



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

Name(s) Zane J, Calini	Project Number J1304
Project Title Making the Strongest Concrete	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This projects goal was finding the perfect ratio of sand to cement in order to make strong concrete. Because the world has been experiencing major natural disasters such as earthquakes, stronger and safer buildings are at demand. The concrete made was designed to help the creation of these stronger buildings for the safety of society.</p> <p>Methods/Materials During the experimentation of this project I used materials including Portland cement, 3/4 inch gravel, sand, and water. The equipment includes buckets, scales, mixing rods, cylinder molds, a shovel, a hoe, a mold, a thermometer, deep tray, and a compression machine. There were 2 main methods used in the making of the concrete. The first method was mixing the dry materials then adding the water to the mix, after thoroughly mixing the batch and placing the wet mix in the cylinder molds, the samples were placed in a controlled room. The second method was placing the samples in a compression machine to measure the compressive strength. The data was then taken from the machine and recorded.</p> <p>Results The results from the testing included many interesting facts. The amount of force the first batch (3:1 ratio of sand to cement) was able to withstand was about 10,000 kg while the fifth batch was able to withstand 30,000 kg. The other factor that increased the strength of the concrete was how long the samples were held in the curing room. The samples tested that were only held in the curing room for 3 days at most were able to withstand 17,000 kg while samples held in the curing room for 28 days were able to withstand 30,000 kg.</p> <p>Conclusions/Discussion The conclusions comparing the batch types and the change in ratio were truly amazing. The compressive strength of batch one to batch five was increased by about 300%. The ratio increase of cement proved to increase the strength exponentially. As for the amount of days the samples spent in the curing room, the longer the sample spent in the curing room, the stronger it would be. Although these facts can be used to find the strongest concrete mix, not all buildings will use this mix. The strength of the concrete really depends on the job. Many real life situations can be connected to this project deeming it useful and able to help society.</p>	
Summary Statement The change in ratios of sand to cement from 3:1 to 2:1 can increase the strength of concrete by 300% or by 3 times.	
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