CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.)
Albert Gonzales; Michael LaRiviere

Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9)
How Many Newtons Does It Take to Stop a 10-Pound Bowling Ball in Less Than 3 Meters?

Science Fair Use Only

J0911

Division
 X Junior (6-8) _ Senior (9-12)

Preferred Category (See page 5 for descriptions.)
1 - Applied Mechanics/ Structures & Mechanisms/ Manufacturing

Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.)
Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.

Objective: The goal of our project was to stop a bowling ball with the force of model rocket engines. We thought this would be an exciting way of demonstrating Newton's Law of Motion.
Materials and Methods: Our project includes a bowling ball, a wooden track and a metal "Catcher" which houses 2 rocket engines up to "D" in size. Our ball rolls down a ramp and on to the track. The ball hits the catcher which slides freely in a groove in the track. On the way down the ramp the ball hits a switch which lights the rocket engines. The thrust of the engines stops the bowling ball. Our rough estimate of the Newtons produced by the ball at the end of the ramp was made by using the equation (Force=Mass x Acceleration x sin0). This was 15 Newtons. Model rocket engines come in different sizes with known thrust. For example a D-12 engine produces 12 Newtons of thrust. We experimented many times to find the most effective combinations of rocket engines which would stop the bowling ball.
Results: We found that it took 18 Newtons to completely stop the bowling ball and even push it in the opposite direction. The most effective combination of rockets was a D-12 and a C-6. These rockets stopped the bowling ball at 5' and pushed it back 1'3".
Discussion: We were able to design and build the parts of our project to safely and successfully complete our goal. We did not have any mishaps in our experiment except that we needed more battery power for the igniters.

Summary Statement (In one sentence, state what your project is about.)
Our project stops a rolling bowling ball using the force of rocket engines

Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4.
Albert's father helped to router the track. My father helped buy the catcher   parts and checked the design for safety.