



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

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Project Title Sound Attenuation of Different Wall Materials	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This experiment tests which wall material will attenuate the most sound. The wall materials tested were brick, wood, and foam. Brick and wood were chosen because they are common wall materials, and foam was chosen to see if it may absorb sound better than a brick or wooden wall</p> <p>Methods/Materials The three walls constructed were concrete brick, foam brick and wooden board. The sound source used was an electric piano because it can test different frequencies and the sound is repeatable and consistent (loudness and frequency). A small guitar amplifier was used to amplify the sound and direct it at the walls. Eight different frequencies were tested between 65 to 2093 Hz. The sound level was measured in front and then behind the wall to get the attenuation. Three tests were averaged for each frequency.</p> <p>Results The attenuation of sound was not the same for all frequencies. The brick wall, being thicker than the wooden wall and densest of the three walls, attenuated more sound at the majority of frequencies. It attenuated more sound at 165 Hz, 262 Hz, 523 Hz, 1397 Hz, and 2093 Hz. The wooden wall was most attenuating at 65 Hz, and the foam wall was most attenuating at 98 Hz, 784 Hz, and tied the brick wall at 1397 Hz.</p> <p>Conclusions/Discussion The sound attenuation by a wall is affected by several different factors. The most important factor is reflection. Sound is reflected better by denser objects. In this experiment the brick wall was the best at attenuating sound because it was the densest wall material tested. Refraction also plays a large roll in the amount of sound attenuated. Some sound will refracted around and over the wall. The higher frequencies are refracted less than the lower frequencies. This may explain why more sound was attenuated at the high frequencies. Last, absorption played a roll in this experiment. The foam wall is best at absorbing sound where sound enters through small holes stay in the wall. The foam wall attenuated more sound than the wood wall. The foam wall being less dense than wooden wall would not reflective as much sound, but attenuated more sound partly because the foam wall was thicker and more absorbent.</p>	
Summary Statement The experiment explores which wall material is best at attenuating sound.	
Help Received Father assisted in playing the tones during the experiment and advised on report, Mrs Carol Turpin (teacher) advised on all stages of the experiment	