

# Simple Pendulum

# Teacher's Notes

<b>Main Topic</b>	Motion
<b>Subtopic</b>	Periodic Motion
<b>Learning Level</b>	Middle
<b>Technology Level</b>	Low
<b>Activity Type</b>	Student

Description: Students test the effect of mass and length on the period of a simple pendulum, made with simple materials.

Required Equipment	Fishing line, Hooked Masses, Meter Stick, Stopwatch, Ring Stand
Optional Equipment	Clamp, Measuring Tape

## Educational Objectives

- Determine the effect of mass and length on the period of a simple pendulum.

## Concept Overview

The period of a pendulum is the time it takes to complete one cycle. A cycle is defined as the full motion. For example, starting at one side, the pendulum swings to the other side and back. The time required for that motion is the period. (The inverse of the period is the frequency. Frequency is the number of cycles in a length of time.)

A simple pendulum is one with its mass concentrated at the end, such as a weight hanging on a thin string.

Students will test two variables, to determine their effect on the pendulum's period. Just as objects with different masses accelerate in free-fall at the same rate, changing the mass of a simple pendulum will not change its period. Changing the length of the pendulum does effect the period, with shorter pendulums having shorter periods.

## Lab Tips

The exact length is not important. If students are unable to tie their lines to reach the exact lengths in the tables, don't worry. They can either be "close enough," or record the actual length in the table. The objective here is to notice a trend, not to calculate exact results.

# Simple Pendulum

Name: \_\_\_\_\_

Class: \_\_\_\_\_

## Goal:

To determine the effect of mass and length on the period of a simple pendulum.

## Materials:

Fishing line (120cm), Hooked Masses, Ring Stand, Clamp, Measuring Tape, Stopwatch

## Procedure:

1. Set up a ring stand or other support, so that there is at least 1m of space under it.
2. Tie a slip knot in each end of the fishing line. Loop one end over the support, and hook 50g mass to the other end.
3. Measure and record the length of the pendulum. (Length is from the point at the top where the string begins to bend, to the center of the mass.) Length = \_\_\_\_\_
4. Pull the pendulum to one side and release it. When it comes back to the starting point, start the stopwatch. Stop the stopwatch after 10 full cycles (over and back). Divide the time by 10 to find the period. Record it in the table.
5. Repeat for the other masses listed in the table.

Changing Mass	
Mass	Period
50g	
100g	
200g	
300g	
400g	

6. Use the 100g mass. Adjust the length of the pendulum until it is 100cm long.
7. Measure the period of the pendulum as before. Record it in the table below.
8. Repeat for the other lengths listed in the table, always using the 100g mass.

Changing Mass	
Length	Period
100cm	
80cm	
60cm	
40cm	
20cm	

9. What is the effect of changing the mass?

10. What is the effect of changing the length?

