Day 4: Solving Systems of Equations by Substitution

Date_____

1) _____ is the _____ of a term of an equation by another known to have the same value.

In other words, solve one equation for y and replace that solution for the y of the other equation.

Solve each system by substitution.

2) $y = -2x + 4$
   $-7x - 3y = -12$

3) $6x + y = 16$
   $-8x - 3y = -8$

4) $-x + y = 1$
   $-4x + 8y = -24$

5) $3x + 7y = 23$
   $-4x - y = 11$

6) If one of the equations is a quadratic equation (this means we have an _____), we will need to solve the quadratic to get our final answer. To solve quadratics, we can:

a. _____

b. _____

Steps to solving if quadratic:
   1. Substitute one equation into the other equation

   2. Set the new equation equal to _____

   3. Solve the quadratic using _____

   4. Plug x value(s) into either equation to find the corresponding y-values

   5. Write solution(s) as _____.

7) $y = x^2 - 11x + 28$
   $y = -3x + 12$

8) $y = 2x^2 + 13x + 15$
   $y = x - 1$

9) $y = 7x^2 - 25x - 12$
   $y = -3x - 30$

10) $y = 3x$
   $y = x^2 + 4x - 2$

Real World Applications

11) Systems of Equations are widely used when solving real world problems.

When you encounter a story problem, you will need to do the following:

Step 1: Define your variables (what is your story asking about).

Step 2: Use the given information to write two equations.

WRITE a system of equations that models the given situation. Do not solve.

12) The sum of Teresa's and Cathy's weight is 118 pounds. Teresa weighs 26 pounds more than Cathy. Use T to represent Teresa's weight and C to represent Cathy's.

13) The Country Buffet Restaurant has tables that seat 6 people and booths that can seat 4 people. The restaurant has 38 seating units for seating a total of 188 people. Use T to represent the number of tables and B to represent the number of booths in the restaurant.

14) Ricki has a prepaid cellphone. Last week Ricki made 4 calls and sent 20 text messages which cost him $4. This week he made 10 calls and sent 5 text messages which cost him $5.50. Use C to represent the number of calls he made, and T to represent the number of texts he sent.

15) A television weighs 50 pounds and a microwave weighs 30 pounds. A TV occupies 4 cubic feet and microwave occupies 3 cubic feet. A truck is carrying 1500 pounds of cargo that occupies 138 cubic feet of space. How many TVs and microwaves the truck could hold?

16) The perimeter of a rectangular wooden deck is 90 sq ft. The deck's length is 5 feet less than 4 times its width.

For each problem define your variables, write a system of equations, and solve the system of equations by substitution.

17) A collection of nickels and quarters is worth $6.10. There are 70 coins in all. How many of each type of coin are there?

18) A field goal is 3 points and the extra point after a touchdown is 1 point. In a recent post-season, Adam Vinatieri of the Indianapolis Colts made a total of 21 field goals and extra point kicks for a total of 49 points. How many field goals and how many extra point kicks did he make?

19) Jose bought 9 movie tickets for a total of $54. Adult tickets cost $8 each and child tickets cost $3.50 each. How many adult tickets did he buy?

20) Sarah and James are selling popcorn and cotton candy at the State Fair. Sarah sold 3 bags of popcorn and 9 sticks of cotton candy for a total of $75. James sold 8 bags of popcorn and 5 sticks of cotton candy for a total of $67. Which is cost of the popcorn and stick of cotton candy?

21) A group of 48 senior citizens attended a baseball game. The number of women in attendance was 12 more than the number of men. How many men and women attended the baseball game?

22) Kathy and Brian drove a total of 750 miles in 12 hours. Kathy drove the first part of the trip at 65 miles per hour and Brian drove the remaining part of the trip at 55 miles per hour. For what length of the time did Kathy and Brian drive?

Solve the system of equations by substitution.

23) The revenue for a production of Wizard of Oz by a theatre group is $y = -50t^2 + 300t$ where t is the ticket price in dollars. The cost for the production is $y = 600 - 50t$. Determine the ticket price that will allow the production to break even. (Hint: a company breaks even when the revenue is equal to the cost)

24) A rocket is launched from the ground and follows the path represented by the equation $h = -t^2 + 10t$. At the same time, a flare is launched from a height of 25 feet and follows the path represented by $h = -t + 25$. Find the time and height when the rocket will connect to the flare.