



# CALIFORNIA STATE SCIENCE FAIR 2012 PROJECT SUMMARY

<b>Name(s)</b> <b>Jessica C. Whiteley</b>	<b>Project Number</b> <b>S0328</b>
<b>Project Title</b> <b>The Effect of Weight on LEGO Brick Bonds</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The Effect of Weight on LEGO Brick Bonds was designed to test the structural support of LEGO bricks, which can be paralleled to actual brick bonds used for brickwork buildings. My experiment focused on testing the brick bond that can support the most weight and seeing which beam has the highest deflection (and therefore is the most straight). The four brick bonds I tested were the Stretcher (control), the Flemish, the English and the Header bonds. My hypothesis; if the bonds in the bricks overlap more, then the more weight the LEGO bricks can sustain.</p> <p><b>Methods/Materials</b> I gathered LEGO bricks, made them into beams of about 92.5 cm long, and placed weight upon them until the beams broke. The beams were supported at either end with 30.5 cm tall structures, to test deflection. I measured the bonds' deflection and weight support through five experimental trials. I kept the number of bricks used in each beam experiment constant, the length and height at which the individual beams were placed constant and the weight placed upon the beams in constant increments. I also kept all outside variables constant.</p> <p><b>Results</b> My major finding was that the Flemish bond can support the most weight. The beam could support 1600 grams, on average, before collapsing. It also had a deflection of 26.16 cm. This is because it has the greatest surface area overlap, making for the greatest static loading allowance and the tolerance of compression and tension. This made the Flemish bond beam my definition of the strongest LEGO brick bond beam. I also found out that the Stretcher bond has the highest deflection (was the straightest).</p> <p><b>Conclusions/Discussion</b> My original hypothesis was refuted by my data findings. I thought that because the English bond has the most physical overlaps, it would be the strongest. But, no; it is the amount of surface area, static loading allowance and the tolerance of compression and tension that the Flemish bond beam could maintain that made it my definition of the strongest LEGO brick beam. This project expands our knowledge about weight allowances on different brick bonds. It addresses which bond to use when building a structure both with LEGO bricks and the real world. This project also encompasses the subject of how buildings and structures can support weight.</p>	
<b>Summary Statement</b> The Effect of Weight on LEGO Brick Bonds was designed to test the structural support of various LEGO beams which were made using different brick bonds (how bricks fit together) for weight and deflection; this can be paralleled to brickwork	
<b>Help Received</b> I received a very small amount of assistance on my experimental design outline from my science teacher.	