



**CALIFORNIA STATE SCIENCE FAIR  
2011 PROJECT SUMMARY**

<b>Name(s)</b> <b>Anthony D. Stuart</b>	<b>Project Number</b> <b>J1321</b>
<b>Project Title</b> <b>Sound Barriers</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to determine which of five household material insulated sound the best.</p> <p><b>Methods/Materials</b> A scale model of two rooms were built using a 12:1 inch ratio. The rooms had a hollow wall in between them. In one room there was a set of speakers connected to an mp3 player that played two sound frequencies, 100 hz (typical frequency for male human voice) and 440hz ( typical frequency for music). In the other room there was a sound level meter used for measuring sound level. The test materials were inserted into the hollow wall to be tested. The five materials I tested were porcelain tile, fiberglass, bubble wrap, felt ,and styrofoam. Three measurements were taken for each frequency for each material. Measurements were averaged and plotted. I also took measurements with no wall and with a hollow wall as a control. Materials ability to insulate relative to a hollow wall was calculated.</p> <p><b>Results</b> Fiberglass was the best insulating material for 100 hz frequency, reducing sound level by 16 dB relative to a hollow wall. Styrofoam did the best for 440 hz reducing sound level by 5 dB. Porcelain tile did the worst job of reducing sound level for both frequencies reducing sound level by 8 dB for 100 hz and 0 dB for the 440 hz. Over all, fiberglass insulated both sounds best, doing the best job of lowering sound levels at frequencies of 100 hz and second best at insulating frequencies at 440 hz. Felt was the second best at lowering sound level for 100 hz, followed by bubble wrap, styrofoam, and porcelain tile.</p> <p><b>Conclusions/Discussion</b> My conclusion was that out of the five materials, fiberglass did the best overall job of lowering sound level and porcelain tile did the worst. Based on my results, I think that materials with more air space insulate sound best because fiberglass, a material with a lot of air space, did the best while porcelain tile, a material with almost no air space, did the worst. If I did this experiment again, I would test more materials with varying levels of density to see if my new hypothesis is correct.</p>	
<b>Summary Statement</b> My project is about evaluating different material's ability to insulate sound using a scale model.	
<b>Help Received</b> Father helped build the test structure	