



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Matthew T. Miyamoto	Project Number J0315
Project Title Making a Point: The Effects of Weight on the Velocity of an Arrow	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Every year people travel into the backcountry of the United States with guns, bows, and snares to hunt wild animals. In the context of bows and arrows, there is a problem in that some types of arrows do not provide the speed or power necessary to kill the animal and it is often left suffering. If the weight of an arrow affects both speed and penetration, then a heavier arrow will provide better sportsmanship by killing an animal instead of maiming; it demonstrates a more humane treatment of animals with in the sport of hunting with a bow.</p> <p>Methods/Materials Researcher used a Genesis compound bow weighing 1.8kg that was 70cm long with a draw of 45cm and draw strength of 1.8kg. A crossbow trigger mechanism was utilized to consistently fire the arrows by releasing the bowstring at the same point. The arrows used where 78.78cm in length with varying weights of 17.8g to 33.2g. Data of speed in meters per second and penetration in centimeters where recorded.</p> <p>Results Multiple trends were apparent in the data after analyzing the results of four rounds of the testing. In each test twelve arrows with differing weights were fired at the target. Results showed that arrow penetration increased with weight, however there were a few exceptions. Variables that may have affected the penetration include the composition of the arrow shaft, the arrowhead, type of fletchings and the length of the shaft. Because of consistency in draw length, target distance, and materials it could be determined that the drops in arrow penetration where due to factors outside of my control. The lightest weight arrow of 17.9 grams penetrated 71mm while the arrow of 32.2g penetrated 85mm.</p> <p>Conclusions/Discussion Researcher found that heavier arrows do in fact penetrate farther into a target than lighter arrows. However an arrow that is too heavy will not fly fast enough to hit a moving target. Therefore, a balance of a heavier arrow with the lighter arrow#s attributes of speed will best suit the hunter.</p>	
Summary Statement Finding what arrow weight can penetrate a target the most effectively.	
Help Received Father provided materials and supervised construction of materials and experiments, Mother made recomendations for design of board and critique of board, South Bay Archery club provided location for tests.	