CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J0113

Project Title
Falling Faster: The Effect of Area on Terminal Velocity

Abstract

Objectives/Goals
The purpose of my project was to determine whether the area of an object has an effect on its terminal velocity.

Methods/Materials
To test this, I built a wind tunnel out of wood, plumbing parts, and a plastic tube. Then I created shapes out of foam board so that I could test if the area was a variable in determining the terminal velocity of an object. I created three pairs of shapes. For two of the three pairs, the objects had the same weight but different areas. This allowed me to prove whether or not the area was influencing the object's terminal velocity. For the third pair of shapes, I decided to test whether objects with the same weight and area but different shape would have different terminal velocities. For each test, I would select two shapes that I had cut out, and, one by one, drop them into my wind tunnel. I would then adjust the ball valve to increase or decrease the wind speed to match the object's terminal velocity. Once I found the terminal velocity, I recorded the object's weight, shape, terminal velocity, and area in my logbook. For each test, I did three trials to ensure that the result had not been a fluke or a mistake. After conducting my experiments, I used the equation of a line to develop an equation that would allow me to predict the terminal velocity of a shape with a constant weight. Once I found this equation, I tested it by creating two new shapes and I used my equation to predict the terminal velocity of each shape. Then I tested the shape in the wind tunnel to make sure that the predicted terminal velocity was the same as the real one.

Results
The shape with the lowest area, the triangle weighing 3.5 grams with an area of 1 square inch, had the highest terminal velocity, 17 mph, because it encountered the least wind resistance. I also found from my data that I could create an equation with which I can predict the terminal velocity of an object with constant weight.

Conclusions/Discussion
The predicted terminal velocity was the same as the terminal velocity when i tested it in my wind tunnel. This proved that my equation was indeed correct. From my research and experiments, I can conclude that the larger an object's area is, the lower the terminal velocity will be. I also proved that an object's shape does not have an effect on its terminal velocity.

Summary Statement
My project demonstrates that the area of an object has an effect on its terminal velocity.

Help Received
My dad took me to buy the needed parts to build my wind tunnel.