Section 7.4 Applications of Linear Systems

Ways to Solve a System of Linear Equations

1. ~~**Graphing:**~~ A useful method for approximating a solution, checking the reasonableness of a solution, and providing a visual model.

2. **Substitution:** A useful method when one of the variables has a coefficient of 1 or -1.

3. **Linear Combinations:** A useful method when none of the variables has a coefficient of 1 or -1.

EXAMPLES

A 5 lbs of raisins and 15 of granola costs $85

1. A health food store mixes granola and raisins to make 20 pounds fo raisin granola. Granola costs them $4 per pound and raisins that cost them $5 per pound. How many pounds of each should they include if they want the mixture to cost them a total of $85?

Setup Values
$g = (-r + 20)$

$g + r = 20$
$-r \quad -r$
$g = 15$

g = granola R = raisins

$g + R = 20$ (lbs)

$4(g) + 5R = 85$ ($)

$4(-r + 20) + 5r = 85$
$-4r + 80 + 5r = 85$
$r + 80 = 85$
$r = 5$

2. An owner of two stores buys five large delivery vans and five small delivery vans. One store receives 3 of the large delivery vans and two of the small delivery vans for a total cost of $161,000. The other stores receives the rest of the vans for a total cost of $154,000. What is the cost of each type of van?

$35,000 for ea. l. van
$28000 for ea sm. van

Values
Values
l = large
s = small

$-2(3l + 2s = 161{,}000)$
$3(2l + 3s = 154{,}000)$

$-6l - 4s = -322{,}000$
$6l + 9s = 462{,}000$
$5s = 140{,}000$
$s = \$28{,}000$

$3l + 2(28000) = 161000$
$3l + 56000 = 161000$
$3l = 105000$
$l = 35000$

3. You are offered two different credit cards. Card A charges $75 per year and 15% interest on your average balance. Card B charges $15 per year and 18% on your average balance.

x = av. balance y = Total Bill

a. What would your average balance need to be for the cards to cost you the same amount?

$x = \$2000$

A: $.15x + 75 = y$

B: $.18x + 15 = y$

$.15x + 75 = .18x + 15$

$-.15x \quad -15 \quad -.15x \quad -15$

$\frac{60}{.03} = \frac{.03x}{.03}$

b. You believe that your average balance is $1000. Which credit card should you choose?

B

$x < 2000$ B is Best choice

$x > 2000$ A is Best choice

4. A chemist needs to make 30 ounces of a 25% alcohol solution by mixing together a 15% alcohol solution with a 40% alcohol solution. How much of each solution should she use?