

Lesson plan for *Pendulum Lab1*: Introduction to Pendulums

Time for activity

Learning Goals:

Students will be able to:

- Design experiments to describe how variables (*length, mass, angle and gravity field*) affect the motion of a pendulum.
- Use a photogate timer to determine quantitatively how the period of a pendulum depends on the variables (*length, mass, angle and gravity field*).

Background:

I am assigning this as homework in my College Physics class. My students will have finished the unit on Conservation of Energy and completed the four Skate Park activities and the Masses and Springs Conservation of Energy activity (homework version) that I wrote. Also, they will have designed several labs and used a photogate. In addition, they will have done the Curve Fitting activity. Because of the earlier emphasis on energy conservation, this activity only addresses the first two learning goals written by the sim design team. You can read the other goals at [Learning Goals for Pendulum](#). I plan to use this as an introduction to circular motion. I will use the Masses and Springs Determine the Unknowns activity at the end of this same unit during the semester review. I have an activity for determining g using *Pendulum Lab* that I am going to use in the Wave unit.

***Pendulum Lab* Introduction:** Here are some of the Tips written by PhET; for the complete document see the “teachers guide” under [Teaching Tips for Pendulum](#). I probably won’t show these to the students, but the information might be handy to remember as I help individuals.

- If you want to do an experiment, **Pause** the sim, set up your experiment, then start it.
- If you want to compare two variables like length, check **Show 2nd Pendulum**, **Pause** the sim, set up your experiment, then start it.
- The **Photogate Timer** operates as a triggered mechanism, which starts when the pendulum crosses the vertical dotted line. The period will be displayed after one cycle.
- All the tools are draggable: the timer, stop watch, ruler and tape measure
- The initial angle is marked by a tick mark the color of the pendulum mass
- As you move the pendulum, the angles are constrained to be exactly whole numbers.
- Students may change the mass or length while the experiments are running. It is possible that they may not realize it.

Lesson: I plan to use some clicker questions to help with class discussion during the semester review time at the end of the unit.