



## Long-Term Project

### *Using Systems in Business, Chapter 7*

Chris owns an automobile dealership. As he makes decisions about his investments, inventory, and other business practices, he often uses systems of equations. Use your knowledge of solving systems of equations to help Chris with his business decisions.

**Briefly describe how to use each method below to solve a system of equations.**

1. graphing

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2. substitution

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3. elimination when there are opposites

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4. elimination by multiplication

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**Write equations to solve the following problems:**

5. Every Monday, Chris takes inventory of the lot. Chris's inventory includes both cars and trucks. The average price of a car on the lot is \$17,500, and the average price of a truck on the lot is \$22,300. If Chris's total inventory of cars and trucks is equal to \$1,855,600 at this time, write an equation, using  $c$  as the number of cars and  $t$  as the number of trucks, that represents his inventory.

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6. Chris counts the total number of vehicles on the lot and finds that he has exactly 100 vehicles. Write an equation, using  $c$  as the number of cars and  $t$  as the number of trucks, that represents his inventory.

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7. Use your equations to calculate the number of cars and the number of trucks that Chris currently has on the lot.
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8. Which process did you use to solve your system of equations? Why?
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Chris has decided to add minivans to his inventory because they are very popular with families. On Tuesday, he received a large shipment of minivans. Chris is going to consider minivans as part of the car inventory. This means that the car section of the lot would include both minivans and other cars.

9. After adding the new shipment of minivans to the cars, Chris finds that he has 100 vehicles in the car section of the lot. Write an equation, using  $m$  as the number of minivans and  $c$  as the number of other cars, that represents his current car inventory.
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10. The accountant informs Chris that the car inventory is now worth \$1,972,500. If the average price of a minivan is \$26,400, write an equation, using  $m$  as the number of minivans and  $c$  as the number of other cars, that represents the value of the car inventory.
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11. Use your equations from Exercises 9 and 10 to calculate the number of minivans and the number of other cars that Chris currently has on the lot.
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12. Which process did you use to solve this system of equations? Why?
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13. According to your new count, how many cars did Chris sell between Monday and Tuesday?
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14. If no trucks are sold between Monday and Tuesday, what is the value of Chris's complete inventory on Tuesday?
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15. On Wednesday, Chris receives a shipment of 3 new trucks. What is the new value of his truck inventory? (Use the average price for trucks.)
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16. Chris has noticed that customers seem to like the one-price concept, in which the dealer offers one price to every customer regardless of his or her bargaining ability. He would like to try this idea in the truck section. He has two different models of trucks. The smaller one is priced at \$21,400, and the larger one is priced at \$23,650. Write an equation, using  $s$  for the small trucks and  $b$  for the big trucks, that represents the total dollar value of the truck section based on your calculations for Exercise 15.
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17. Write an equation representing the number of small trucks and the number of big trucks in the truck section at Chris's dealership.
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18. Use your equations from Exercises 16 and 17 to calculate the number of small trucks and the number of big trucks that Chris has on the lot.
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19. Which process did you use to solve this system of equations? Why?
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20. Chris's business has been booming since he instituted the one-price concept in the truck section. He would like to do the same thing in the car section with the cars that are not minivans. The cars are a mix of economy and sports cars. The price for the economy cars will be \$16,400, and the price for the sports cars will be \$21,900. Write two equations that can be used to find the number of economy cars,  $e$ , and the number of sports cars,  $s$ .
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21. Solve your system of equations from Exercises 20 to find the number of economy cars and the number of sports cars.

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22. Which process did you use to solve this system of equations? Why?

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23. Design your own car dealership by using systems of equations to help you decide on your inventory. You may use fictional prices and models of vehicles, or you may research actual prices of models sold in your area. Start by deciding on a total dollar value for the inventory. Then decide on the total number of vehicles. Next you need to determine average prices for the sections or models of vehicles on your lot. Work with two sections or models at a time so that you will generate and solve systems of two equations.

Total dollar value \_\_\_\_\_

Total number of vehicles \_\_\_\_\_

Other descriptions or information \_\_\_\_\_

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24. How did you use systems of equations to set up your car lot?

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25. Which processes did you use to solve your systems of equations? Why did you choose these processes over the other options?

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