



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

<b>Name(s)</b> Nicole M.L. Stokowski	<b>Project Number</b> <b>J1825</b>
<b>Project Title</b> <b>Flute Physics</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of this project was to see if keyhole (finger hole) size, on a flute, would affect its pitch, (I was curious how a flute worked). I believed that as the keyhole size got bigger the pitch would go up. <b>Methods/Materials</b> First I did some research on flutes and sound waves, then, me and my dad built a two-foot PVC flute with an embouchure hole and a cork in one end and a keyhole in the other end. I used different size drill bits from 1/16-3/4 and a drill to bore different size keyholes in the same flute (one at a time). I then played the flute, with the keyhole open, and used a tuning app on my dad's phone to see the note being played and the hertz. For each hole I played the lowest note, an octave above it, two octaves above it, and a note in between the second and third octaves. <b>Results</b> As the keyhole size got bigger the pitch went up, but it barely went up between some keyhole sizes where it went up drastically for others. <b>Conclusions/Discussion</b> Although the keyhole size did affect the pitch, I also realized that there were many other factors affecting the flute's pitch as well. I thought this because the tuner was showing me many of the notes I was playing as much higher notes due to overtones.	
<b>Summary Statement</b> My project is about how different keyhole sizes affect what note a flute plays.	
<b>Help Received</b> Father helped with idea, drilling, cutting, and recording; Mother helped with presentation.	