



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Zachary N. Goldberg</b>	<b>Project Number</b> <b>J0313</b>
<b>Project Title</b> <b>Trebuchet: The Counterweight to Payload Ratio</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this study is to measure the largest launch distance of a trebuchet with varying counterweights.</p> <p><b>Methods/Materials</b> Four meter tall trebuchet (That I constructed at home), measuring tape, multiple counterweights, three 250 gram miniature basketballs. Launched basketballs ten times with each of three counterweights and measured distance.</p> <p><b>Results</b> Identical basketballs were launched ten times with each of three different counterweights and their launch distances were measured. The launch distance correlated directly with the amount of weight.</p> <p><b>Conclusions/Discussion</b> Repeated trials showed that a heavier counterweight increases the velocity of the payload at launch. However, drag and structural soundness are large factors in the launch distance of a trebuchet, and eventually a heavier counterweight may fall short.</p>	
<b>Summary Statement</b> I designed and built a trebuchet and showed that a heavier counterweight increases launch distance, but drag and structural soundness play a large factor.	
<b>Help Received</b> I designed and built the trebuchet myself with general ideas from several trebuchet hobbyist websites. The experiment was conducted by my father, my brother, and myself.	