



# CALIFORNIA STATE SCIENCE FAIR 2005 PROJECT SUMMARY

<b>Name(s)</b> <b>Anthony R. Coy</b>	<b>Project Number</b> <b>J0204</b>
<b>Project Title</b> <b>How Does Temperature Affect a Rubber Band's Elasticity?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of the project was to see how temperature affects a rubber band's elasticity. The hypothesis was the heated (130 degree Fahrenheit) rubber bands would be most elastic, meaning they would stretch farthest, and be able to sustain the least amount of force before breaking.</p> <p><b>Methods/Materials</b> Three different temperatures were tested on the rubber bands, 10 tests for each. The temperatures tested were 0, 66, and 130 degrees Fahrenheit. The setup of the project consisted of a meter stick measuring the rubber band's length in centimeters, and a spring scale measured the force required to break that rubber band in Newtons. Two video cameras were recording the footage at 30 FPS (Frames per Second). One recorded force, while the other recorded length. This footage was uploaded to a computer to accurately analyze the recorded data. Using Adobe Premier Pro, a video editing program, the footage was slowed down to the individual frames. When these frames or pictures are played at 30 FPS, it creates the illusion of motion.</p> <p><b>Results</b> The frozen rubber bands (0 degrees Fahrenheit) broke at the average force of 33.6 Newtons, and stretched to 52cm. The room temperature rubber bands (66 degrees Fahrenheit) broke at an average force of 30.2N. The heated rubber bands (130 degrees Fahrenheit) sustained an average force of only 25.5N and stretched to an average 69.35cm.</p> <p><b>Conclusions/Discussion</b> The results proved the hypothesis correct. The heated rubber bands were most elastic, stretching to the farthest distance of 69.35cm and breaking with the least amount of force with 25.5N. The frozen rubber bands were just the opposite with the shortest length of 52cm, and were able to sustain the greatest amount of force of 33.6N. The results were pretty consistent, providing a reliable conclusion to the project. Thermal expansion caused the rubber bands to react as they did. When the rubber bands were heated, the particles stretched out, making them more elastic and able to withstand greater force. When frozen, the particles contracted, adding strength and decreasing resistance to force.</p>	
<b>Summary Statement</b> Temperature's affect on the length a rubber band can stretch, and the force it can withstand before breaking.	
<b>Help Received</b> Dad provided video camera; Mom got board cut, and let me burn rubber in the kitchen; Neighbor provided a video camera	