CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
Aaron H. Smith

Project Number
J0223

Project Title
How Different Surfaces Affect the Velocity of a Rolling Object

Abstract

Objectives/Goals

The purpose of my project was to discuss how different surfaces would affect the velocity of a rolling object. I used a fifteen centimeter ramp, a pool table, and a pool ball. The three surfaces I used in my experiment were the plastic ramp itself, the ramp covered with a medium thick felt, and the ramp covered with medium grade sandpaper. I then marked every twenty centimeters on the pool table with a piece of tape. When I rolled the ball down the ramp and along the pool table, I videotaped the movement and downloaded it onto my computer. I then used Adobe Premier Elements 4.0 to measure how many frames it would take for the ball to roll from one piece of tape to the next. There are thirty frames per second. With this information I created a chart and a graph to compare the average velocities on each surface. I measured the average speed that the ball traveled between each mark after all of my different tests and found that my findings confirmed my hypothesis which stated that the sandpaper surface would allow the ball's velocity to be greater than the other two surfaces. This was because the ball on the sandpaper achieved the greatest rotational velocity and had to work the least on this surface when traveling down the ramp than it did on the other two surfaces. The reason that the ball went the slowest on the felt was because it was soft and the ball had to work to move over and through the felt. This caused it to expend more energy and travel at a slower velocity. The velocity of the ball on the smooth surface was between the velocities on the sandpaper surface and the felt surface because it slid intermittently as it traveled down the smooth surface and while it did not expend energy in pushing its way down the smooth surface as the ball on the felt did, the intermittent slipping caused it to expend energy and not achieve as great a rotational velocity. Therefore, it traveled at a slower velocity than the sandpaper covered surface. Finally, I tested my results by determining the standard deviation for each test sample. From this, I determined that the test results were very accurate.

Summary Statement

My project shows how different surfaces affect the speed of a pool ball traveling down a ramp and across a pool table.

Help Received

Family friend, Aaron Kvamme, helped with understanding and interpreting the results. Neighbor, Tom Carr, helped in coming up with the idea for the project.