



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Portia M. Osuch	Project Number <div style="text-align: right;">34624</div>
Project Title Kicking It	
<div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> Objectives/Goals <p>The goal is to measure and identify which of the following three Taekwondo kicks: front snap kick, roundhouse kick, and back kick, generates the most force. The first step is to define the calculation of force. The second step is to understand how to measure the components for the equation. Then translate the recorded measurements into useful data.</p> <p>Assemble a team of 10 Taekwondo volunteer subjects. The subjects will perform each of the 3 trials per kick type for a total of 9 kicks. The kicks will have no impact and solely performed in the air. The data is input into an Excel spreadsheet for auto calculations with formulas.</p> <p>This process will help an athlete to identify which kick he or she performs with the greatest amount of force. It will also reveal which kick they can improve upon.</p> </div> <div style="width: 65%;"> Abstract </div> </div> Methods/Materials Methods: 1.F = M x A; 2.Average % of a foot weight(1.48%); 3.Consult Mr. Collins on formulas, accurate measurements and data collections; 4.Set up a spreadsheet: a.ID#; b.Age, belt rank, weight, type of kick (3 per type), mass of foot, speed, time in 1/100sec, acceleration/force, and #s of force; c.Force=Mass x Acceleration; d.M or Mass of foot = weight in kilograms x 1.48% of the human foot weight; e.Acceleration = Speed/Time; f.Speed=radar device in meters/sec; g.Time=stopwatch in 1/100sec; h.lbÆ# = F x 22.5; 5.Taekwondo session; 6.ID#; 7.Age; 8.Belt rank; 9.Weigh; 10.Perform three kick types; 11.Radar device measure the speed; 12.Stopwatch measure the time; 13.Record the data; 14.Repeat 10-13 until all 9 trials are complete; 15.Repeat step 6 with the 10 subj; 16.Analyze and avg the results. Materials: Weight scale, Radar device, Stop Watch, Laptop with Excel spreadsheet, Data book, Pencil, Math equations, At least two helpers, 10 subjects Results My analysis shows that among the 3 kick types, the front snap kick produced the highest overall average lbÆ# at 255 lbs. followed by roundhouse kick at an overall average of 227 lbÆ#, and then back kick at 224 lbÆ#.	
Summary Statement This process will help an athlete to identify which kick he or she performs with the greatest amount of force and it will reveal which kick they can improve upon.	
Help Received Mr. Collins for mathematic formulas; TMAX/Lee's Taekwondo Studeo, Pasadena, CA - volunteer subjects; Mom and Dad to assist me with making sure that the equations were correct.	