CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)

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Project Number

J0107

Project Title

Air Pressure in Soccer Balls

Abstract

Objectives/Goals

The goal of our project was to find out how air pressure inside of a soccer ball affects how high it bounces if dropped and how far it goes when kicked. We also wanted to establish a relation between first, second, and third bounces. We believe that higher pressure inside of the balls will lead to higher bounce and longer kick.

Methods/Materials

In our experiment, we tested a soccer ball with 10, 9, 8, 7, 6, 5, 4, 3, and 0 PSI gauge pressure. We built a structure to kick the soccer balls for our kick test. The structure was made of ABS pipe. We designed the structure with a swinging arm and weight plates attached to kick the soccer balls. In our kick test, we lifted the kicking arm to a 90-degree angle and let it swing at the ball and #kick# it. We had spotters place beanbags where the ball landed on the first three bounces. We then repeated the test. Later, we did a drop test in which we dropped the soccer ball in front of three yardsticks from 9 feet high. We took photos of the ball dropping and used them to identify how high the ball bounced after the first three bounces.

Results

In our results, the balls inflated to higher pressure generally bounced higher and were kicked farther. The first bounce was the highest/longest bounce, and the following bounces decreased even more. However, the difference between the second bounce and third bounce was much less.

Conclusions/Discussion

Our results generally followed our hypothesis, since higher PSI led to higher/longer bounce. However, one result that we found interesting was the kick distance of the ball at 5 PSI in the kick test. The ball went farthest, but the result doesn#t make sense because of Hooke#s Law. In summary, according to Hooke#s Law, a stiff spring will apply more force than a loose spring when it is compressed. This applied to our experiment because a tight spring is like a ball at high pressure while a loose spring is like a ball at low pressure.

Summary Statement

How does air pressure in a soccer ball affect how high the ball bounces or how far it is kicked?

Help Received

Parents bought materials and drove us to test site; Dad's friend helped build kick machine;