



**CALIFORNIA STATE SCIENCE FAIR  
2010 PROJECT SUMMARY**

<b>Name(s)</b> <b>Megan L. Spencer</b>	<b>Project Number</b> <b>J0223</b>
<b>Project Title</b> <b>The Physics of Roller Coasters</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My favorite subject being math, I wanted to do something that included many formulas and calculations. I decided to design an experiment in which I could learn more about how roller coasters work and what forces act upon them. After completing my research, I decided to build a roller coaster for marbles out of 1 inch foam pipe insulation.</p> <p><b>Methods/Materials</b> I made a loop 11 inches in diameter and then I used the extra track to make a starting hill exactly 20 inches away from the bottom of the loop. I started with a hill height of 20 inches and then worked my way up or down until I found a height that got the marble through the loop 10 out of 10 times.</p> <p><b>Results</b> I found that the lowest height at which the marble made the loop all 10 times was 22.5 inches. After that, I did my calculations. First, I figured out how steep the slope of the winning height was by using Sine to calculate the angle of elevation. Then, I calculated the marble's potential energy. Lastly, I calculated how big my loop could have been, based on the height of my hill, had no energy been lost to outside forces like friction (kinetic energy = potential energy.) My loop could have been 44 percent larger than it actually was.</p> <p><b>Conclusions/Discussion</b> I think that the main reason for the loss of energy was movement of the track. If I had built a solid, steady wooden frame, then I would have lost less potential energy. If I were to continue this project, I would try to isolate different aspects of what caused the loss of energy, and I would use the wobbling track as my starting point.</p>	
<b>Summary Statement</b> My project explored the relationship between potential and kinetic energy in roller coasters.	
<b>Help Received</b> My mother proofread my written work, and my sister helped me run the experiment.	