



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>David K. Knittel</b>	<b>Project Number</b> <b>J0115</b>
<b>Project Title</b> <b>Pick-Up the Pace: A Study in Truck Body Shapes and Drag</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment is to see which truck style is the most aerodynamic.</p> <p><b>Methods/Materials</b> To test which truck and camper bodies were the most aerodynamic, different boxes and camper styles were cut from wood and then attached to a standard pinewood derby truck cab design. The truck with the different shapes was then put in a wind tunnel, where drag was measured and recorded at different speeds. The test was run with wind speed increasing and decreasing to reduce the effects of hysteresis. To find the actual drag at each speed, the values were averaged.</p> <p><b>Results</b> After reviewing the data, the hypothesis was neither proved nor disproved because all the data sets were very similar. This was unexpected because internet research studies indicated that driving with the tail gate up was better than leaving it down, and that long, smooth shapes had much lower drag.</p> <p><b>Conclusions/Discussion</b> Since the body styles were tested at low Reynolds Numbers, the flow was mostly laminar for all shapes and the drag was mostly due to friction. The streamlined shape had more surface area than the other shapes, so their increased friction reduced their overall performance. Reynolds Numbers need to match to create accurate scale testing. For my model, the 40 mph air speed only equated to about 1.4 mph for the actual truck. For my small model to simulate the same conditions that the full-scale truck would encounter at 40 mph, the model would need to be tested at air speeds of 1130 mph.</p>	
<b>Summary Statement</b> With higher gas prices, I wanted to determine the most fuel efficient truck body style.	
<b>Help Received</b> Dad helped build, test and analyze the truck shapes; Mom helped with report and display; Mrs. Hornnes allowed access to wind tunnel.	