Exercise Set 6.2: More Systems and Applications

Solve the following systems of equations by using substitution and/or elimination.

1. $\begin{aligned} 3x-5y+z &= 22 \\ 2x+y &= 1 \\ x-3y-4z &= 7 \end{aligned}$

2. $\begin{aligned} x+3z &= 5 \\ 3x-2y-z &= -13 \\ 5x-7y+4z &= -1 \end{aligned}$

3. $\begin{aligned} x+y+z &= 1 \\ -2x+3y-5z &= 20 \\ 3x-y+2z &= -1 \end{aligned}$

4. $\begin{aligned} x-y+z &= 2 \\ -4x+2y-3z &= -5 \\ 2x+3y+z &= 4 \end{aligned}$

5. $\begin{aligned} 2x+3y-4z &= -9 \\ 3x-5y-2z &= 4 \\ -2x+4y+3z &= 0 \end{aligned}$

6. $\begin{aligned} 4x-5y+2z &= 7 \\ 3x+2y-4z &= 10 \\ -2x-3y+3z &= -3 \end{aligned}$

Solve the following equations by using the substitution method.

7. $\begin{aligned} y &= x^2 \\ x+y &= 12 \end{aligned}$

8. $\begin{aligned} x &= y^2 \\ x-y &= 2 \end{aligned}$

9. $\begin{aligned} x^2+y^2 &= 10 \\ x+3y &= 0 \end{aligned}$

10. $\begin{aligned} x+y^2 &= 5 \\ x+y &= 3 \end{aligned}$

Solve the following equations by using the elimination method.

11. $\begin{aligned} 2x^2+3y &= -7 \\ 3x^2-4y &= 32 \end{aligned}$

12. $\begin{aligned} x^2-2y^3 &= 7 \\ -2x^2+5y^3 &= -13 \end{aligned}$

13. $\begin{aligned} \frac{6}{x}-\frac{8}{y} &= 11 \\ \frac{4}{x}+\frac{3}{y} &= -1 \end{aligned}$

14. $\begin{aligned} \frac{12}{x}+\frac{9}{y} &= 0 \\ \frac{8}{x}-\frac{6}{y} &= -4 \end{aligned}$

For each of the following problems:

(a) Write a system of equations involving two variables to model the problem.

(b) Solve your system of equations and answer the question.

15. Dillan is at a baseball game and is buying hot dogs and sodas for his family. Hot dogs cost \$3 each and sodas cost \$1.75 each. He purchases nine items and spends a total of \$22.00. How many hot dogs did he buy? How many sodas did he buy?

16. Gabrielle is buying notebooks at the bookstore. Red notebooks cost \$3.50 each, and black notebooks cost \$2.20 each. She buys fourteen notebooks and spends a total of \$42.50. How many notebooks of each color did she buy?

17. Two numbers have a sum of 77 and a difference of 13. Find the two numbers.

18. Two numbers have a sum of 130 and a difference of 78. Find the two numbers.

19. A rectangle has a perimeter of 26 centimeters and an area of 36 square centimeters. Find the dimensions of the rectangle.

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20. A rectangle has a perimeter of 44 inches and an area of 72 square inches. Find the dimensions of the rectangle.

21. A rectangular garden has a perimeter of 200 feet, and its width is 56 feet less than its length. Find the length and width of the garden.

22. A rectangular picture frame has a perimeter of 50 inches, and its width is $\frac{2}{3}$ of its length. Find the length and width of the picture frame.

23. Paul has 16 coins in his pocket, consisting entirely of dimes and quarters. If he has a total of $3.40 in coins, how many coins of each type are in his pocket?

24. Michael has 105 coins in his piggy bank, consisting entirely of dimes and nickels. If he has a total of $9.10 in coins, how many coins of each type are in his piggy bank?

25. Kathy has $2,500 to invest and she decides to invest it in two different accounts which both yield simple interest $(I = PRT)$. The first account yields 5% interest per year, and the second account yields 6% interest per year. At the end of one year, she earns a total of $139 in interest. How much money was invested in each account?

26. Mark has $12,000 to invest and he decides to invest it in two different accounts which both yield simple interest $(I = PRT)$. The first account yields 4% interest per year, and the second account yields 4.5% interest per year. At the end of one year, he earns a total of $527.50 in interest. How much money was invested in each account?

27. Jen and Anthony have received a total of 64 emails in the past week. If Jen received 5 less than twice the amount of emails that Anthony received, how many emails did they each receive?

28. Brian and Teri have changed a total of 73 diapers this week. If Teri has changed 2 less than four times the amount of diapers that Brian has changed, how many diapers did each of them change?