CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY

Name(s)
Terry Hsu

Project Number
J0319

Project Title
Flip It Around: How to Get the Best Succeeding Rate for Bottle Flips

Abstract

Objectives/Goals
The purpose of our study is to compare the succeeding rate of a bottle flip in different angles and different water height, in this experiment, we can find out the best angle and water height for a bottle flip to succeed. It is hypothesized that a water height of 1/3 will make a best succeeding rate of bottle flips in most angle.

Methods/Materials
In this experiment, first, we used large 1 large plastic pipe, metal holders, and 3 pieces of wood to make a bottle launcher. Then, we prepare 5 Kirkland bottle with a marked height, each with 600ml capacity, to perform the bottle flip. Next, we will put in the following height of water: 0cm, 3cm, 6cm, 9cm, 12cm, 15cm, 18cm. After preparing the bottles, we can start putting the bottles inside the bottle shooter, and record each test result, we have the following angles to test: 0 degrees, 15 degrees, 30 degrees, 45 degrees, and 60 degrees. Each water height has 30 tests times 5 angles, which is 150 tests per water height.

Results
The result was that 1/3 of the water height does give the best bottle flip succeeding rate. We found that both low water filled and high water filled bottle give a very low succeeding rate, because it will cause the bottle to bounce very high in the bottle flip. We also found that 15 degrees angle actually works better than a 0 degree angle, because of the rounded edge on the Kirkland plastic bottle, therefore, the angle of 15 degrees performs the best succeeding rate. Based on the best condition of 33cm, insert angel of 15 degrees, we found the succeeding rate can reach 93% when the water height is 1/3.

Conclusions/Discussion
The result of our experiment clearly shows that our hypothesis, ¡°A water height of 1/3 will make a best succeeding rate of bottle flips in most angle.¡±, is true. However, in our experiment, we used a machine to eliminate human factors and make an accurate result with more than 1000 tests, the actual bottle flips still depend on the way the person performs it, especially when it comes to the angle. And still, I believe that our experiment can help people determine their water height of bottle flips and is a really fun and interesting idea to work on!

Summary Statement
In our experiment, we tested the insert angle and water height to find the best condition to make a highest succeeding rate for bottle flips using a bottle launcher on more than 1000 trials.

Help Received
My father helped me build some parts of my bottle launcher that I designed, including buying materials and sawing wood. My mother helped me design and organizing my display board.