Name ______________________________ Date ___________ Class ___________

LESSON 3-6

Practice B
Solving Linear Systems in Three Variables

Use elimination to solve each system of equations.

1. $\begin{cases} x + y - 2z = 10 \\ 8x - 9y - z = 5 \\ 3x + 4y + 2z = -10 \end{cases}$

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2. $\begin{cases} 6x + 3y + 4z = 3 \\ x + 2y + z = 3 \\ 2x - y + 2z = 1 \end{cases}$

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3. $\begin{cases} x + y + z = 0 \\ x - y + z = 14 \\ x - y - z = 16 \end{cases}$

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4. $\begin{cases} 8x + 3y - 6z = 4 \\ x - 2y - z = 2 \\ 4x + y - 2z = -4 \end{cases}$

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5. $\begin{cases} 2x - y - z = 1 \\ 3x + 2y + 2z = 12 \\ x - y + z = 9 \end{cases}$

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6. $\begin{cases} 2x - y + 3z = 7 \\ 5x - 4y - 2z = 3 \\ 3x + 3y + 2z = -8 \end{cases}$

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Classify each system as consistent or inconsistent, and determine the number of solutions.

7. $\begin{cases} 2x - 6y + 4z = 3 \\ -3x + 9y - 6z = -3 \\ 5x - 15y + 10z = 5 \end{cases}$

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8. $\begin{cases} -4x + 2y + 2z = -2 \\ 2x - y - z = 1 \\ x + y + z = 2 \end{cases}$

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Solve.

9. At the arcade Sami won 2 blue tickets, 1 yellow ticket and 3 red tickets for 1500 total points. Jamal won 1 blue ticket, 2 yellow tickets, and 2 red tickets for 1225 total points. Yvonne won 2 blue tickets, 3 yellow tickets, and 1 red ticket for 1200 total points Write and solve a system of equations to determine the point value of each type of ticket.

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LESSON 3-6

Practice A

Solving Linear Systems in Three Variables

Use elimination to solve each system of equations.

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

   a. Eliminate the variable z by adding the last 2 equations
   $2x - y + z = 3$
   $-4x + 2y - z = -1$
   $-2x + y = 2$

   b. Then add the first and third equations.
   $x + y + z = 4$
   $-4x + 2y - z = -1$
   $-3x + 3y = 3$

   c. Solve this system of 2 equations for x and y using elimination. $x = -1, y = 0$

   d. Substitute x and y into one of the original equations and solve for z. $z = 5$

   e. Write the solution as an ordered triple. $(-1, 0, 5)$

2. $\begin{cases} x + y + 2z = 3 \\ x - y - z = 0 \\ 3x - 2y - z = 1 \end{cases}$ $(2, 3, -1)$

3. $\begin{cases} 4x + y + 3z = 0 \\ 2x - 2y - z = 10 \\ 3x - 2y + 2z = 11 \end{cases}$ $(1, -4, 0)$

4. $\begin{cases} 3x + 4y - z = 1 \\ 3x - y - 4z = -3 \\ x + 3y - 3z = 9 \end{cases}$ $(-3, 2, -2)$

5. $\begin{cases} 2x + y + z = 1 \\ 3x - 2y - z = 3 \\ 4x - 3y - 2z = 5 \end{cases}$ $(1, 1, -2)$

Solve.

6. In a souvenir shop, Jodi purchased 2 small picture frames and 1 large one for $28. Mike bought 3 medium-size frames and 2 large ones for $56. Shelly bought a small, a medium, and a large frame for $30. Write and solve a system of equations to find the price of each size of picture frame.

   $\begin{cases} 2x + z = 28 \\ 3y + 2z = 56 \\ x + y + z = 30; \end{cases}$
   small: $6, medium: $8, large: $16

LESSON 3-6

Practice B

Solving Linear Systems in Three Variables

Use elimination to solve each system of equations.

1. $\begin{cases} x + y - 2z = 10 \\ 8x - 9y - z = 5 \\ 3x + 4y + 2z = -10 \end{cases}$ $(0, 0, -5)$

2. $\begin{cases} 6x + 3y + 4z = 3 \\ x + 2y + z = 3 \\ 2x - y + 2z = 1 \end{cases}$ $(-2, 1, 3)$

3. $\begin{cases} x + y + z = 0 \\ x - y + z = 14 \\ x - y - z = 16 \end{cases}$ $(8, -7, -1)$

4. $\begin{cases} 8x + 3y - 6z = 4 \\ x - 2y - z = 2 \\ 4x + y - 2z = -4 \end{cases}$ $(-4, 0, -6)$

5. $\begin{cases} 2x - y - z = 1 \\ 3x + 2y + 2z = 12 \\ x - y + z = 9 \end{cases}$ $(2, -2, 5)$

6. $\begin{cases} 2x - y + 3z = 7 \\ 5x - 4y - 2z = 3 \\ 3x + 3y + 2z = -8 \end{cases}$ $(-1, -3, 2)$

Classify each system as consistent or inconsistent, and determine the number of solutions.

