CALIFORNIA STATE SCIENCE FAIR
2005 PROJECT SUMMARY

Name(s)
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Project Number
J0220

Project Title
The Limit of a Bounce

Abstract

Objectives/Goals
Objective: Find out what effect pressure (PSI) has on the bounce height of a ball.
Hypothesis: I predict that as you add more air pressure into a ball, the ball will bounce higher. At some high air pressure level, I predict that additional air pressure inside the ball will no longer increase the bounce height of the ball.

Methods/Materials
To conduct this experiment, I built a ball drop device that allowed me to consistently control the drop of each ball for my testing. Three different types of balls were tested: a men#s basketball, a women#s basketball and a soccer ball. Each ball was tested at twelve different air pressures, beginning at 5 psi and adding 1 psi of pressure each time to a total of 17 psi. The materials used for this experiment were: plywood, bolts and washers; compass; jig saw; screw driver, wrenches and drill; video camera and tripod; two ladders; balls, ball pump and needle; digital pressure gauge; measuring tape; weight scale.

Results
Each ball bounced higher as I increased the air pressure. I discovered that an air pressure of about 11.5 psi was where the balls began to level off in bounce height. After charting the results of my tests, I noticed that the larger the ball, the higher the bounce. I then investigated the relationship between the ball weight and circumference and the bounce height by charting the results into line graphs to view the relationships. The weight and the circumference of the ball had a consistent effect on the bounce height; therefore these factors didn#t affect the goal of my experiment.

Conclusions/Discussion
My results showed that the men#s basketball bounced the highest, then the women#s basketball, then the soccer ball. Up to the 12-15 psi level, all the balls did increase in bounce height. Above 15 psi, increasing the air pressure didn#t make the balls bounce higher. I discovered that a ball#s bounce height is related to all the factors of air pressure, weight, circumference and drop height.

Summary Statement
I tested three different balls by adding air pressure to them to see what effect the additional air pressure would have on the bounce height of ball.

Help Received
Dad helped me with the design and construction of the ball drop, ran the video camera as I dropped the balls, and taught me how to create charts and graphs in Excel.