



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Kelly H. Hutchinson	Project Number 22704
Project Title Injury Free Is the Way to Be! Effectiveness of Various Protective Shin Guard Materials	
Objectives/Goals Abstract The objective in this project is to find out which shin guard material protects the shin the most from an impact forced upon the shin, by measuring the depth of each indentation in the green floral foam. The objective is to test shin guard materials to find the most protective material out of Yellow Sponge, Flexi Foam, Gel, Black Foam, Two sponges, and White Foam. An additional objective is to see if open celled or closed celled materials are more protective. Methods/Materials Materials: Red wood, ABS pipes, Plaster of Paris, Machine bolts, Lag bolts, Nuts, Green Floral foam, Marbles, Plastic transparent shin plate, Soccer shoe, Velcro strap, Two dumb bells(2,265 grams each), Flexi foam, Gel, Yellow sponge, Black foam, White foam, Two sponges, Drill, Hammer, Saw, Knife, Pipe cleaners, Vaseline. Methods: A soccer shoe hits a shin plate that has a material strapped to the back of it with a marble taped on to the material that sits on top of the green floral foam. When the soccer shoe with the weights on the back hits the shin plate it causes the marble to be forced into the foam, therefore, leaving an indention that is later filled with Plaster of Paris. The indentations, after they are dried are taken out of the depression in the green foam and measured. This process is repeated five times for each of the six materials being tested. Results The Gel was the most efficient while the sponge materials were the worst. The Gel material had an overall indentation average of 1.47 cm. The Flexi Foam average was 2.52cm, the Two Sponges was 2.84, White Foam average was 2.86 cm, Black Foam was 2.82cm, and the Yellow Sponge was 2.98 cm. All materials combined averaged 2.51cm, the open celled materials average 2.71 cm, and the closed materials average was 2.31 cm. Conclusions/Discussion The conclusion to this project was that Gel was the most protective shin guard material. After Gel, Black Foam was the next most effective, then Flexi Foam, White Foam, the Two Sponges, and least effective was the Yellow Sponge. Additionally proven was that the open celled materials were less protective than the closed celled materials.	
Summary Statement The objective of my project is to determine which shin guard protects the shin the most from an impact forced upon the shin, by measuring the depth of each indentation in the green floral foam.	
Help Received I got help from Peter Logan, a contractor, who helped build the kicking machine. My mom helped proof read my lab report.	