

Simple Pendulum

As you work through the steps in the lab procedure, record your experimental values and the results on this worksheet. Use the exact values you record for your data to make later calculations.

Setup

Does the period depend on the length of the string?

Does the period depend on the amplitude of the swing?

Does the period seem to depend on the mass?

Record the elapsed time between the first chosen cycle and the end of the final chosen cycle.

Record the number of chosen cycles.

Determine the period for the pendulum.

Determining How Period Depends on Amplitude

Complete the table.

Table 1

Amplitude (°)	Average Period (s)

Determining How Period Depends on Length

Complete the table.

Table 2

Length (cm)	Average Period (s)

Determining How Period Depends on Mass

Complete the table.

Table 3

Mass (g)	Average Period (s)

Using Excel

Does the period depend on amplitude?

Does the period appear to depend on length?

Does the period appear to depend on mass?

Do you have enough data to answer conclusively?

Explain your answers to the preceding four questions.

Of the three period-length graphs, which is closest to a direct proportion; that is, which plot is most nearly a straight line that goes through the origin?

Using Newton's laws, we can show that for the small oscillations of a simple pendulum, the period T is related to the length l and free-fall acceleration g by $T = 2\pi\sqrt{\frac{l}{g}}$. Do any of your graphs support this relationship?

From your T^2 vs l graph determine a value for g .

Upload a file with all your graphs. (Submit a file with a maximum size of 1 MB. *You will upload this file in the WebAssign question.*)

Try a different method to study how the period of a pendulum depends on the amplitude.

Complete the table.

Table 4

Average Amplitude ($^{\circ}$)	Average Period (s)

Studying Energy Conservation

Find the total mechanical energy of the system at an angle of zero and for the maximum angle that the mass makes during its swing.

How do these two values compare?

Upload your graphs. (Submit a file with a maximum size of 1 MB. *You will upload this file in the WebAssign question.*)