Lesson-by-Lesson Review

6-1 Graphing Systems of Equations

Graph each system and determine the number of solutions it has. If it has one solution, name it.

9. \[ x - y = 1 \]
   \[ x + y = 5 \]

10. \[ y = 2x - 4 \]
    \[ 4x + y = 2 \]

11. \[ 2x - 3y = -6 \]
    \[ y = 3x + 2 \]

12. \[ -3x + y = -3 \]
    \[ x = -3 \]

13. \[ x + 2y = 6 \]
    \[ 3x + 6y = 8 \]

14. \[ 3x + y = 5 \]
    \[ 6x - 10y = 2y \]

15. MAGIC NUMBERS: Sean is trying to find two numbers with a sum of 14 and a difference of 4. Define two variables, write a system of equations, and solve by graphing.

CHECK \[ y = 2x + 2 \]

Original equation
\[ 0 = 2(1-1) + 2 \]
Substitution
\[ 0 = -2 + 2 \]
Multiply
\[ 0 = 0 \]

Original equation
\[ y = -3x - 3 \]
Substitution
\[ 0 = -3(1-1) - 3 \]
Multiply
\[ 0 = 3 - 3 \]

The solution is \((-1, 0)\).

6-2 Substitution

Use substitution to solve each system of equations.

16. \[ x + y = 3 \]
   \[ 2y = 2 \]

17. \[ x + 3y = -28 \]
   \[ y = -5x \]

18. \[ 3x + 2y = 16 \]
   \[ x = 3y - 2 \]

19. \[ x - y = 8 \]
   \[ y = -3x \]

20. \[ y = 5x - 3 \]
   \[ x + 2y = 27 \]

21. \[ x + 3y = 0 \]
   \[ y = -1 \]

22. GEOMETRY! The perimeter of a rectangle is 48 inches. The length is 6 inches greater than the width. Define the variables, and write equations to represent this situation. Solve the system by using substitution.

Example 2

Use substitution to solve the system.

\[ 3x - y = 18 \]

\[ x = 4 \]

First equation
\[ 3x - (x - 4) = 18 \]
Substitute \(x - 4\) for \(y\)
\[ 2x + 4 = 18 \]
Simplify
\[ 2x = 14 \]
Subtract 4 from each side.
\[ x = 7 \]
Divide each side by 2.

Use the value of \(x\) and either equation to find the value for \(y\).
\[ y = x - 4 \]
Second equation
\[ y = 7 - 4 \] or \[ 3 \]
Substitute and simplify.

The solution is \((7, 3)\).
6-3 Elimination Using Addition and Subtraction

Use elimination to solve each system of equations.

23. \( x + y = 13 \)
   \( x - y = 5 \)
\[ x + y = 13 \]
\[ 3x + y = 14 \]

24. \(-3x + 4y = 21\)
\[ 3x + 3y = 14 \]

25. \( x + 4y = -4 \)
   \( 2x + y = -5 \)
\[ x + 10y = -16 \]
\[ x = y = 2 \]

26. \( -5x + 3y = 15 \)
\[ 3x + 4y = 38 \]

27. \( 6x + y = 9 \)
   \( 2x - 8y = 46 \)
\[ x + 2y = 2 \]

30. \( 3x + 2y = 8 \)
\[ x + 2y = 2 \]

31. BASEBALL CARDS: Cristiano bought 24 baseball cards for $50. One type costs $1 per card, and the other costs $3 per card. Define the variables, and write equations to find the number of each type of card he bought. Solve by using elimination.

32. \( x + y = 4 \)
\( -2x + 3y = 7 \)
\( 2x + 4y = 38 \)

34. \( 3x + 4y = 1 \)
\( -9x + 3y = 2 \)
\( 3x - 2y = -4 \)

36. \( 8x - 3y = 35 \)
\( 2x + 6y = 3 \)
\( 3x + 4y = 33 \)
\( 5x + 4y = 26 \)

38. \( -7x + 3y = 12 \)
\( 8x + 5y = 18 \)
\( 2x - 8y = -32 \)
\( 6x + 6y = -6 \)

40. BAKE SALE: On the first day, a total of 40 items were sold for $556. Define the variables, and write a system of equations to find the number of cakes and pies sold. Solve by using elimination.

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6-4 Elimination Using Multiplication

Use elimination to solve each system of equations.

32. \( x + y = 4 \)
\( -2x + 3y = 7 \)
\( 2x + 4y = 38 \)

34. \( 3x + 4y = 1 \)
\( -9x + 3y = -3 \)
\( 3x - 2y = -4 \)

36. \( 8x - 3y = 35 \)
\( 2x + 6y = 3 \)
\( 3x + 4y = 33 \)
\( 5x + 4y = 26 \)

38. \( -7x + 3y = 12 \)
\( 8x + 5y = 18 \)
\( 2x - 8y = -32 \)
\( 6x + 6y = -6 \)

40. BAKE SALE: On the first day, a total of 40 items were sold for $556. Define the variables, and write a system of equations to find the number of cakes and pies sold. Solve by using elimination.

