Mr. Thurlwell's Supplemental Packet
Algebra 1

Unit 3: Systems of Linear Equations & Inequalities

Name:_____

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Assignment #2 (6.1) pg 338 18-20,23,24,32
Assignment #3 (6.2) pg 347 1-3,8,9,12,13
Assignment #4 (6.2)*** pg 347 4,5, 20-22
Assignment #5 (6.3/6.4) pg 353 1-4 pg 359 1,2,8,10
Assignment #6 (6.3/6.4)*** pg 354 25,28,43 pg 359 3,4,12,14
Assignment #7 (6.5) pg 367 1-4,12-15
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Assignment #10 (6.6)*** pg 374 9,16,18,28,34,36

EQ 1: What are the three methods to solve systems of equations?

EQ 2: When does one method become more appropriate to use than others while solving systems of equations?

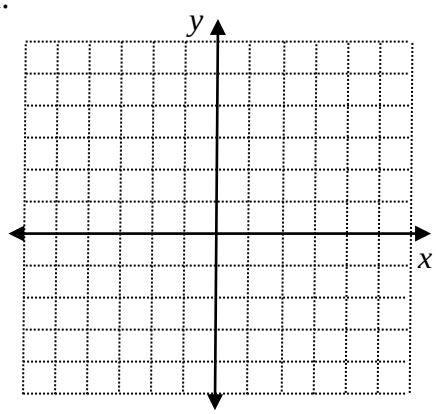
*****=quiz to follow**

6.1 systems

1) Solve the system:

$x + y = 1$

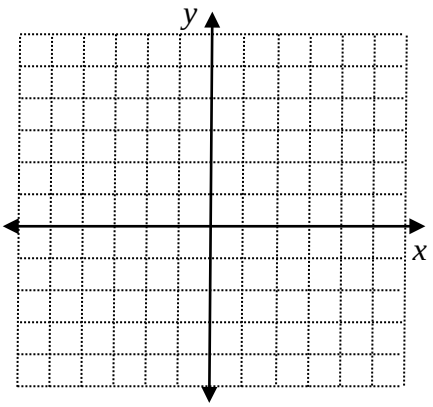
$2 = x - y$



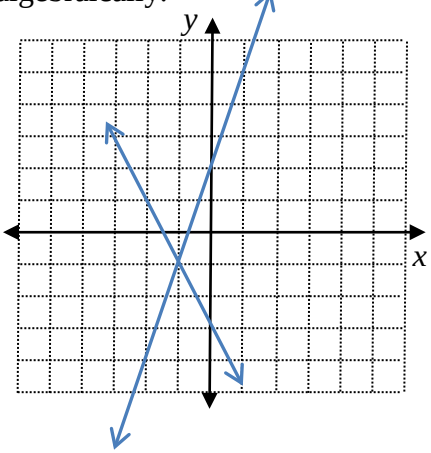
2) Solve the system:

$y + 4 = -\frac{2}{3}(x - 2)$

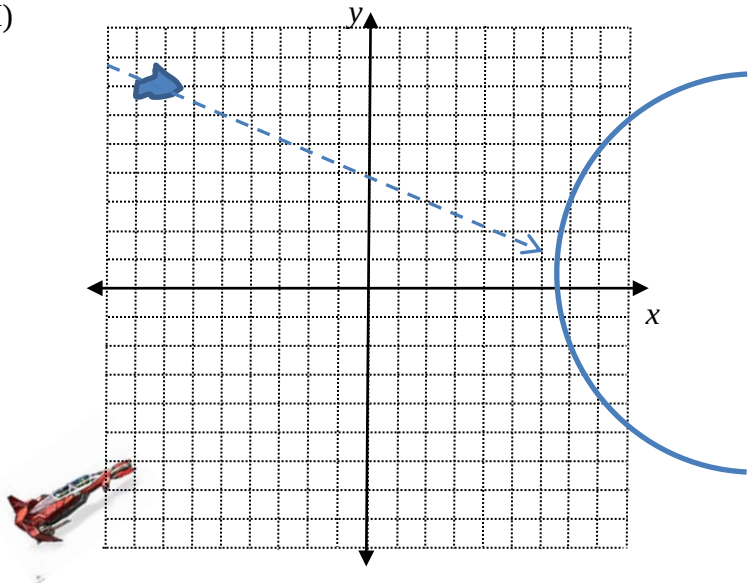
$1x + 11x = -12$



3) Find the equations that satisfy the system below. Then, verify your equations with the solution algebraically.