7. $\begin{cases} 2x - 6y + 4z = 3 \\ -3x + 9y - 6z = -3 \\ 5x - 15y + 10z = 5 \end{cases}$ Inconsistent; 0 solutions

8. $\begin{cases} -4x + 2y + 2z = -2 \\ 2x - y - z = 1 \\ x + y + z = 2 \end{cases}$ Consistent; infinitely many solutions

Solve.

9. At the arcade Sami won 2 blue tickets, 1 yellow ticket and 3 red tickets for 1500 total points. Jamal won 1 blue ticket, 2 yellow tickets, and 2 red tickets for 1225 total points. Yvonne won 2 blue tickets, 3 yellow tickets, and 1 red ticket for 1200 total points Write and solve a system of equations to determine the point value of each type of ticket.

   $\begin{cases} 2b + y + 3r = 1500 \\ b + 2y + 2r = 1225 \\ 2b + 3y + r = 1200 \end{cases}$
   blue tickets: 125 points; yellow tickets: 200 points; red tickets: 350 points

LESSON 3-6

Practice C

Solving Linear Systems in Three Variables

Use elimination to solve each system of equations.

1. $\begin{cases} 3x + 3y + z = -3 \\ 2x - 3y - 4z = -5 \\ 5x + 4y - z = 10 \end{cases}$ $(-7, 9, -9)$

2. $\begin{cases} 3x + 4y + 2z = 8 \\ 5x - 6y - 3z = 26 \\ 4x + 8y + 5z = 1 \end{cases}$ $(4, 2.5, -7)$

Classify each system as consistent or inconsistent, and determine the number of solutions.

3. $\begin{cases} -4.5x + 3y + 1.5z = 9 \\ x + y - z = 0 \\ 3x - 2y - z = 4 \end{cases}$ Inconsistent; 0 solutions

4. $\begin{cases} 4x + 2y + 5z = 5 \\ 3x - 4y + 10z = 21 \\ 3x + 6y + 15z = 42 \end{cases}$ Consistent; 1 solution

Solve.

5. The band members sold pumpkins in October to raise money for their annual tour. Rick sold 4 small pumpkins, 2 medium-sized pumpkins, and 8 large pumpkins for $45.20. Valerie sold 7 small, 2 medium, and 5 large pumpkins for $35.45. Therese sold 2 small, 9 medium, and 16 large pumpkins for $93.40. Write and solve a system of equations to find the price of each of the three sizes of pumpkins.

   $\begin{cases} 4x + 2y + 8z = 45.20 \\ 7x + 2y + 5z = 35.45 \\ 2x + 9y + 16z = 93.40; \end{cases}$
   small: $1.25, medium: $2.10, large: $4.50

6. Mr. Reese counts homework and class participation as well as tests toward a student's grade each quarter. Use the table to determine what percent each accounts for in the final grade.

Student	Homework	Class Participation	Tests	Final Grade
Fabian	90	85	80	83.75
Ingrid	85	90	95	91.25
Nesita	80	75	90	82.75

   Homework: 20%, class participation: 35%, and tests: 45%

LESSON 3-6

Review for Mastery

Solving Linear Systems in Three Variables

You know how to solve a system of two linear equations in two variables using the **elimination method**. The same method can be used to solve a system of three linear equations in three variables.

$\begin{cases} x - y + 2z = 8 \\ 2x + y - z = -2 \\ x + 2y + z = 2 \end{cases}$

The first and second equations have opposite coefficients of y. So adding these two equations will eliminate y.

$x - y + 2z = 8$
$+2x + y - z = -2$
$3x + z = 6$

Multiply the first equation by 2 and add to the third equation to eliminate y.

$2x - 2y + 4z = 16$
$+ x + 2y + z = 2$
$3x + 5z = 18$

Now you have two equations in two variables. Solve using the elimination method for a system of two equations.

$\begin{cases} 3x + z = 6 \\ 3x + 5z = 18 \end{cases}$

Solving this system gives $x = 1$ and $z = 3$. Substituting these values in any of the original equations gives $y = -1$.

So the solution is the ordered triple $(1, -1, 3)$

Show the steps you would use to eliminate the variable z.

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

   a.
   $2x - y + z = -3$
   $+ \; x + 2y - z = 2$
   $3x + y = -1$

   b.
   $2(2x - y + z = -3) = 4x - 2y + 2z = -6$
   $+ x + 3y - 2z = 3$
   $5x + y = -3$

   c. Give the resulting system of two equations. $\begin{cases} 3x + y = -1 \\ 5x + y = -3 \end{cases}$