



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jonathan M. Masukawa</b>	<b>Project Number</b> <b>J1524</b>
<b>Project Title</b> <b>Relation between Acceleration and Angle of Inclination</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this project is to determine the relation between the acceleration of a rolling object and the angle of inclination of a ramp. <b>Methods/Materials</b> An inclined plane, which could change inclination from 10 degrees to 60 degrees, in intervals of 10, was constructed. A marble was rolled down the ramp while being taped on a camcorder. The time it took to travel specified distances on the ramp was calculated, and then from that acceleration was determined for each angle. <b>Results</b> The acceleration increased as the angle of inclination increased, and the velocity of the marble was found to be constantly increasing as it traveled down the ramp. The accelerations for each angle were graphed against the sine, cosine, and tangent of the corresponding angle. It was determined after analysis and comparison that the sine of the angle directly related to the acceleration of the marble. <b>Conclusions/Discussion</b> I have concluded that the relationship between the sine of the angle and the acceleration of any rolling object can be shown through the equation $a = g \cdot (\sin)\text{angle}$ , where $a$ = the acceleration, $g$ = the acceleration caused by gravity (9.81), and angle = the angle of inclination. With this equation, acceleration can be calculated with just the knowledge of the angle of inclination. A computer simulation program was created to show how this equation could be used to simulate acceleration for things such as video or computer games.	
<b>Summary Statement</b> My project is about finding the relationship between the acceleration of a rolling object and the angle in which it is inclined, and then being able to accurately predict acceleration.	
<b>Help Received</b> Brother helped with ideas/overcoming problems; Father helped and supervised construction of the materials needed to complete project; Mathematical and physics background supplied by high school physics teacher; Inspiration and encouragement from my science teacher.	