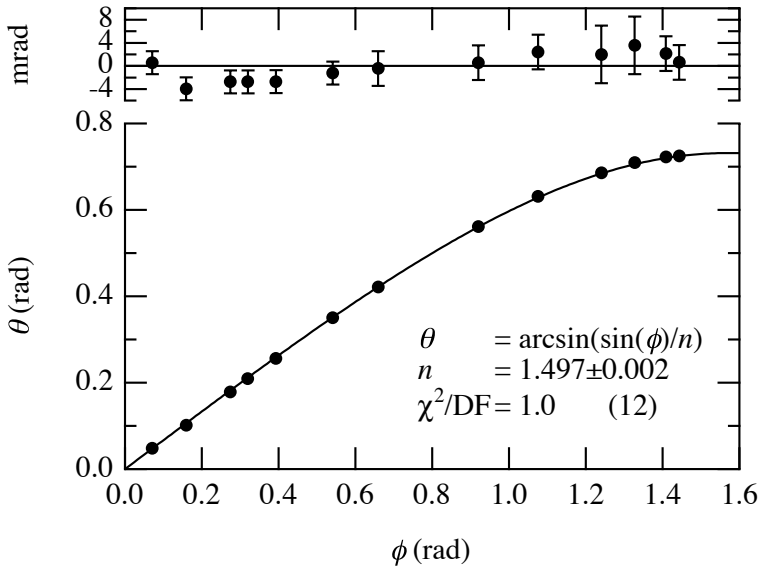
Quantity	Definition or Expression	Excel Function
mean — your best guess for the quantity you measured	$\bar{y} = \frac{1}{N}\sum_{n=1}^{N} y_n$	=AVERAGE()
standard deviation — a measure of the width of the distribution of your data points	$\sigma_y = \left[\frac{1}{N-1}\sum_{n=1}^{N}(y_n - \bar{y})^2\right]^{1/2}$	=STDEV()
standard deviation of the mean (aka standard error) — your best guess for the *random* uncertainty of the measurement	$\sigma_{\bar{y}} = \frac{\sigma_y}{\sqrt{N}}$	=STDEV()/ SQRT(COUNT())
weighted average — this is how to combine several measurements of the same thing that have different uncertainties	$\bar{x} = \frac{\sum_i x_i/\sigma_i^2}{\sum_i 1/\sigma_i^2} \quad \sigma = \left[\sum_i 1/\sigma_i^2\right]^{-1/2}$	

Error Propagation		
general uncorrelated errors $z = z(x, y)$	$\delta z = \left[\left(\frac{\partial z}{\partial x}\,\delta x\right)^2 + \left(\frac{\partial z}{\partial y}\,\delta y\right)^2\right]^{1/2}$	
sum $z = x + y$	$\delta z = \sqrt{(\delta x)^2 + (\delta y)^2}$	
product $z = xy$	$\frac{\delta z}{z} = \left[\left(\frac{\delta x}{x}\right)^2 + \left(\frac{\delta y}{y}\right)^2\right]^{1/2}$	
generalized product $z = x^m y^n$	$\frac{\delta z}{z} = \sqrt{\left(m\frac{\delta x}{x}\right)^2 + \left(n\frac{\delta y}{y}\right)^2}$	

Plotting and Analyzing Results



Residuals

- *Do they appear random?*
- *Are about 2/3 of the points within one error bar from the zero line?*

Fit Results

- *Does the curve describe the data trends well?*
- *Are the parameter values reasonable?*
- *Is the reduced value of χ^2 approximately equal to 1?*