Measuring the Gas Mileage of 5 Different Models of Cars

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Mrs Berkey Period #1
9/04/2015

ABSTRACT: Five different 2016 production model cars were tested under identical, controlled conditions to determine which car obtains the highest gas mileage. 1.00 gallons of identical gasoline were placed in each car and then driven around the same track until the engine was exhausted. Mileage was then measured at that location to the nearest .10 miles and the gas mileage was determined by simple algebra using a Texas Instruments TI-83 calculator. The Toya Prius obtained the highest gas mileage of 57.92 mpg as expected. However, the Ford Mustang achieved the second highest mileage (52.3 mpg) which was wholly unexpected and further work needs to be done to evaluate those findings. **<<Your abstract should be between 75 and 125 words. This example is 109 words in length>>**

Purpose

We conducted this investigation to determine which of the five production models we tested would achieve the highest gas mileage.

Measurements/Devices

The cars that we tested were 2016 production models of a Ford Mustang V6 manual transmission, VW Beetle 1.8 L 4-cylinder automatic transmission, Honda Accord, manual transmission 2.4 L 4-cylinder, Toyota Prius 1.8 L 4-cylinder and Jeep Wrangler manual transmission 3.6 L V6.

We measured 1 gallon of Chevron Regular Techron gasoline into each car using a Purex 2.0 gallon graduated cylinder with 1.0 milliliter markings.

We measured the distance each car traveled on 1 gallon of gasoline using Wolgie Industries Laser Guided Distance Finder model w123abc with accuracy to 1.0 mm.

Gas mileage (mpg) was calculated using a Texas Instruments TI-83 calculator.

Methods

To conduct this experiment all five models of car were lined up on the start line at Seattle International Raceway. Each car was totally emptied of gas, and then one gallon of Chevron regular gas was put in each model of car. All the cars were driven at the same time to make sure the temperature and wind conditions were the same. Each car was driven by a person weighing 185 pounds. The drivers drove their cars around the track until each car ran out of gas. The car's distance travelled was then measured using a laser guided distance finder and that data was recorded.

This process was repeated for three more trials for each car.

We determined, however, after conducting the trials that some drivers had been flooring their cars and going as fast as they could, while other drivers were driving at slower speeds. Since gas mileage of the models was being investigated having the cars driven at different speeds might have messed up the data. To correct this problem we re-tested the cars in the same way the following day, but all drivers were required to maintain a constant acceleration and a constant cruising speed of 45 mph.

We then found that our Wolgie brand laser guided distance finding device was faulty. We reordered a new model from Wolgie industries and restarted our investigation as before with no further error.

We found that different drivers drove their cars in such different ways that our data was inconsistent. We changed our approach so that the same driver drove all the cars in all trials using the same methods described previously and our final data is reported in the table below.

Sample Calculations:

All mileage calculations were done as follows:

(distance travelled in miles)/(gallons of gasoline)

For example, the Ford Mustang Trial #1 was measured as follows:

53.0 miles/1 gallon = 53.0 miles/gallon

Averages were calculated by adding all trials and dividing by the number of trials:

(53.0 mpg + 51.9 mpg + 52.0 mpg + 52.4 mpg) / 4 trials = 52.325 mpg average

= 52.3 mpg rounded to appropriate significant figures

Results

Gas Mileage of Different Car Models					
	Gas Mileage (in miles/gallon)				
Car Models	Trial 1	Trial 2	Trial 3	Trial 4	Average
Ford Mustang	53.0	51.9	52.0	52.4	52.3
VW Beetle	35.5	35.6	35.6	35.5	35.6
Honda Accord	33.9	34.1	34.3	34.3	34.1
Toyota Prius	57.5	58.3	58.0	57.9	57.9
Jeep Wrangler	16.8	17.2	17.2	17.1	17.1

Discussion:

Claim: The Toyota Prius consistently obtained the highest gas mileage of the 5 cars we tested. <<**MR W NOTE:** Please notice how the claim both summarizes the results of the investigation but also ties that back to the purpose of the lab>>

Evidence: The Prius achieved an average of 52.0 miles per gallon. <<**MR W NOTE:** Notice that I use average data here, and I don't cherry-pick a particular trial—that is key!>>

Reasoning: The Prius achieved the highest gas mileage because it sometimes runs on electricity. Since it doesn't always use gasoline it doesn't use as much gasoline as cars that use gasoline all the time and therefore achieves a higher gas mileage.

Error Discussion*:* We occasionally spilled gasoline when pouring it into the cars' gas tanks. We estimate the spills to average about .10 gallons per spill. That meant that the those cars achieved approximately $1/10^{th}$ less gas mileage than it should have. That would have been particularly important in the results for the VW Beetle and the Honda Accord because they were only 1.5 mpg different, so the order of finish may have been effected. We will run additional trials to verify that.