Applications of Systems of Equations
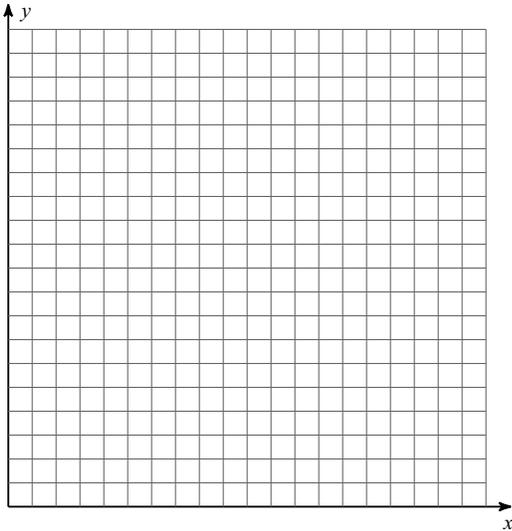
Date_____ Period_____

Solve the following system of equations. *Remember you are trying to use the best method (graphing vs substitution). You must show all of your work.

1) You are trying to throw a tennis ball up and over a flag pole. You are 10 feet away from the flag pole that is 15 feet tall. If the ball has a trajectory of $y = -0.2x^2 + 14$, will the tennis ball clear the flag pole?


2) A cannonball is fired up a hill. The trajectory of the ball follows the equation $d = 2 + 0.12t - 0.002t^2$. If the slope up the hill follows the equation $d = 0.15t$, how far up the hill (d in feet) does the cannonball land? How long (t in seconds) does it take the cannonball to land?
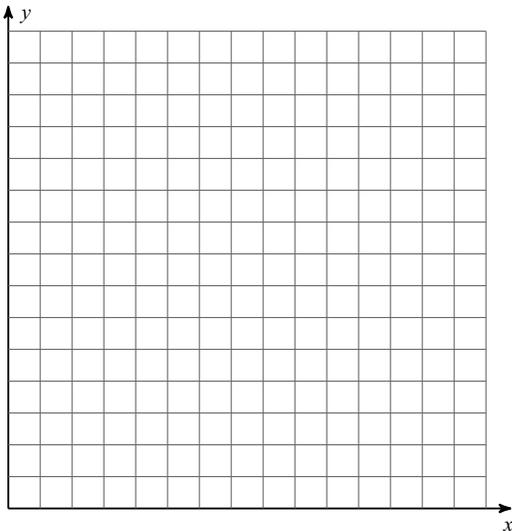
3) A horse corral is being built and they are using the equation $x^2 + y^2 = 25$ in yards to lay out the fence rails. There is a line of shrub trees planted every yard along the line $x = -3$.

   A) Will the shrub trees end up bing in the area of the corral?

   B) If so, how many shrub trees will be in the area of the corral?

