



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

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Project Title Vibration Sensation	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project is to explore what happens to air molecules when a trumpet is played. The researchers wanted to see if the effects of invisible air molecule movement could be made visible. The researchers also desired to find out why different notes or pitches sound differently. They predicted that higher sounding notes vibrate air molecules more quickly than lower sounding notes.</p> <p>Methods/Materials Evidence of the movement of air molecules was explored by observing and measuring the effect of different trumpet notes on a laser beam reflected off a mirror that was glued to the center of a plastic membrane placed tightly over a large mixing bowl. Lower trumpet notes expanded the plastic membrane more and could be "seen" as longer marks of laser light. The lengths of light that resulted from the different notes were recorded, averaged, and compared.</p> <p>Conclusions/Discussion At first the student researchers concluded that the length of the laser light on the wall probably equaled the measurement or actual length of the sound waves that are created when a trumpet note is played. This seemed to make sense because in trials the lower notes caused a longer laser light reflection. However, retesting by moving the laser further from the wall, and thereby changing the angle of reflection, resulted in the notes having different measurements for the lengths of the reflected laser beam than had been recorded previously. It was observed that if the same note was played, and if the angle of the reflected laser beam changed, then the measurement of the laser light on the poster board changed as well. (However, higher notes continued to consistently produce lengths much shorter than lower notes.) Thus, it was concluded that the measurement and length of the laser light on the poster board is a visible indication of the relative lengths of sounds waves produced by different notes (not the actual lengths of the sound waves). Higher notes really do vibrate air molecules more quickly than lower notes. The differences of the invisible waves of vibrating air molecules were made visible!</p>	
Summary Statement The researchers wanted to see (1) if the effects of invisible air molecule movement caused by the playing of notes on a trumpet could be made visible, and (2) how different movements of air molecules can cause notes to have different pitche	
Help Received	