



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> <b>Huthayfa A. Kahf</b>	<b>Project Number</b> <b>J1815</b>
<b>Project Title</b> <b>Concrete: Brittle, Bust, or Brick?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My goal was to find out if more gravel or sand makes a concrete mixture stronger. My hypothesis was that the more I increase the percentage of gravel in a mixture, the stronger it will be. <b>Methods/Materials</b> I made five different mixtures of concrete. My mixture materials included: Portland cement, coarse aggregate (gravel), fine aggregate (sand), water, and air. Then I poured each of the mixtures into the molds that I had prepared ahead of time using cardboard boxes and masking tape. After drying for three days, I then took the concrete bricks to the Twining Lab to test their strength. <b>Results</b> My hypothesis was wrong. More sand and less gravel made the strongest concrete brick. The mixture with no gravel (only sand) was the weakest, but the mixture with no sand (only gravel) was also not the strongest. <b>Conclusions/Discussion</b> My mixture #2 with 50% sand and 17% gravel was strongest because the sand absorbs more water than gravel and thus helps the cement #glue# the mixture together harder.	
<b>Summary Statement</b> My project is about how much sand or gravel makes concrete strongest.	
<b>Help Received</b> My father helped with some of the calculations. Mr. Hung Nguyen and Mr. Mike Fattal answered many questions I had and also allowed me to use the Lab equipment to test my bricks' strength.	