Swing Time

Task Statement 1

In the early 1600s, Galileo began to study pendulums after noticing that a chandelier in the Tower of Pisa had a regular swinging motion. He later figured out how to design a pendulum that swung back and forth in exactly two seconds, 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 variables might affect the period of a pendulum?
2. Collect data. Which variable appears to have the greatest 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 on the number of digits to record in your measurements. Explain these decisions.
5. Use your model to determine the characteristics of a pendulum with 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 on the number of digits to include in the lengths of the 2-second, 1-minute, and 1-hour pendulums. Explain these decisions.

Swing Time

Task Statement 2

In the early 1600s, Galileo began to study pendulums after noticing that a chandelier in the Tower of Pisa had a regular swinging motion. He later figured out how to design a pendulum that swung back and forth in exactly two seconds, 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 variables might affect the period of a pendulum?
2. Collect data. Which variable appears to have the greatest effect on the period of the pendulum? Justify your response.
3. Build a pendulum that allows you to adjust the length by making the string longer or shorter. Use your stopwatch to time, in seconds, 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 model seems like 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 with 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 on the number of digits to include in the lengths of the 2-second, 1-minute, and 1-hour pendulums. Explain these decisions.