



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Siegen A. McKellar</b>	<b>Project Number</b> <b>J0117</b>
<b>Project Title</b> <b>Getting a Kick Out of Freestyle: Does Foot Angle Affect Swim Propulsion?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of my project was to determine if a swimmer's foot angle affected kicking propulsion in freestyle sprints. I believe that if the angle of the foot is increased, and water is kicked backward rather than downward as is usually taught competitive swimmers, the propulsion of the kick and the speed of the swimmer will be increased. <b>Methods/Materials</b> I made a reversible pair of fins out of styrofoam, fiberglass, and epoxy. One side of the fins was left flat. The front part of the other side was cut on a 20% angle to propel water backward instead of downward. The angled side was reinforced with pieces of aluminum sheeting. The fins were made reversible to control for variables.  I had each of eight swimmers swim three laps (15 yards) using the flat side as the kicking surface and three laps using the angled side, for a total of 48 trials. I controlled for variables. Swimming was done under the supervision of a USA Swimming certified coach. <b>Results</b> The experiment showed that all eight swimmers were consistently faster when they used the angled side if the fins as compared to the flat side of the fins. The results ranged from 14.3% faster to 19.4% faster. <b>Conclusions/Discussion</b> My hypothesis was correct. When the swimmer's foot angle is increased, the propulsion of the kick and the speed of the swimmer are both increased in freestyle sprints. At elite, international and Olympic levels, where fractions of a second can make the difference between first and fourth place, drops in time like those in my experiment could help win medals and break records.	
<b>Summary Statement</b> My project investigates the effect of foot angle on the propulsiveness of the kick and the speed of the swimmer in competitive freestyle swimming.	
<b>Help Received</b> (1) My dad took me to Home Depot to help me find suitable materials. (2) After I measured the angles that I wanted, he helped me cut the styrofoam since it was hard for me to work with. He also helped me cut the metal toe plates and bracing strips, and supervised mixing and using the fiberglass and epoxy.	