

PROPOSED THEORY

In section 11-4 in the textbook, a theory is introduced to describe the oscillation of a simple pendulum. It is mentioned that “for small displacements, the motion is essentially simple harmonic” and the period of oscillation is given by

$$T = 2\pi\sqrt{\frac{L}{g}}$$

For the purpose of the lab, we will assume that this is just a theory that may or may not be a correct representation of real pendulums. Therefore, like any other physics theory, it has to pass experimental testing before it is validated. This is your goal in this lab.

Let us make few notes about this theory. In the equation above, we do not see any reference to the oscillation amplitude or even to the mass of the pendulum. The period of oscillation, according to this equation, depends only on the length and the gravitational acceleration at the location of the pendulum. Also, this dependence is not linear. For instance, in order to double the oscillation period of a simple pendulum we need a string that is four times as long.

For the purpose of this lab, you will put the three statements below under experimental testing and provide detailed analysis and discussion that support your conclusions.

Statement 1

The oscillation period of a simple pendulum is independent of the oscillation amplitude.

Statement 2

The oscillation period of a simple pendulum is independent of the oscillating mass.

Statement 3

The oscillation period of a simple pendulum is given by the equation $T = 2\pi\sqrt{L/g}$.