### Simulation Results (5 points)

Using virtualtrebuchet.com, simulate the performance of your arm using values from the ACTUAL AutoCad Inventor design including, Volume, Mass, Inertia about center of gravity, distance from pivot to center of gravity and Lengths of short and long arms measured from the pivot.

|  |
| --- |
|  |
|  |  |

Length of Short Arm (in)

Length of Long Arm (in)

Length of Sling (in)

Length of Weight (in)

Height of Pivot (in)

Mass of Arm (lb)

Inertia of Arm (lb·in²)

Pivot to Arm CG (in)

Mass of Weight (lb)

Inertia of Weight (lb·in²)

Mass of Projectile (lb)

Projectile Diameter (in)

Wind Speed (in/s)

Release Angle (deg)

Volume of Material In Arm (in3)

Predicted Distance (ft)

### Trebuchet Testing (5 points)

Test the distance your assembled trebuchet can toss the ball. Measure from the pivot point to where the ball first lands. Bounces and rolls do not count. Make any modifications you can to your design within the design constraints to improve its performance. **Record your trials in your notebook** in a table like the one below. Observe other designs; note the performance and any design features you can see that contribute to the performance.

|  |  |  |
| --- | --- | --- |
| Test Number | Distance (ft) | Modifications made before next test. |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Final distance = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (ft)

### Design Analysis (15 points)

1. How did how your design perform compared to the **simulation**? List **possible factors** that caused differences between actual and simulated performance. (Think about what your simulation may not have accounted for.) List also **how** you think these **factors affected** your actual results.

Example: Friction in the axle of rotation. Friction causes a loss of energy, so not all of the potential energy of the weight is transferred to kinetic energy of the projectile.
2. Discuss how your design compared with **other designs**. Compare features of the best designs and the worst designs. What were the differences and similarities? What are the features of the best designs that resulted in better performance? What features resulted in poor performance?