Ty Marking

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Period 4

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Rocket Launch Lab

**Conclusion**

After testing the range a stomp rocket will fly at launch angles of 0°, 15°, 30°, 45°¸60°, 75°, and 90°, we found the best 15° increment to launch a stomp rocket is 45° with an average range of approximately 29 meters. This was found by taking the average of the best 3 launches out of 5 launches at each launch angle. The launch angle with the shortest range is at 90° with an average range of approximately -2.5 meters. The data fit into a parabolic curve with the optimum launch angle of approximately 41 degrees.

**Limitations to Conclusion**

We are not confident in our results having any accuracy in any numeric values. The highest uncertainty was over 5 meters which is a clear indicator the data is unreliable. While the data is unreliable in its numeric value, we are confident that the idea that the optimal launch angle is somewhere between 30 and 45 degrees is correct.

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| **Limitations to Procedure** | **Suggestions for Improvement** |
| Probably the biggest limitation of our procedure is the limited data size. With only taking the best 3 out of 5 launches for each angle, there is a large amount of uncertainty and error. | The solution to the lack of sample size is simply to launch more rockets at each angle. Even doubling the amount of launches to 10 and keeping the best 5 would significantly decrease the error of our data. |
| A variable that likely affected the results that we did not account for is the wind. With varying speeds and directions, the wind affected each launch uniquely possibly leading to wrong or skewed data. | To account for the wind factor, two steps could realistically be taken. One is to perform the tests in the lee of a large building, the other is to wait for a day with little wind. |
| Another cause for uncertainty and error in our results is the method for marking where each rocket landed. Because each rocket bounced wildly after hitting the ground, we had to do our best to estimate where the first contact occurred. This is obviously not precise. | A simple way to remove the human estimation is to dust colored chalk powder on the heads of each rocket so that it would leave a colored mark where it landed allowing for accurate measurements of each rocket’s range. |