Pg. 138 #1-5 odd, 9 and pg. 161 #6-24 even, 25

Solve each system of equations.

1. $\begin{cases} 3x + 2y = 6 \\ x - 2y = 10 \end{cases}$

2. $\begin{cases} 4x + 7y = 28 \\ y = 2x - 14 \end{cases}$

3. $\begin{cases} 4x + 5y = -12 \\ 3x - 4y = 22 \end{cases}$

4. $\begin{cases} 3y - 2x = 7 \\ 2y - 2 = 4x \end{cases}$

5. The Village Inn offers two special packages. For two nights and three meals the cost is \$158. For two nights and five meals the cost is \$181. Write and solve a system of linear equations to find the costs per night and per meal.

6. **Smart Shopping** An ordinary refrigerator costs \$489 and has an estimated annual operating cost of \$84. An energy-saving model costs \$599, with an estimated annual cost of \$61. After how many years will the costs to buy and to operate the two models be equal?

7. Each week you must do a minimum of 18 hours of homework. Participation in sports requires at least 12 hours per week. You have no more than 35 hours per week in total to devote to these activities.
   a. Write a system of inequalities to model the situation.
   b. Graph and solve the system.

Solve each system of inequalities by graphing.

8. $\begin{cases} y \le -2 \\ y > |x + 1| \end{cases}$

9. $\begin{cases} 8x + 2y > 5 \\ x + 2y \le -3 \end{cases}$

10. $\begin{cases} 4y < 3x - 1 \\ y > 2|x| - 3 \end{cases}$

Pg. 161

A **system of equations** is a set of two or more equations that use the same variables. The points where all the graphs intersect represent solutions. You must check the coordinates of the points of intersection in the original equations to be sure you have a solution. A **linear system** consists of linear equations.

An **independent system** has a unique solution while a **dependent system** does not have a unique solution. An **inconsistent system** has no solutions.

Solve each system by graphing.

6. $\begin{cases} y = 2x + 1 \\ y = 4x + 5 \end{cases}$

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

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

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

10. $\begin{cases} 4x - y = 6 \\ -2x + 3y = 12 \end{cases}$

11. $\begin{cases} 12x + 3y = -9 \\ 4x + y = 7 \end{cases}$

Without graphing, classify each system as *independent*, *dependent*, or *inconsistent*.

12. $\begin{cases} 6x + 3y = 12 \\ y = -2x + 4 \end{cases}$

13. $\begin{cases} y = -x + 5 \\ x - y = -3 \end{cases}$

14. $\begin{cases} x + 2y = 2 \\ y = -0.5x - 2 \end{cases}$

If you can easily solve one equation in a system of two equations for one of the variables, you can substitute that expression in the other equation. Then you can find the value of the other variable.

Otherwise, you can multiply one or both equations by a nonzero quantity to create two terms that are additive inverses. This creates an **equivalent system** of equations. Adding the two equations then eliminates one variable. Again, you can solve for the other variable.

In either case, you substitute the value of this second variable into either of the original equations to find the value of the first variable. Recall that some systems have an infinite number of solutions and some have no solutions.

Solve using substitution.

16. $\begin{cases} 3x + 5y = 10 \\ y = -4 \end{cases}$ **17.** $\begin{cases} 4x + 3y = 12 \\ x = 5y - 20 \end{cases}$ **18.** $\begin{cases} 8x + y = 17 \\ x + 4y = 37 \end{cases}$

Solve using elimination.

19. $\begin{cases} 2x + y = 13 \\ x - y = -4 \end{cases}$ **20.** $\begin{cases} 2x + 3y = 4 \\ 4x + 6y = 9 \end{cases}$ **21.** $\begin{cases} a + b = \frac{1}{3} \\ a - b = \frac{1}{4} \end{cases}$

22. Nutrition Roast beef has 25 g of protein and 11 g of calcium per serving. A serving of mashed potatoes has 2 g of protein and 25 g of calcium. How many servings of each are needed to supply exactly 29 g of protein and 61 g of calcium?

The solution of a system of inequalities is represented on a graph by the region of overlap of the inequalities. To solve a system by graphing, first graph the boundaries for each inequality. Then shade the regions of the plane containing the solutions for both inequalities.

Solve each system by graphing.

23. $\begin{cases} y < -x + 1 \\ y \geq \frac{3}{4}x - 6 \end{cases}$ **24.** $\begin{cases} x + y \leq 4 \\ y < 6 \end{cases}$ **25.** $\begin{cases} y > |x - 4| \\ y < \frac{1}{3}x \end{cases}$

26. For a community breakfast there should be at least three times as much regular coffee as decaffeinated coffee. A total of ten gallons is sufficient for the breakfast. Model this situation with a system of inequalities. Graph to solve the system.