



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Scott K. Hempy	Project Number J1114
Project Title Sound Busters: Which Material Best Insulates Sound?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to determine which of nine common materials best insulated sound when tested at a variety of frequencies. I wanted to find which material I could use to further insulate my room, because my family complains when I practice my drums.</p> <p>Methods/Materials A PVC pipe, four inches in diameter and four feet long (cut in two foot segments), was used as the testing device. A speaker was secured to one end of the pipe, then connected to a frequency generator. At the other end of the pipe I secured a digital decibel reader. Each of nine materials was placed between the two segments of pipe and the sound level was recorded at six frequencies. This was done to determine which substance insulated the sound traveling from the speaker at one end to the decibel reader at the other end. Each reading was then compared with a control reading when no insulating material was placed between segments and the sound level was recorded.</p> <p>Results The hard substances (pine, drywall, plywood and glass) insulated the most effectively. When pine wood was placed in between the segments, it reduced (from the control reading with no substance) the decibels recorded by an average of 38.17 decibels over the six frequencies. Drywall recorded 37.67 average decibels reduced, plywood averaged 36 decibels, and glass averaged 30.83 decibels. The soft substances reduced the decibels recorded as follows: sponge 23.33, bubble wrap 15.33, smooth foam 12.83, egg shell foam 10.67, and packing peanuts 10.00.</p> <p>Conclusions/Discussion There was a significant difference between the sound insulating quality of the various substances. The hard substances insulated more effectively. The hard substances reflected the sound back to the source, and less sound reached the decibel reader on the other side of the insulation. The soft and porous materials absorbed more sound, reflecting less of the sound back to the source, but allowing more to reach the decibel reader. Builders use drywall and plywood between rooms for a reason.</p>	
Summary Statement The objective was to determine which of nine common materials best insulates sound at a variety of frequencies.	
Help Received Used a frequency generator under the supervision of Matt Cheresh at Accsense, Inc.	