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There's Another Way?

Using Linear Combinations to Solve a Linear System

Vocabulary

Define the term in your own words.

1. linear combinations method

Problem Set

Write a system of equations to represent each problem situation. Solve the system of equations using the linear combinations method.

1. The high school marching band is selling fruit baskets as a fundraiser. They sell a large basket containing 10 apples and 15 oranges for $20. They sell a small basket containing 5 apples and 6 oranges for $8.50. How much is the marching band charging for each apple and each orange?

   Let x represent the amount charged for each apple. Let y represent the amount charged for each orange.

   $$\begin{cases} 10x + 15y = 20 \\ 5x + 6y = 8.50 \end{cases} \qquad \begin{array}{l} 10x + 15y = 20 \\ -2(5x + 6y = 8.50) \end{array}$$

   $$\begin{array}{r} 10x + 15y = 20 \\ -10x - 12y = -17 \\ \hline 3y = 3 \\ y = 1 \end{array}$$

   $$\begin{array}{r} 10x + 15(1) = 20 \\ 10x + 15 = 20 \\ 10x = 5 \\ x = 0.5 \end{array}$$

   The solution is (0.5, 1). The band charges $0.50 for each apple and $1.00 for each orange.

2. Asna works on a shipping dock at a tire manufacturing plant. She loads a pallet with 4 Mudslinger tires and 6 Roadripper tires. The tires on the pallet weigh 212 pounds. She loads a second pallet with 7 Mudslinger tires and 2 Roadripper tires. The tires on the second pallet weigh 184 pounds. How much does each Mudslinger tire and each Roadripper tire weigh?

3. The Pizza Barn sells one customer 3 large pepperoni pizzas and 2 orders of breadsticks for $30. They sell another customer 4 large pepperoni pizzas and 3 orders of breadsticks for $41. How much does the Pizza Barn charge for each pepperoni pizza and each order of breadsticks?

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4. Nancy and Warren are making large pots of chicken noodle soup. Nancy opens 4 large cans and 6 small cans of soup and pours them into her pot. Her pot contains 115 ounces of soup. Warren opens 3 large cans and 5 small cans of soup. His pot contains 91 ounces of soup. How many ounces of soup does each large can and each small can contain?

5. Taylor and Natsumi are making block towers out of large and small blocks. They are stacking the blocks on top of each other in a single column. Taylor uses 4 large blocks and 2 small blocks to make a tower 63.8 inches tall. Natsumi uses 9 large blocks and 4 small blocks to make a tower 139.8 inches tall. How tall is each large block and each small block?

6. Dave has 2 buckets that he uses to fill the water troughs on his horse farm. He wants to determine how many ounces each bucket holds. On Tuesday, he fills an empty 2000 ounce water trough with 7 large buckets and 5 small buckets of water. On Thursday, he fills the same empty water trough with 4 large buckets and 10 small buckets of water. How many ounces does each bucket hold?

Solve each system of equations using the linear combinations method.

7. $\begin{cases} 3x + 5y = 8 \\ 2x - 5y = 22 \end{cases}$

$3x + 5y = 8$

$\underline{2x - 5y = 22}$

$5x = 30$

$x = 6$

$3(6) + 5y = 8$

$18 + 5y = 8$

$5y = -10$

$y = -2$

The solution is $(6, -2)$.

8. $\begin{cases} 4x - y = 2 \\ 2x + 2y = 26 \end{cases}$

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9. $\begin{cases} 10x - 6y = -6 \\ 5x - 5y = 5 \end{cases}$

10. $\begin{cases} 2x - 4y = 4 \\ -3x + 10y = 14 \end{cases}$

11. $\begin{cases} 3x + 2y = 14 \\ 4x + 5y = 35 \end{cases}$

12. $\begin{cases} x + 6y = 11 \\ 2x - 12y = 10 \end{cases}$

13. $\begin{cases} 1.5x + 1.2y = 0.6 \\ 0.8x - 0.2y = 2 \end{cases}$

14. $\begin{cases} \frac{3}{4}x + \frac{1}{2}y = -\frac{3}{4} \\ \frac{2}{3}x + \frac{2}{3}y = \frac{2}{3} \end{cases}$