Applied Statistics - Project 1
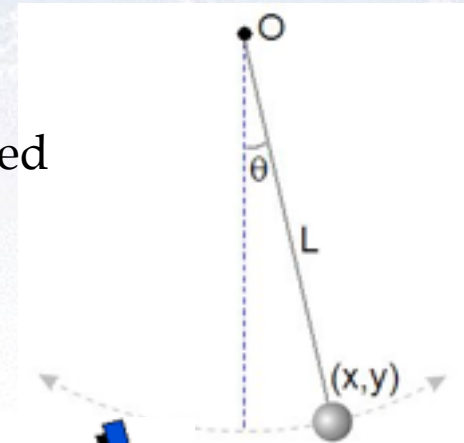
The first project in Applied Statistics is to measure the gravitational acceleration, g, with the greatest possible precision, using two different experiments:
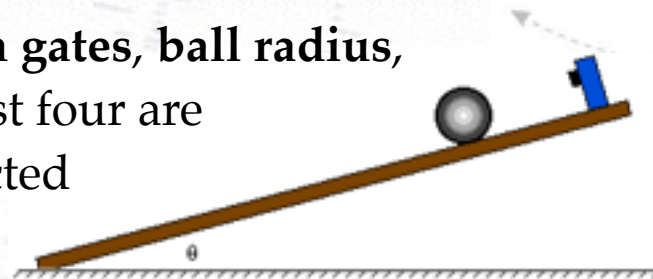
<u>Simple pendulum:</u>
Measure **length** and **period** of the pendulum. Length is measured with a measuring band and a laser, and time by your hand.

<u>Ball rolling down incline:</u>
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**, **minimise** and **propagate** errors. Before doing the experiments, please consider through error propagation, which of the measurements are going to be most challenging/limiting.
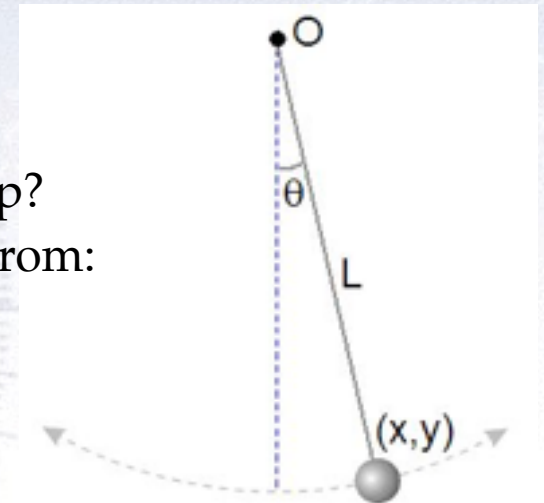
For more information, please look at the <u>project 1 webpage</u>.

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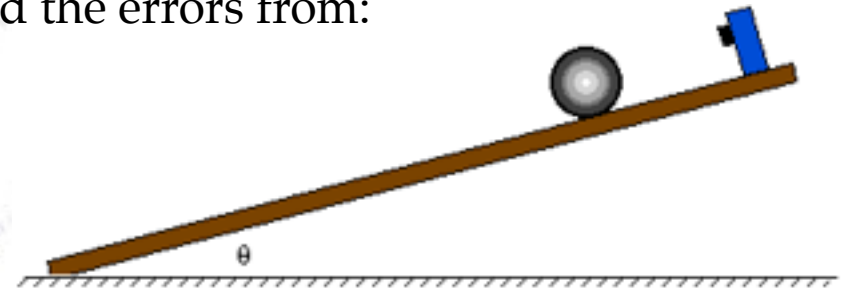
Finally, perhaps you can eliminate some of your uncertainty by making $\theta = 90^o$?