The purpose of this project was to determine and compare the mileage per gallon a car could obtain using regular 85 octane gasoline, mid-grade 87 octane gasoline, and premium 90 octane gasoline. The cost of the fuel and the results of the mileage test were then used to determine the overall cost per mile. This data was used to determine which fuel would be the most economical to purchase. The researcher wanted to know if it would actually be more economical to purchase higher octane fuels because of better mileage obtained. Based upon the fact that most drivers purchase regular 85 octane gasoline, the researcher hypothesized that it would not be more economical to purchase higher octane fuels. This test was performed three times under controlled conditions (same driver/vehicle, speed, 40 mile highway terrain and temperature). The results of this experiment concluded that the car obtained an average of 8.931 km/L (21 mi/gal) when using regular gasoline, an average of 9.526 km/L (22.4 mi/gal) when using mid-grade octane and an average of 10.291 km/L (24.2 mi/gal) when using premium. The costs of the fuel were $1.79/gal, $1.89/gal and $1.99/gal respectively. Cost per mile was determined by dividing the cost per gallon by the miles per gallon and concluded that the regular fuel was $0.085238/mile, the mid-grade was $0.084375/mile and the premium was $0.082231/mile. This means that a driver who uses premium rather than regular and drives 15,000 miles in a year would save $45.105 annually. The hypothesis was rejected.