

# Riding on a Pendulum – Module Overview

**Student Challenge:** Design a Pendulum-type amusement park ride rated high on the thrill factor.

## Module Intent

- Design and conducting well-defined scientific investigations.

## Module Science Concepts

- Periodic force, harmonic motion
- Gravity

## Module Math Concepts

- Independent vs. Dependent variables
- Types of graphs
- Formula for Period of a Pendulum
- Finding a variance

## Module Engagement

Introduce module engagement.  
Assess background knowledge.

## Scientific Investigation

### Activity 1 – Components of a Pendulum

*Structured Inquiry - Design, construct, and create scientific drawing of a pendulum.*

**Concepts:** Read to perform a task.

### Activity 2 – Amplitude of a Pendulum

*Structured Inquiry – Students discover the concept of amplitude through observing the motions of the pendulum they built in Activity 1.*

**Concepts:** Amplitude  
Independent vs. Dependent variables

### Activity 3 - Period of a Pendulum

*Structured Inquiry – Data are collected on the period of the pendulum through individual and, then, repeated trials.*

**Concepts:** Calculate period of pendulum. What is variance and how to calculate?

### Activity 4 – How Does Amplitude Affect Period?

*Structured Inquiry – Introduces the students to the influence of amplitudes on the period of a pendulum.*

**Concepts:** Well structured investigation. Graphing

### Activity 5 - How Does Mass Affect the Period of a Pendulum

*Guided Inquiry – Students conduct repeated trials to validate their hypothesis about mass and the period of a pendulum..*

**Concepts:** Well structured investigation. Data table organization.

### Activity 6 - How Does Length Affect the Period of a Pendulum?

*Guided Inquiry – Pendulums of varying lengths are investigated.*

**Concepts:** Well structured investigation. Dependent vs. Independent variables. Formula for the period of pendulum

## Design and Engineering

### Activity 7 – Engineering Your Pendulum

*Guided Inquiry – Design a Pendulum Thrill Ride.*

**Concepts:**  
Engineering Process

## Module Extension

Effects of Gravity

### Activity 8 - Galileo and the Pendulum

*Guided Inquiry – Students compare their findings and confirm or refute Galileo’s findings.*

**Concepts:** Effects of the force of gravity.

### Activity 9 - Pendulum on the Moon

*Structured Inquiry – Students explore how a pendulum would behave on the Moon.*

**Concepts:** Force of gravity

### Activity 10 – Riding on a Pendulum

**Guided Inquiry -** Students explore what creates the “thrill factor” in amusement park rides.

**Concepts:** Relate riding on a pendulum swing to microgravity.