Day 5: Applications for Systems of Equations

Date_____

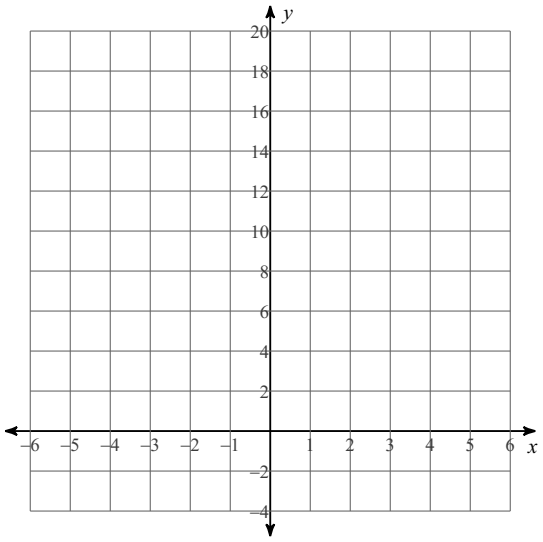
Solve the following systems by substitution.

1) $x + y = 3$
$y = -x - 3$

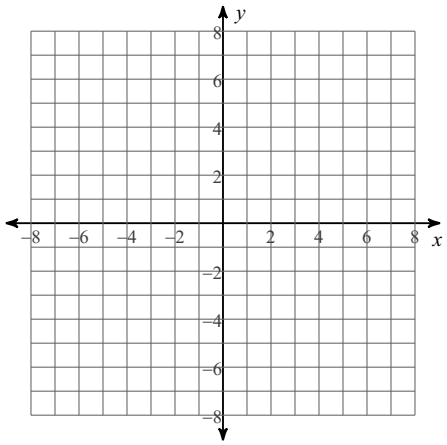
2) $y = \frac{1}{2}x$
$y = -x + 3$

Solve the following systems by graphing.

3) $y = x^2 + x - 2$
$y = 6x - 6$



4) $x^2 + y^2 = 13$
$y = x + 1$

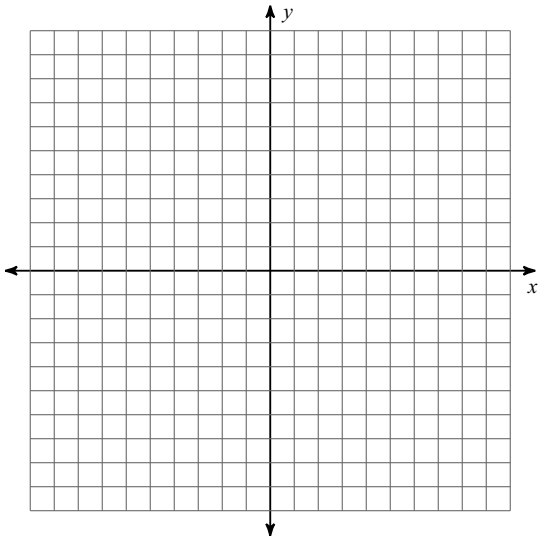


Substitution vs. Graphing

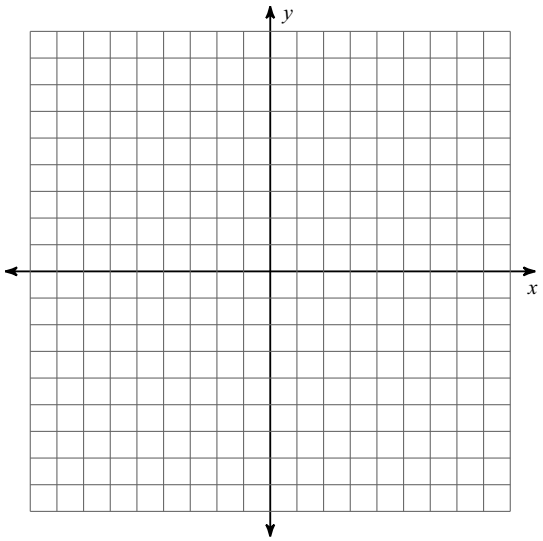
5) You have learned 2 ways to solve systems, substitution and graphing. Sometimes it is best (and easier) to use one method over another.
How will you know when it would be best to use substitution vs. graphing?

Set up and solve the following problems. You must show all of your work.

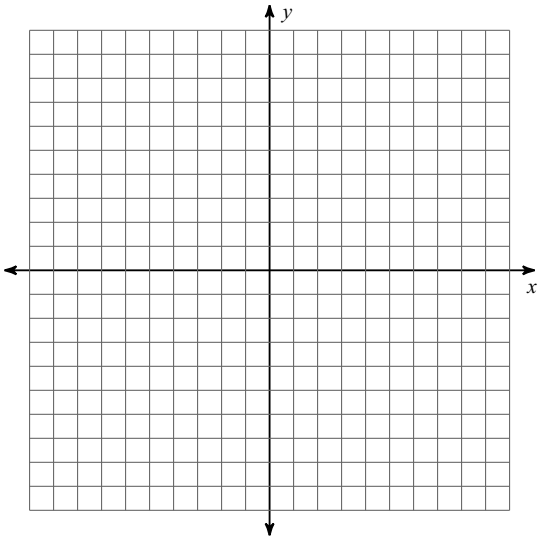
6) AGRICULTURE: The area of a garden sprinkler watering the lawn is represented by $x^2 + y^2 = 25$ (in feet). The dog run in the back yard is represented by the function $y = x - 5$ (in feet). Does the dog run go through the sprinkler? If so, between what two points does the dog run go through? What is the distance of the dog run that will get wet?



7) COMMUNICATIONS: The range of a radio station is bounded by a circle given by the following equation: $x^2 + y^2 - 1600 = 0$ (in miles). A straight highway can be modeled by the following equation: $y = -\frac{1}{2}x + 40$ (in miles). Find the length of the highway that lies within the range of the radio station.



8) LAW ENFORCEMENT: Suppose a car is traveling down the highway at a constant rate of 90 miles per hour. This car is represented by $d = 60t$; where d (in miles) is the distance after an amount of time t (in hours) has passed. It passes a police car parked at the side of the road. To catch up to the car, the police officer accelerates at a constant rate. The police car is represented by the equation $d = 3600t^2$. Write and solve a system of equations to calculate how long it takes the police car to catch up to the other car.



9) MECHANICS: Tommy and his good buddy William are both mechanics at a shop that does oil changes. They are in a friendly competition to see who can complete the most oil changes in one day. Tommy's rate is modeled by the equation $y = 2x + 3$. William just came on shift, and his rate is modeled by $y = 4x - 1$ (y represents the total number of oil changes, and x represents the number of hours that have passed). Sometime during the day, the friends will be tied, with the same number of oil changes completed. How many oil changes will Tommy and William each have done? How long will that take?