6-5 Applying Systems of Linear Equations

Determine the best method to solve each system of equations. Then solve the system.

41. \( y = x - 8 \)
\( y = -x \)
\( y = -3x \)
\( y = 2x \)

43. \( x + 3y = 12 \)
\( x = -6y \)
\( x = 10 \)
\( x = -y \)

45. \( 3x + 2y = -4 \)
\( 5x + 2y = -8 \)
\( 2x + 4y = 14 \)

47. \( 3x + 4y = 26 \)
\( 2x + 3y = 19 \)
\( 5x - 8y = -25 \)

49. COINS: Tonra has saved dimes and quarters in her piggy bank. Define the variables, and write a system of equations to determine the number of dimes and quarters. Then solve the system using the best method for the situation.

50. FAIR: At a county fair, the cost for 4 slices of pizza and 2 orders of French fries is $21.00. The cost of 2 slices of pizza and 3 orders of French fries is $16.50. To find out how much a single slice of pizza and an order of French fries costs, define the variables and write a system of equations to represent the situation. Determine the best method to solve the system of equations. Then solve the system.

<table>
<thead>
<tr>
<th>4x + 5y = 4</th>
<th>4x + y = -6</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x + 30 = 20x + 4</td>
<td>-17x - 30 = 14</td>
</tr>
<tr>
<td>-17x = 54</td>
<td>x = 2</td>
</tr>
<tr>
<td>Divide by -17</td>
<td></td>
</tr>
</tbody>
</table>

Last, substitute -2 for x in either equation to find y.

\( 4x + y = -6 \)
\( 4(-2) + y = -6 \)
\( -8 + y = -6 \)
\( y = 2 \)

Add 8 to each side.

The solution is \((-2, 2)\).
Graph each system and determine the number of solutions that it has. If it has one solution, name it.

1. \[ y = 2x \\
   \] \[ y = 6 - x \\
   \]
2. \[ y = x - 3 \\
   \] \[ y = -2x + 9 \\
   \]
3. \[ x - y = 4 \\
   \] \[ x + y = 10 \\
   \]
4. \[ 2x + 3y = 4 \\
   \] \[ 2x + 3y = -1 \\
   \]

Use substitution to solve each system of equations.

5. \[ y = x + 8 \\
   \] \[ 2x + y = -10 \\
   \]
6. \[ x = -4y - 3 \\
   \] \[ 3x - 2y = 5 \\
   \]

Use elimination to solve each system of equations.

10. \[ x + y = 13 \\
    \]
\[ x + y = 5 \\
   \]
11. \[ 3x + 7y = 2 \\
    \]
\[ 3x - 4y = 13 \\
   \]
12. \[ x + y = 8 \\
    \]
\[ x - 3y = -4 \\
   \]
13. \[ 3x + 6y = 18 \\
    \]
\[ 3x + 2y = 13 \\
   \]

Use elimination to solve each system of equations.

14. MAGAZINES: Julie subscribes to a sports magazine and a fashion magazine. She received 24 issues this year. The number of fashion issues is 6 less than twice the number of sports issues. Define the variables, and write a system of equations to find the number of issues of each magazine.

Determine the best method to solve each system of equations. Then solve the system.

15. \[ y = 3x \\
    \]
\[ x + 2y = 21 \\
   \]
16. \[ x + y = 12 \\
    \]
\[ y = x - 4 \\
   \]
17. \[ x + y = 15 \\
    \]
\[ x - y = 9 \\
   \]
18. \[ 3x + 5y = 7 \\
    \]
\[ 2x - 3y = 11 \\
   \]

19. OFFICE SUPPLIES At a sale, Ricardo bought 24 reams of paper and 4 inkjet cartridges for $320. Britney bought 2 reams of paper and 1 inkjet cartridge for $50. The reams of paper were all the same price and the inkjet cartridges were all the same price. Write a system of equations to represent this situation. Determine the best method to solve the system of equations. Then solve the system.

Solve each system of inequalities by graphing.

20. \[ x > 2 \\
    \]
\[ y < 4 \\
   \]
21. \[ x + y \leq 5 \\
    \]
\[ y \geq x + 2 \\
   \]
22. \[ 3x - y > 9 \\
    \]
\[ y > -2x \\
   \]
23. \[ y \geq 2x + 3 \\
    \]
\[ -4x - 3y > 12 \\
   \]