



**CALIFORNIA STATE SCIENCE FAIR  
2014 PROJECT SUMMARY**

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<b>Project Title</b> Constituents that Affect an Object's Friction on Non-Stable Surfaces	
<p align="center"><b>Abstract</b></p> <p><b>Objectives/Goals</b> This project is to demonstrate what alternate materials can be used as a substitution for the traditional snow chains in snow or ice in the event of an absence of proper traction equipment.</p> <p><b>Methods/Materials</b> Materials: Car tire, sandpaper, silicon pot/pan holding pad, cling/plastic wrap, inside of shoe, bottom of shoe, bottle caps, tin cans, bungee cords, standard chains, supercooled water, spring scale, asphalt road, PVC pipe Procedure: 1. Prep the asphalt road with ice shavings to simulate snowy and icy conditions 2. Attach a harness of PVC pipe to the center of the wheel 3. Attach the selected material to the tire 4. Attach the spring scale to the end of the PVC harness 5. Pull carefully on the spring scale parallel to the ground until the tire slides. When the tire moves, the scale will read how much force it took to move the tire 6. Reset the supercooled water, and repeat steps 3-5 with different materials Perform at least 3 trials for each material and record results</p> <p><b>Results</b> In this experiment, materials were shown to not perform as well as standard tire chains. However, there were various materials that came very close like the bottle caps which differed by mere 0.2 Newtons.</p> <p><b>Conclusions/Discussion</b> My hypothesis was wrong in stating that I could find a material that could possibly out-perform standard tire chains, I did find several materials that could used come close to the traction of standard chains including the bottle caps. Some small source of error in this procedure may have included the tire rotation as appose to sliding on the slick surface. However I tried to counter that by pulling on the spring scale parallel to the ground. Another source of error could have been Newtons lost in the PVC framing system to pull the tire, but this is why I used PVC as appose to another material- because it is sturdy and will not stretch to lose energy or force. What I have found through this experiment is that if someone is driving on a icy or snowy road without proper traction gear, someone could use any of the materials that he/she might have in their vehicle that were tested and have been shown to have more friction on the road than with a bare wheel besides the plastic wrap.</p>	
<b>Summary Statement</b> My project explains how common materials can be used to increase traction on a vehicle's tire.	
<b>Help Received</b> My 8th grade science teacher provided spring scales for my project.	