**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:** This lesson was written for an emergency back-up lesson. It can easily be used with any sub if the students have done some PhET activities.

***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](http://phet.colorado.edu/simulations/sims.php?sim=Pendulum_Lab). 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 triggeredmechanism, whichstarts 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:** There are some questions that could be used the next day.