

NAME _____

Key

Car Comparison Project



Introduction

Systems of linear equations are a useful way to solve common problems in different areas of life. One of the most powerful ways to use them is in a comparison model where two similar situations are compared side by side to determine which one is better. In this project, you will be choosing two cars that you are interested in purchasing and then using systems of linear equations to decide which one is the better buy for you.

Car Comparison

Situation: Your job requires you to be on the road a lot and therefore your company will buy you a vehicle. However in order to buy the vehicle you need to demonstrate to your company that you have researched your options and are purchasing the most economical vehicle you can. You are trying to decide between getting a hybrid or a regular sedan. The hybrids cost more upfront, but get better gas mileage, so it will cost less to drive. Regular cars cost less upfront, but get worse gas mileage, so they will cost more to drive.

For this project, you will need to choose one hybrid car and one regular midsized sedan car from the list given below. Please circle one car from each list. Make sure that each car is new and is from the same year.

Hybrids

Toyota Prius
Chevy Volt
Honda Civic Hybrid
Toyota Camry Hybrid
Ford Fusion

Regular Sedans

Ford Focus
Honda Accord
Chevy Malibu
Chrysler 200 Limited
Ford Taurus

Assignment: You will collect information (price of the car, gas mileage, and mileage cost) for each car you choose. Then you will create a system of linear equations for the two cars and create a graph to determine which car will be the better buy for you. You will be completing and turning in this packet as well as a power point as your final products for the project. You may use these websites as a helpful resource:

- <http://www.fueleconomy.gov/>
- <http://www.edmunds.com/>

Project Steps...

Step 1 – Research your cars online.

	Hybrid: 2016 Camry Hybrid	Regular Sedan: 2016 Chevy Malibu
Cost (\$)	\$26,790	\$24,915
Gas Mileage (miles/gallon) City	43 mpg	27 mpg

Step 2 – Calculate the rate it would cost each car to drive 1 mile. Round your answer to the nearest ¢ (penny). In order to do this, please use the gas cost of \$3.5 per gallon.

	Hybrid: 2016 Camry Hybrid	Regular Sedan: 2016 Chevy Malibu
Mileage Cost (\$/mile)	Work: $\frac{\$3.5}{\text{gal}} \div \frac{43 \text{ mi}}{\text{gal}}$ $\frac{\$3.5}{\text{gal}} \cdot \frac{\text{gal}}{43 \text{ mi}}$	Work: $\frac{\$3.5}{\text{gal}} \div \frac{27 \text{ mi}}{\text{gal}}$ $\frac{\$3.5}{\text{gal}} \cdot \frac{\text{gal}}{27 \text{ mi}}$
	Answer: $\frac{\$.08}{\text{mi}}$	Answer: $\frac{\$.13}{\text{mi}}$

Step 3: Create the linear equation for each car. Let x represent the number of miles that you have driven the car and y represent the total cost of the car to that point.

	Hybrid: 2016 Camry Hybrid	Regular Sedan: 2016 Chevy Malibu
Equation	$y = .08x + 26,790$	$y = .13x + 24,915$

Step 4: Solve the system of linear equations both graphically and algebraically. In case you may have forgotten, solve algebraically means solve by substitution and by elimination.

To help you graph, complete the table below to figure out some data points to plot:

Number of Miles driven x	Total Cost of Purchasing & Driving the HYBRID y	Total Cost of Purchasing & Driving the REG. SEDAN y
0	\$ 26,790	\$ 24,915
10,000	\$ 27,590	\$ 26,215
20,000	\$ 28,390	\$ 27,515
30,000	\$ 29,190	\$ 28,815
40,000	\$ 29,990	\$ 30,115
50,000	\$ 30,790	\$ 31,415

Solve By Graphing:



My solution is (37,500, 29,790).

Solve by Substitution:

Equations: $y = .08x + 26,790$

$y = .13x + 24,915$

$$\begin{array}{r} .13x + 24,915 = .08x + 26,790 \\ -.08x \quad -24,915 \quad -.08x \quad -24,915 \end{array}$$

$$\frac{.05x = 1,875}{.05 \quad .05}$$

$$x = 37,500 \text{ miles}$$

$$y = .08(37,500) + 26,790$$

$$y = 3,000 + 26,790$$

$$y = \$29,790$$

My solution is $(37,500, 29,790)$.

Solve by Elimination:

Equations: $y = .08x + 26,790$

$y = .13x + 24,915$

$$\rightarrow y = .13x + 24,915$$

$$\xrightarrow{m(-1)} -y = -.08x + -26,790$$

+

$$0 = .05x + -1,875$$

$$+1,875$$

$$+1,875$$

$$\frac{1,875}{.05} = \frac{.05x}{.05}$$

$$x = 37,500 \text{ miles}$$

My solution is $(37,500, 29,790)$.

$$y = .13(37,500) + 24,915$$

$$y = 4,875 + 24,915$$

$$y = \$29,790$$

Step 5: Distinguish the meaning of your solution as it relates to the new car scenario.

Driving both cars 37,500 miles costs the same price of \$29,790