

Constant Acceleration

Overview The purpose of this activity is to see if the acceleration of a rolling tennis ball down a ramp is constant. We set up a ramp at a fairly shallow angle. We released a tennis ball from various distances and measured the time it took the tennis ball to pass through a photogate at the bottom of the ramp. The data we collected is in the Fathom file called Ramp Speed Tennis Ball.ftm.

Getting Started Open the Fathom file. In the file you will see a picture of the set up and the data described above. The data is labeled as follows:
 blocked_time [s] -- the time it took the tennis ball to pass through the photogate.
 distance_down_ramp [cm] is the distance from the photogate to the point where the ball was released.

In addition, the diameter of the tennis ball has been measured and is contained in the file as a slider called diameter_TennisBall. The speed of the tennis ball at the bottom of the ramp is listed in the data table as speed_at_bottom, but it has been left up to you to figure out how to calculate it.

Reviewing the Theory and Making Predictions If it is true that the acceleration of a rolling tennis ball down a ramp is constant, what relationships do you know from kinematics that might apply here? (for example, $v = a*t$)

How will you calculate the speed_at_bottom?

What prediction can you make using the assumption of constant acceleration that you can test using the data you have? (Hint: It may be easiest to predict a relationship between two variables)

Data Analysis

- Enter the equation you found to calculate the speed_at_bottom into Fathom. (To put in an equation for a calculated column, either double click in the equation row or choose **Edit Formula** from the **Edit** menu with the column selected.)
 - ☞ Fathom will automatically convert the units of speed_at_bottom if you change them in the units row.

