

Analyzing & Interpreting Data

Activity #1: Pendulums

Investigation:

In this activity learners investigate how the following variables affect the frequency of a pendulum: mass, string length, placement of structure, and amplitude.

Common Language:

- Frequency (measured in cycles per second)
- Hertz (also called frequency)
- Period (seconds per cycle)
- Cycle (from starting point and back to the start position)
- Amplitude (how far back you held the pendulum in start position)

Materials:

- Washers
- Paperclips
- String
- Masking tape
- Stand to hold pendulums
- Rulers
- Stopwatch

Learners are allowed to choose from the materials listed. The goal is to find what influences the frequency of the pendulum. For example, if and how the frequency changes when different string lengths are used or if the mass of the pendulum is varied.

One possible approach: Tape the string to the stand. Have groups decide the number of washers to use and the degree angle for releasing the pendulum. Test with *mass* as the

variable, keeping all other variables constant. Students can then record the amount of time it takes the pendulum to cycle 10 times. With each trial, learners can add or discard washers. This data can then be used by students to determine if mass affects the frequency of the pendulum swing.

Another possible approach: Use 10 different string lengths, completing three trials for each string length. Keep all other variables constant. Calculate the average time for each string length trial. Record this data in a line graph and determine if frequency is affected by string length. Use graphing and predicting to analyze data. Look for patterns in numbers and find relationships.

For additional connections, refer to [Using Computational Thinking Activity #1: Pendulum Simulation](#) from the [Using Mathematics and Computational Thinking Practice](#).

Related Crosscutting Concepts:

- [Patterns](#)
- [Cause & Effect](#)

Related Disciplinary Core Ideas:

- [Core Idea PS2: Motion and Stability: Forces and Interactions](#)
 - [PS2.A: Forces and Motion](#)
 - [PS2.B: Types of Interactions](#)
 - [PS2.C: Stability and Instability in Physical Systems](#)
- [Core Idea ETS1: Engineering Design](#)
 - [ETS1.A: Defining and Delimiting an Engineering Problem](#)
 - [ETS1.B: Developing Possible Solutions](#)
 - [ETS1.C: Optimizing the Design Solution](#)