   C) Since you do not want the shrub trees in the corral area, what equation could you use for the placement of the corral instead?
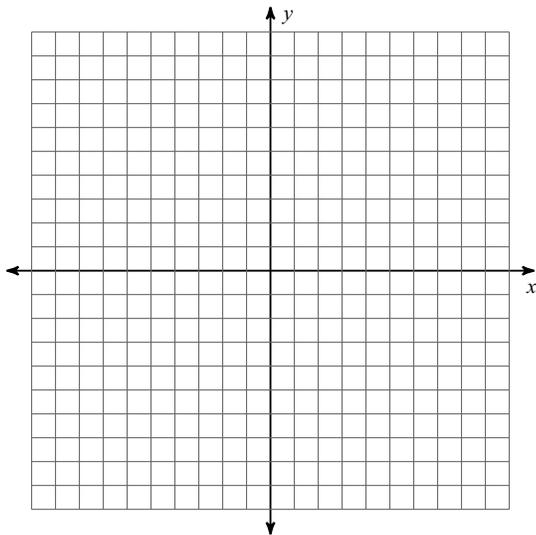
4) In the game you are programming, you wnat the yellow smiley face emoji to change to a red frowny face. You discover that when your equation for the yellow emoji, $2x - y = -1$, touches the equation for the red emoji, $y = x^2 - 2$, it changes what emoji is displayed. In order to check that your code is correct, what coordinates do you need to know?
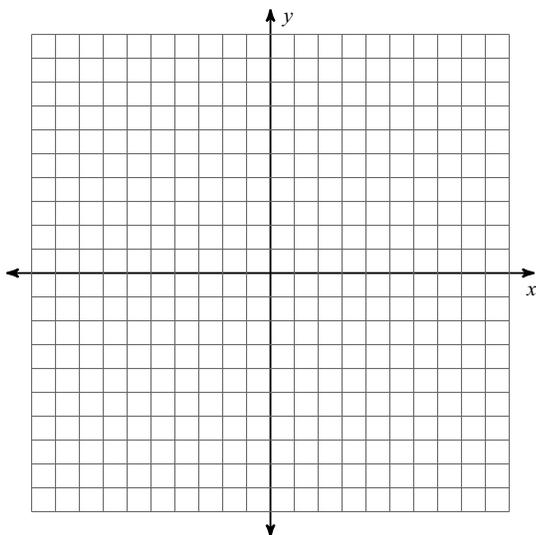
5) Given a circle that is centered about the origin with a radius of 6, produce an equation for a line that splits the radius exactly in half AND give the coordinates where the line and circle intersect.
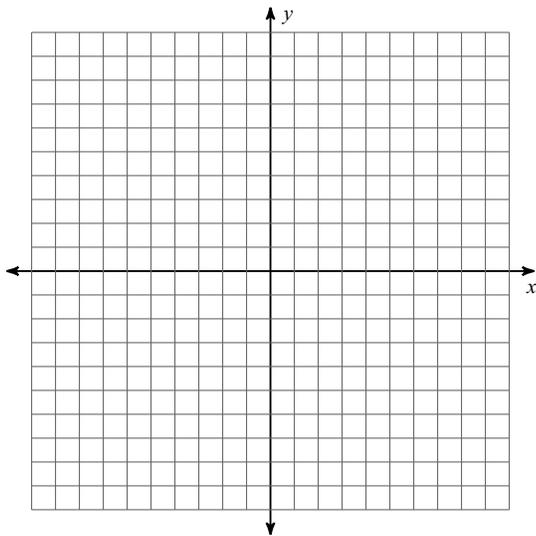
6) Shanice's school is selling tickets to the annual dance competition. On the first day of ticket sales the school sold 9 senior citizen tickets and 3 student tickets for a total of $99. The school took in $96 on the second day by selling 2 senior citizen tickets and 13 student tickets. Find the price of a senior citizen ticket and the price of a student ticket.

7) Asanji and Daniel each improved their yards by planting hostas and shrubs. They bought their supplies from the same store. Asanji spent $156 on 6 hostas and 9 shrubs. Daniel spent $152 on 4 hostas and 10 shrubs. Find the cost of one hosta and the cost of one shrub.

8) Jenny and Jacob are selling fruit for a school fundraiser. Customers can buy small boxes of tangerines and large boxes of tangerines. Jenny sold 3 small boxes of tangerines and 1 large box of tangerines for a total of $32. Jacob sold 3 small boxes of tangerines and 8 large boxes of tangerines for a total of $172. Find the cost each of one small box of tangerines and one large box of tangerines.

9) BONUS:
When you reverse the digits in a certain two-digit number you decrease its value by 9. What is the number if the sum of its digits is 7?

Factor each completely.

10) $k^2 + 11k + 10$

11) $p^2 + 8p$

12) $5n^2 + 5n - 25$

13) $3m^2 + 51m + 216$

Solve for x by factoring.

14) $9x^2 - 25$

15) $6x^2 - 216$

16) $4x^2 - 24x$