



# CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

<b>Name(s)</b> <b>James A, Poirier</b>	<b>Project Number</b> <b>J0323</b>
<b>Project Title</b> <b>Shock Absorbers: Counteracting Physics and Force</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of this experiment is to optimize the handling of a high-performance remote control (RC) car. This project explores the effect of using different viscosity oil inside the shocks to determine the optimal configuration for relative speed, handling and jumping capabilities of the car.</p> <p><b>Methods/Materials</b> An acceleration course, jump course, cornering course, and drop fixture were set up to run the experiments. For the acceleration test the car was run down a 30m straightaway and timed. For the jump test the apex and distance traveled were measured by recording on a video camera and reviewing frame by frame. The cornering test timed how fast the car could complete four tight circles. Finally, the drop test involved dropping the car from four different heights and measuring the amount of compression on two clay blocks placed below the car. An accelerometer was also used to measure total shock.</p> <p><b>Results</b> The results of the testing showed that there is a significant performance difference by changing out the oil in the shocks. In the acceleration test the 45 viscosity oil performed the best by 0.05 seconds. In the cornering test the 45 viscosity oil was best by 0.94 seconds. In the jump test the 45 viscosity oil helped the car spring off of the jump and went 0.11 meters higher and 0.81 meters farther. Finally, in the drop test the 90 viscosity oil did the best by providing the most resistance against the force on the car as it hit the ground.</p> <p><b>Conclusions/Discussion</b> Whether competing in a race or driving for fun, the oil that you put in the RC shocks matters. For overall results, the 45 viscosity oil had the highest performance results for three of the four tests, followed by the 90 viscosity oil, and then the 15 viscosity oil. For racing courses with lots of jumps, choosing shock oil between 45 and 90 viscosity would be best. If racing on a track that has lots of turns choosing shock oil between 45 and 15 viscosity would be the best.</p>	
<b>Summary Statement</b> This project explores the effect of using 15, 45, and 90 viscosity oils inside the shocks of an RC car to determine the optimal configuration for relative speed, handling and jumping capabilities of the car.	
<b>Help Received</b> Help received from Dad with testing, Mom with my display board, and my teacher Mrs. Schumacher with guidance and support in the development of the experiment.	