



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Marc G. Akiyama	Project Number J1601
Project Title Mr. Drum Drum Needs a Tune-Up!	
Abstract Objectives/Goals The objective is to investigate whether measuring drumhead displacement is a suitable substitute for measuring drumhead tension, and if it is, whether drumhead displacement can be used to reliably tune a drum to a desired pitch. Methods/Materials A snare drum holding fixture allowed a dial indicator to measure the displacement of the drumhead while the drumhead was subjected to the constant force of a barbell weight. As the drumhead tension was incremented, displacement was recorded, the weight was then removed, the drumhead was struck, and GoldWave(TM) computer software recorded the resulting sound. The frequency was calculated from the elapsed time for the first five cycles. Results When the drum's lugs were turned incrementally from finger-tight, the dial indicator reading of displacement decreased from about 4.6 mm to 2.5 mm, while the frequency of the recorded drum sounds increased from about 180 to 250 cycles per second, respectively. Displacement readings and corresponding elapsed times recorded for each setting of drumhead tension showed extremely little group variation, which indicates high repeatability. Conclusions/Discussion Once the frequency of the desired pitch is known, the experimental method of tuning drums by measuring drumhead displacement offers a by-the-numbers alternative to the traditional method of tuning by ear. This method may be brand-specific, since different brands of drumheads may require more or less tension to produce a desired pitch due to differences in material properties (e.g., composition, thickness, and elasticity).	
Summary Statement Measuring drumhead displacement for tuning a drum to a desired pitch offers an alternative to tuning by ear.	
Help Received Father helped build the drum-holding fixture; Friend loaned the GoldWave(TM) software for recording sound.	