CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY

Name(s)
Seth W. Brown

Project Number
J0204

Project Title
Investigating the Relationship of a Basketball's Air Pressure to Bounce Height

Abstract

Objectives/Goals
The purpose of this experiment was to investigate the relationship of air pressure to bounce height, using a basketball. I believe at a variable held constant, which is the height a ball is dropped from; a positive correlation will exist between the manipulated variable - the air pressure in the ball, and the responding variable, which is the height the ball bounces.

Methods/Materials
The experiment was conducted using three different brands of 24cm diameter basketballs. A sports pump with a PSI gauge and a pump needle was used to inflate the balls, to nine air pressures between 0 to 20 PSI. Each ball was dropped from a fixed height (the underside of a breakfast bar)onto a firm surface (the kitchen tile floor). An oversized centimeter grid was placed behind the area where the balls were to be dropped, for recording bounce height measurements using a video camera. Using the camera's playback frame-by-frame mode, each ball's maximum bounce height was determined. Each ball was dropped at the various air pressures five times each. The average height of each ball at each air pressure was calculated, converted from PSI to kg/sq. cm, and graphed.

Results
Increasing the air pressure in the basketballs, did result in increasing the balls' bounce heights. The graphed results showed an acute linear correlation in bounce height from 0 to 5 PSI. A less acute, but still significant linear rise occurred from 5 to 15 PSI. Between 15 and 20 PSI, with 20 PSI being almost the maximum air the balls could hold, the height the balls could bounce increased only about 1 cm, the least significant amount of change.

Conclusions/Discussion
The goal of this experiment was to improve my basketball game by finding out what is the best air pressure for a basketball, because a basketball's bounciness is important in dribbling and rebounding. The International Basketball Federation says a properly inflated ball rebounds to 62 +/- 6% from the height from which the ball is dropped. Based on this information and my data, the balls should be at ~7.5 PSI. The follow-up experiment might be to evaluate dribbling and rebounding at the recommended range of inflation written on the basketballs of 7 to 9 PSI, to see if 7.5 PSI is the best air pressure, or if increasing the air pressure and thus increasing bounciness, improves or hinders my game.

Summary Statement
Investigating the relationship of air pressure to bounce height, using a basketball.

Help Received
Mother helped with some typing and videotaping.