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# Demo: Fitting Polynomial Models

In this video, we explore the FreeFall data using the Graph Builder, and see how to fit polynomial models using Fit Y by X.

We'll start by opening the Graph Builder from the Graph menu. Recall that we are measuring Distance as a function of Time. We'll drag Distance to the Y zone and Time to the X zone. A Smoother, which is automatically fit to the data, provides some insight regarding the nature of the relationship between the two variables. When we change the graph element to Line of Fit, we can easily see that a straight line does not fit the data well.

Let's turn on some statistics: R2, RMSE, the Equation, and the F Test. R2 is high and the model is significant, even though we know the relationship is not linear. We'll change the Degree of fit from Linear to Quadratic. A Quadratic fit seems to capture the relationship between the two variables. The equation now has a quadratic term.

Look at the fit statistics. This is clearly a much better model!

To formally fit this model, we'll use Fit Y by X. Distance is the Y, Response, and Time is the X, Factor. Since we know that a quadratic model is appropriate, we'll fit a quadratic model. To do this, we'll select Fit Polynomial, 2,quadratic from the red triangle.

Let's take a look at the residual plots. We'll select Plot Residuals from the red triangle menu for Polynomial Fit Degree=2. The residuals plots all look good, with no left over non-random pattern. This confirms that the quadratic model makes sense.

Note that, if needed, a number of transformations are available using Fit Special, which is a menu option under the top red triangle. Additional transformations can also be explored directly in the Graph Builder.




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