

KJHS

Name

At the turn of the century 400 years ago, _____ was completing his examination of the study of motion and had discovered a profound relationship of a pendulum and its period (the time to complete a swing). Before _____, no one had ever noticed the regularity of this common phenomenon. His discovery allowed time keeping to be done to accuracy 1000 times greater than in the past.

The myth is that he discovered this relationship while watching an urn filled with burning incense swing at the end of a chain during a church service. It is suggested that he measured the swing with the beating of his heart that led him to discover that the period of a pendulum is constant.

Objective: to determine factors that affect the swing of a pendulum

Hypothesis: If the length of a string is _____,
then the speed of the pendulum _____

Materials: string, hooked mass (200g), timer, ring stand, meter stick, rubber stopper, paper clip

Procedure:

1. Place the ring stand on a table so that the clamp hangs over the side of the table. Attach one end of the string to the rubber stopper and to the clamp. Attach the 200g weight to the other end of the string.
2. Record the values stamped on the mass below. Set the length of the pendulum to approximate length, indicated in the data table below, by winding or unwinding the string around the paper clip. NOTE: one winding equals about _____ cm
3. Measure your actual length to the closest tenth of a centimeter and record in the table below; make sure to measure to the vertical center of the hanging mass.
4. Swing the pendulum from an angle (_____). Record the time to make 10 complete swings or vibrations. One complete swing is back and forth. Repeat three times for each length.

The **period of a pendulum** is defined as the time (in sec) required for one complete vibration. To calculate its value in the data table below, you will take the average of your three times for 10 vibrations and divide by the number of vibrations in each trial.

The **frequency of a pendulum** is defined as the number of vibrations occurring each second. It is measured in **hertz, or Hz**. One Hz, means one vibration per second. To calculate its value in the data table, you will divide the number of vibrations in each trial, 10, by the average of your 3 times, **Frequency is the multiplicative inverse, or reciprocal, of period.**

Data table:

A	B	C	D	E	F	G	H
		Add and divide by 3 = F					
Approx. Length (cm)	Actual Length (cm)	Trial #1 time for 10 vib (sec)	Trial #2 time for 10 vib (sec)	Trial #3 time for 10 vib (sec)	Average time for 10 vib	Average Period $\frac{F}{10}$	Average Frequency $\frac{1}{G}$ Hz
95							
85							
75							
65							
55							
45							
35							
25							
15							

Conclusion:

1. What was the mass of your pendulum's bob in grams? _____
2. What was the independent variable? _____
3. What was the dependent variable? _____
4. Which of the following is the control? (circle) frequency, length, mass, period, time
5. Why did you do allow the pendulum to swing 10 times, rather than just once?
