

Applied Statistics - Project 1

The first project in Applied Statistics is to measure the gravitational acceleration, g , with the greatest possible precision, using two different experiments:

Simple pendulum:

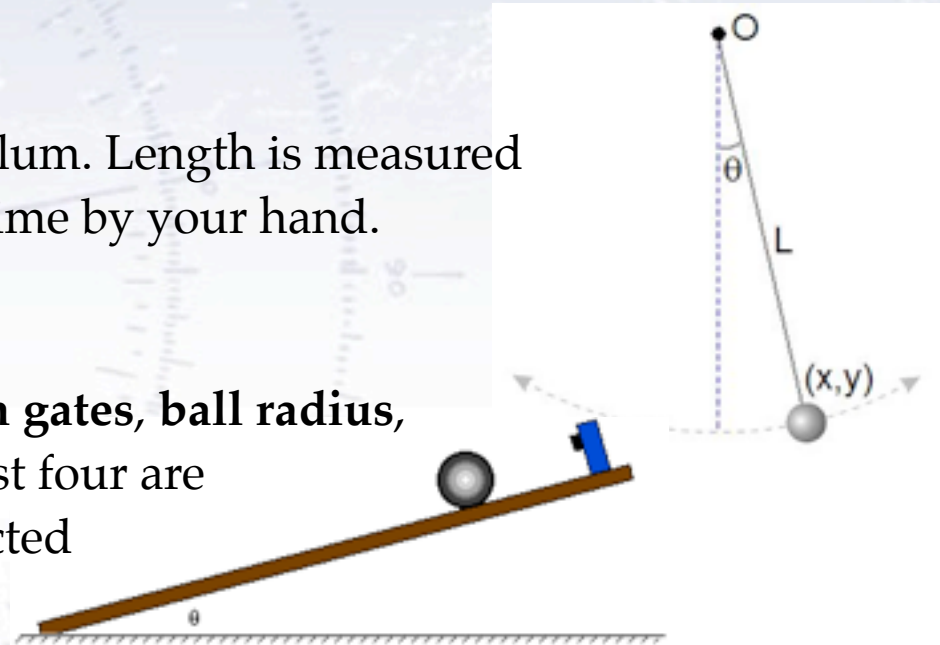
Measure **length** and **period** of the pendulum. Length is measured with a measuring band and a laser, and time by your hand.

Ball rolling down incline:

Measure **incline angle**, **distance between gates**, **ball radius**, **rail distance** and **gate passage times**. First four are measured by hand, while timing is extracted from data files.

The project purpose is to learn how to **extract**, **minimize** and **propagate** errors. Before doing the experiments, please consider through error propagation, which of the measurements are going to be most challenging/limiting.

For more information, please look at the [project 1 webpage](#).

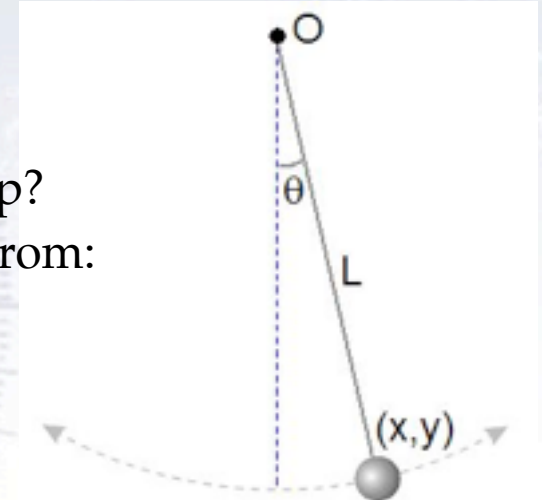


Experiment objectives

In doing these experiments, you should make sure that you answer the following questions:

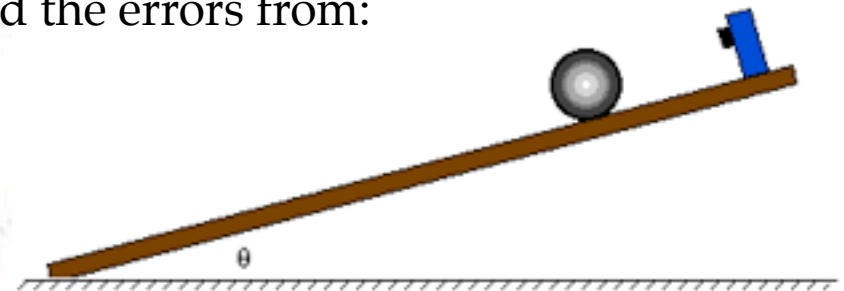
Pendulum:

- What is the timing precision of each person in the group?
- What is the gravitational acceleration g and the errors from:
 - ♦ Length of pendulum.
 - ♦ Period of pendulum.



Ball on an incline:

- What is the angle of the rail, and what is the angle of the table?
- What is the gravitational acceleration g and the errors from:
 - ♦ Timing measurements in the five gates.
 - ♦ Distance between the gates.
 - ♦ Ball radius and rail distance.
 - ♦ Angle of rail.



Finally, perhaps you can eliminate some of your uncertainty by making $\theta = 90^\circ$?