# Calibration/Regression Activity

In this activity, teams will work in the computer lab, playing a trebuchet game. The game can be found at: <http://www.globalspec.com/trebuchet/>

We want to discover the sensitivity of each variable to distance thrown. You will only use the ‘First Challenge” to determine distance thrown.

Form in to teams of 3-4 people. Of the adjustable parameters below, **choose one** that your team will look at. Make sure all parameters are covered by the other groups.

1. Projectile Mass
2. Counterweight Mass
3. Counterweight Height
4. Launch Angle

Use the following parameters as the “Base Values”

* Projectile Mass 25
* Counterweight Mass 75
* Counterweight Height 75
* Launch Angle 45
* Gravity 0.98
* Wind 0

## Part 1 – Regression around Base Values

Leaving all the other parameters on the “Base Values,” divide your parameter in to 20 points (10 on each side of the base values, covering the whole range of your variables adjustment). Record the distance shown on the game for each point.

Plot your data in Excel, and use an appropriate regression to get an equation for the sensitivity of distance to your parameter.

## Part 2 – Sensitivity to Base Value Changes

Run your same experiment (three more times), but for each iteration change one of other three parameters to a value that is either notably higher or lower than the base value. For instance, if your chosen parameter was counterweight mass from 50-100, redo your experiment with projectile mass set to 75. Then redo your experiment with counterweight height at 25. Then redo your experiment with launch angle of 20.

Make three more plots - one for each parameter - that show your original data and your data with the parameter value changed. Does changing the parameter change the sensitivity of the parameter you are studying? If so, is it just the slope, both slope and intercept, or more?

## For Class Thursday:

Bring your printed results to class and as a team be prepared to present your results to the class in a presentation lasting less than 3 minutes. You will turn in your results, so make sure the names of your team members are on your packet.