



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Douglas R. Dean	Project Number J1005
Project Title Which Material While Being Contained Inside a Sandbag Best Diverts Water During a Simulated Flood?	
Objectives/Goals If I drop 32 ounces of water against sandbags containing different materials, then the mixture of sand and fine gravel will divert the largest amount of water. I chose to do this project, because when I saw the victims of horrible floods globally, I felt devastated and compelled to do something to help. I hope to find an environmentally friendly solution and a material that is common in all areas. After completion of this experiment I decided to further test the ability of sand and gravel; Which percentage combination of sand and gravel best diverts water? I tested 50/50, 25/75, and 75/25. The final results are that 50/50 of sand and water best diverted sand and water.	
Abstract I tested five different types of materials (course gravel, fine gravel, garden soil, sand and mixture of fine gravel and sand) inside sandbags and poured 32 ounces of water against each material, testing to see how much water each type of sandbag diverted. I recorded the results. Tests were repeated three times to obtain accurate results. Observations were made immediately, during and after. Independent variables were the amount of water used, the type of sandbag, materials used, the angle the water travels down, and how much of each material I put in each sandbag. Dependent variable was the amount of water diverted. Constants used were 32 ounces of water in each test, the same amount of material in each sandbag, the same measuring bucket to measure the amount of water diverted and the amount seepage from the sandbag, and I used the same wood and buckets that the water traveled down.	
Methods/Materials I tested five different types of materials (course gravel, fine gravel, garden soil, sand and mixture of fine gravel and sand) inside sandbags and poured 32 ounces of water against each material, testing to see how much water each type of sandbag diverted. I recorded the results. Tests were repeated three times to obtain accurate results. Observations were made immediately, during and after. Independent variables were the amount of water used, the type of sandbag, materials used, the angle the water travels down, and how much of each material I put in each sandbag. Dependent variable was the amount of water diverted. Constants used were 32 ounces of water in each test, the same amount of material in each sandbag, the same measuring bucket to measure the amount of water diverted and the amount seepage from the sandbag, and I used the same wood and buckets that the water traveled down.	
Results My hypothesis was correct; the mixture of sand and gravel diverts the most water. Both materials are easily found and environmentally friendly. The final results of my second testing are that 50/50% combination of sand and coarse gravel best diverted water.	
Conclusions/Discussion I will continue to test my project; I will test the efficiency, test the placement of the bags (different order or combinations), and the different types of sand to see which are more successful at diverting water.	
Summary Statement Which material while being contained inside a sandbag best diverts water during a simulated flood?	
Help Received Father helped drive me to get supplies and take pictures.	