



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Reagan A. Risk</b>	<b>Project Number</b> <b>J0124</b>
<b>Project Title</b> <b>What a Lift: Force and Fluid Dynamics</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> By simulating greater depth of water, can I create more force to lift greater weight at greater acceleration, as predicted by Newtons 2nd and 3rd laws?</p> <p><b>Methods/Materials</b> Construct a device to simulate greater water depth by suspending a water source (5 gallon bucket which was constantly refilled) attached by flexible 3/8 inch tubing to an elevator (sliding inner sleeve box) which was supported by a 5-gallon water bladder. Test the lift capacity at water source heights of 12 inches, 24 inches, 36 inches, 48 inches, and 60 inches. Each height is tested at four weights: empty elevator (29 pounds), 20 small concrete blocks (74 pounds), 2 cinder blocks (103 pounds), and 4 cinder blocks (177 pounds). Test acceleration and total time it takes to lift these weights to maximum height. Repeat each test three times.</p> <p><b>Results</b> I took a total of 594 timed measurements. Because of the original design flaws in the elevator system, I redesigned and built my elevator mechanism and reran my tests. As I increased the water source height from 12 inches to 36 inches, the acceleration and maximum lift increased. At 48 inches and 60 inches my data had more variations.</p> <p><b>Conclusions/Discussion</b> As the water source was lifted to 36 inches, simulating greater depth, more weight was lifted at greater acceleration. At water source heights above 36 inches some of the increased pressure caused by the increased height was offset by the small diameter of the tubing. However, when this was factored out, my hypothesis was proved correct.</p>	
<b>Summary Statement</b> As I changed the depth of water, the increased pressure created reflects in the increased acceleration of the mass being lifted.	
<b>Help Received</b> Mom helped me with the graphs; explanation of water lateral flow based on diameter obtained from Coachella Valley Water District Engineers Dan Charlton, Mike Shaefer, and Kevin Hemp.	