

Physical Pendulum

Teacher's Notes

Main Topic	Motion
Subtopic	Periodic Motion
Learning Level	Middle
Technology Level	Low
Activity Type	Student

Description: Students will observe a physical pendulum and how its period is determined.
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Required Equipment	Meter stick with small hole drilled very close to one end, nail, Stopwatch, Ring Stand or other support, fishing line, 100g mass.
Optional Equipment	Clay

Educational Objectives

- Observe a physical pendulum and see how its period is determined.

Concept Overview

A pendulum with its mass spread throughout its length is called a physical pendulum. A typical clock pendulum is an example. Rarely is a pendulum made in the ideal situation of the ideal pendulum with all of its mass at the end.

Students will observe a physical pendulum and measure its period, and then construct a simple pendulum with the same period. They will see that a physical pendulum acts as if its mass is concentrated at its center of mass.

Lab Tips

In the optional activity, students will use a lump of clay to create an irregular physical pendulum, and repeat the activity.

Simple Pendulum

Name: _____

Class: _____

Goal:

Observe a physical pendulum and see how its period is determined.

Materials:

Meter stick with small hole drilled very close to one end, nail, Stopwatch, Ring Stand or other support, fishing line, 100g mass.

Procedure:

1. Set up a ring stand or other support, so that there is at least 1m of space under it.
 2. Clamp a nail so that it can support the meter stick through the hole, and the meter stick can swing freely back and forth.
 3. Pull the stick to one side and release it. When it returns 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. Period = _____
 4. If you did the activity titled "Simple Pendulum," look at it and see which simple pendulum had a period closest to that of the meter stick. Remove the meter stick and build a pendulum of that size.
 5. Adjust the pendulum and test it until its period exactly matches that of the meter stick.
 6. Record the length of the simple pendulum. _____
 7. What conclusions can you make about the effective length of a physical pendulum?
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8. A grandfather clock keeps time by the swinging of its pendulum. A certain clock sits in a house that is warm in the summer and cooler in the winter. If the clock keeps good time in the winter, what will happen to its timekeeping abilities in the summer? Be specific.

Optional Activity

9. Stick a lump of clay on your meter stick. What happens to its period? Describe how the clay's position affects the new period.