DETERMING GRAVITY

Objective: To use the pendulum to determine gravity in a given location.

Materials:

String
Weight
Stop watch or motion detector

Procedure:

1. Use a length of string approximately 1 meter long.
2. Attach the weight to the string
3. Make an accurate measurement of the pendulum
4. Allow the pendulum to swing back and forth
5. Determine the period of the pendulum using the stop watch or the motion detector
6. After determining the period of the pendulum use the formula provided by the instructor to determine the value of g at your location.

Extension:

determine if the value of g changes if you increase or decrease the length of the pendulum.
PENDULUM

If an object that pivots around a fixed point is pulled and let go, gravity makes it swing back and forth at a regular rate. Such an object is called a pendulum. The simple pendulum consists of a weight hanging at the end of a string or wire. The path traveled by the weight is called the and of the pendulum. The period of oscillation is the time it takes the weight to pass back and forth once over this arc. The frequency of the pendulum is the number of oscillations per second. If a pendulum were taken from one place to another on the earth, the period would change in the pull of gravity. (The pull of gravity varies over the surface of the earth and it also varies with altitude.)

The Italian physicist Galileo Galilei (1564-1642) made a very important discovery concerning pendulums. One discovery made by Galileo deals with harmonic motion. Galileo discovered the natural law we call the law of the pendulums. He noticed that a hanging lamp would swing with an almost constant period, whether the arc was large or small. He believed that a pendulum could regulate the movements of clocks. (The first pendulum clock was patented by the scientist Huygens in 1657)

Question: What determines the period of a pendulum, the mass attached to the end or is it the length of the pendulum or are both equally important.

Frameworks:
NS.1.K.1
NS.1.1.2
NS.1.2.3
NS.1.3.3
NS.1.4.3
NS.1.1.5
NS.1.1.6
NS.1.3.4
NS.1.3.6
NS.1.4.7
NS.1.4.10
NS.1.1.11
NS.1.2.7
NS.1.3.8
NS.1.4.13
PS.6.K.3
Objectives:

1. To determine the period of a pendulum-using a stop watch.
2. To determine what effect mass and length have on the period of a pendulum.

Materials:

2 lengths of string
Washers (3)
Stop watch

Procedure: (To determine the period of a pendulum)

1. Students are to make a pendulum using a string with a loop in one end and attach the weight to the other end.
2. Pull the pendulum back and release. At the time of release start the stop watch. Determine the time it takes for the pendulum to make 10 oscillations.
3. Determine the period of the pendulum by dividing the time/oscillations. The frequency can be determined by dividing the oscillations/time.

Procedure: (To determine what effect mass and length have on the period of a pendulum)

1. Each pair of students will be give two lengths of string along with 3 washers to be used as weights.
2. Students are to make two pendulums, one using one washer and the other using the two washers.
3. Count the number of times the pendulum swings back and forth in 15 seconds.
4. Tape the pendulum below the number that represents the number of times it oscillated in 15 seconds.
5. Repeat the procedure with the other pendulum, this time using two washers for weight.
6. Tape this pendulum below the number that represents the number of times it oscillated in 15 seconds.

After each pendulum has been taped to the board, look for a pattern.

What is the pattern that emerges? Does weight effect period or is it length that effect period? Is the period of the pendulum determined by both weight and length?