



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Madeline M. Hearst	Project Number J0209
Project Title Going the Extra Mile: Tire Pressure and Gasoline Consumption	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective was to determine the effect of tire pressure on gasoline consumption.</p> <p>Methods/Materials 35cc gas powered scooter, gas cap modified with 25 mL pipette, pump with tire pressure gauge, gasoline, safety helmet, elbow and knee pads, digital calipers</p> <p>Procedures: The gas tank cap was modified by drilling for the insertion of the 25mL pipette then carefully calked and sealed. The tires were inflated to the maximum recommended pressure of 50 psi and confirmed with the tire gauge. The fuel tank and pipette were filled to the top mark. The experimenter drove 20 2-lap trials, recording the fuel consumption and refilling the pipette. Another 20 trials were run and observed at each pressure, 20 psi and 35 psi. The experimenter constructed a tire stand slotted to allow the measurement of tire sidewall bulge at each pressure using digital micrometer calipers.</p> <p>Results The 20 2-lap (.55km) trials averaged 19.3 mL at 20psi, 17.99 mL at 35 psi, and 17.64 mL at 50 psi. Tire sidewall distortion was measured multiple times at each pressure with calipers on the tires maximum buldge at ground contact. The tire width averaged 87.36mm at 50 psi, 87.38mm at 35 psi and 89.32mm at 20 psi.</p> <p>Conclusions/Discussion The average gasoline consumption with tires inflated to 50 psi (the manufacturers maximum recommended pressure) was 17.64 mL. The average gasoline consumption at the intermediate pressure (35 psi) was a similar 17.99mL. The average gasoline consumption at 20 psi was a significantly higher 19.13 mL. The average for the 20 psi trials showed an 8.5% increase over the 50 psi trials. The 35 psi trials were 6.3% higher than the 20 psi trials and only 2.0% lower than the 50 psi trials. This may be because there was relatively less tire distortion between 50 and 35 psi (87.36mm vs. 87.38mm) than between 35 psi and 20 psi (87.38mm vs. 89.32mm). A greater degree of tire sidewall distortion, and thus greater effect on fuel efficiency, may be observed with a load closer to the vehicles top rating (270 lbs/123 kg) rather than the experimenter (99 lbs/45 kg).</p>	
Summary Statement This experiment measured and compared fuel consumption of a gasoline powered vehicle under varying tire inflation pressures.	
Help Received My dad supervised the testing and the modification of the gas cap. My mom took the photographs and helped arrange the display board.	