



California Science Center  
**CALIFORNIA STATE SCIENCE FAIR**  
**2001 PROJECT SUMMARY**

<b>Your Name</b> (List all student names if multiple authors.) <b>Justin R. Jee</b>	<b>Science Fair Use Only</b>  <span style="font-size: 2em; font-weight: bold;">J1115</span>
<b>Project Title</b> (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) <b>The Mathematics of Sound Waves</b>	<b>Division</b> <u>X</u> Junior (6-8) _ Senior (9-12)
<b>Preferred Category</b> (See page 5 for descriptions.) <b>11 - Mathematics &amp; Software</b>	
<b>Abstract</b> (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.	
<p><b>Objective:</b> My goal was to take recorded sound waveforms and approximate them with a sum of simple sine functions.</p> <p><b>Materials/Methods:</b> First, I recorded multiple pitches from various musical instruments and devices with a digital recording device called a minidisc. I downloaded the sounds onto my computer through the sound card. A program allowed me to see and print out the waveforms of my recorded tones. To approximate the waveforms, I used a guess-and-check strategy and plugged the estimated sine equations into Maple, an advanced math computer program that could graph the equations for me. I compared the graphs against the waveforms to check my approximation.</p> <p><b>Result:</b> Visually, I was able to get close to matching 5 of the originally recorded waveforms with sine functions.</p> <p><b>Conclusion:</b> Waveforms with a clear tone can be approximated with a sum of sine functions; however, the approximation is difficult using only guess-and-check.</p>	
<b>Summary Statement</b> (In one sentence, state what your project is about.) I'm trying to use mathematical equations to replicate sound waves.	
<b>Help Received in Doing Project</b> (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. Dad suggested project, supplied background info., and resources. Mom helped put together board.	