



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>George X. Lin</b>	<b>Project Number</b> <b>S1515</b>
<b>Project Title</b> <b>How Much Force is Exerted onto the Violin Top?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> My Objective is to find the amount of force exerted on to the violin top while the violin itself is in tune and to see how different kinds of strings effect that amount of force. <b>Methods/Materials</b> The materials needed are :Stand for the violin, Large clamp (for holding the stand onto the table), Small clamp (for holing the violin onto the stand), Violin bow, Electric chromatic tuner, Bucket with approximately 16 Kilograms of mass in rocks ( which is used to make the experiment easier to follow), Tail gut extension, Electric scale (in Kg.), A violin (4/4 full-size), Camera, Rope, A protractor, Pencil and paper, Set of steel strings (violin), Set of nylon strings (violin), and Set of gut strings (violin). The violin is set onto the stand with the clamps holding it in place while the bucket is tied onto the gut extension which the string hooks onto. By using a electric tuner and putting enough rocks into the bucket, one can find the tension of the string required to produce the right tune. Weight that and convert it to Newtons. Use different strings and different sets of strings to find out if there are variations on the force exerting onto the top of the violin. <b>Results</b> 109.19 Newtons of Force is exerted onto the violin face while using the set of steel strings. 89.21 Newtons of Force is exerted onto the violin face while using the set of nylon strings, and 80.65 Newtons of Force is exerted onto the violin face while using the set of gut strings. Different types of string can put different amounts of force onto the violin face. <b>Conclusions/Discussion</b> Different strings exert different amounts of force. Because some violin tops are soft and some are hard, due to the wood, some will have trouble supporting or balancing the force exerted by the strings. If the violin top cannot support that kind of force, its sound cannot be as colorful, nor as deep as it should be because the violin would not vibrate as much as they would if the force pushing up is at a equilibrium with the force pushing down. If the force exerted by the strings matches exactly with what the violin top can support (by using different types of Strings), then the sound will be able to project well and will be wonderful. In conclusion, each violin will need a certain type of string to bring out the beauty of music within it. There are many variables, and each violin is unique.	
<b>Summary Statement</b> My project is about how different strings exert different amounts of force onto the violin face.	
<b>Help Received</b> Father told what books to read; Mr. Duncan help clarify some physics; Mrs. Jesfeld gave support and kept me going; Mrs. Sigg and Anne Jefferson help with spelling and grammar.	