

# Swing Time

In the early 1600s, Galileo began to study pendulums when he noticed that a chandelier in the Tower of Pisa had a regular swinging motion. He later figured out how to design a pendulum that took exactly two seconds to swing back and forth, which allowed people to build clocks that used pendulums to keep time. The time it takes a pendulum to complete one back-and-forth swing is called its *period*.

1. What are some variables that might affect the period of a pendulum?
2. Collect some data. Which variable appears to have the biggest effect on the period of the pendulum? Justify your response.
3. Create a mathematical model relating the variable you identified to the period of a pendulum.
4. Think carefully about how you decided how many digits to record in your measurements. Explain these decisions.
5. Use your model to determine the characteristics of a pendulum that would have a period of 2 seconds.
6. Would it be possible to create a pendulum with a period of 1 minute? 1 hour? If so, what would you need to create these pendulums? If not, why not?
7. Think carefully about how you decided how many digits to include in the lengths of the 2-second, 1-minute, and 1-hour pendulums. Explain these decisions.

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1. What are some variables that might affect the period of a pendulum?
2. Collect some data. Which variable appears to have the biggest effect on the period of the pendulum? Justify your response.
3. Build a pendulum where you can adjust the length by making the string longer or shorter. Use your stopwatch to time the period of a pendulum with each length in inches: 30, 20, 15, 10, 5.0, 3.0, 1.0. Record the period of each pendulum in an organized way.
4. Think carefully about how you decided how many digits to record in your measurements. Explain these decisions.
5. Use technology to create a scatter plot of your data, placing length in inches on the horizontal axis and time in seconds on the vertical axis.
6. Which type of model seems like it would be the best fit: linear, quadratic, or square root? Create a model that fits the data.
7. Use your model to determine the characteristics of a pendulum that would have a period of 2 seconds.
8. Would it be possible to create a pendulum with a period of 1 minute? 1 hour? If so, what would you need to create these pendulums? If not, why not?
9. Think carefully about how you decided how many digits to include in the lengths of the 2-second, 1-minute, and 1-hour pendulums. Explain these decisions.