peak:_____
Second Peak:_____
Period:_____seconds

Are the periods significantly different for the light can and the heavy can?

Does this data support your hypothesis? Explain.

7. How do you think the period would be affected if a shorter piece of string were used? Record your hypothesis. Explain your reasoning.

8. Test your hypothesis using the string already attached to the can. Use a length of 25 centimeters. Record your results.

Analysis and Conclusions:

1. Identify the variables in this investigation:

2. What was the relationship between the pendulum's mass and period?

3. What was the relationship between the pendulum's length and period?

4. In the second part of this activity, the pendulum's length was divided in half, and this caused the period to change. Was the period divided in half also? What does this tell you about the **relationship** between pendulum length and period?

5. The **frequency** of a swinging pendulum tells how many cycles it completes per second. Frequency and period are related by this formula:
Frequency = 1 ÷ Period

   Based on the data that you collected find the frequencies for both pendulums.

4. How would the frequency be affected if the pendulum <u>length</u> increased? How would frequency change if a pendulum's <u>period</u> is tripled? Be specific.