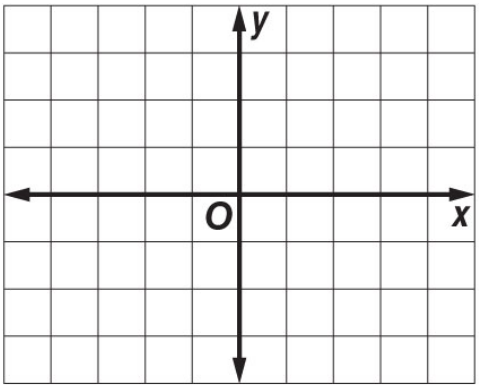


4) A meteor is heading towards earth! You, conveniently, are in a space ship. What line must you shoot your laser in order to intercept the meteor so it is destroyed before it enters our atmosphere (Quadrant I)? At what ordered pair will it blow up? How are you sure it will hit it? (your ship can tilt and go anywhere in Quadrant III)

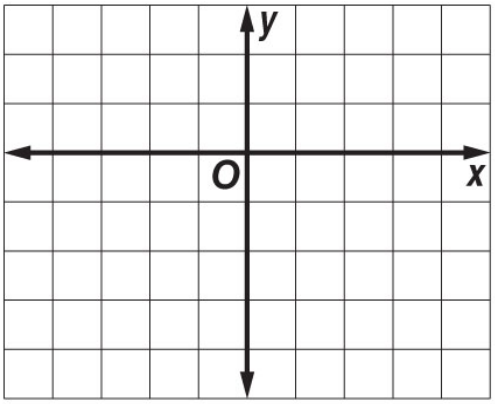


For problems 5-7, solve the system of equations by graphing.

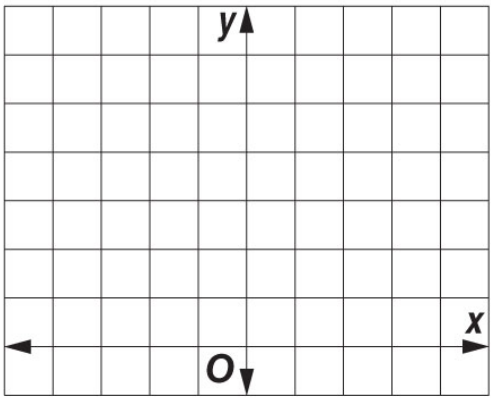
5) $3x - y = -2$
$3x - y = 0$



6) $y = 2x - 3$
$4x = 2y + 6$



7) $x + 2y = 3$
$3x - y = -5$



6.2 Substitution

Solve the following systems using the substitution method

1) $0 = \boldsymbol{x} - 4 - \boldsymbol{y}$
$3\boldsymbol{x} + \boldsymbol{y} = -8$

2) $-m + 5n = -18$
$-13 = 2m - 3n$

3) $\frac{1}{3}x + \frac{5}{6}y = 1$
$-\frac{1}{2}x - y = 1$

4) $\frac{1}{3}x + \frac{2}{3}y = 12$

$x + 9y = -6$

Solving Systems of Equations

Steps to Solving a Linear Equation by **SUBSTITUTION**:

1. Manipulate one of the equations for one variable to be alone.

2. Substitute this expression into the **other** equation and solve for the remaining variable.

3. Take your answer and plug it into an original equation to obtain the other variable.

4. Check!

Ex. 1: Solve the following systems using the substitution method.

a. $y = -13 + 3x$
$2x + 2y = -10$

b. $x + 3y = -2$
$-4x - 5y = 8$

c. $2x - y = 14$
$6x + 3y = 18$

Steps to Solving a Linear Equation using the linear combination method (**ELIMINATION**).

1. Multiply one or both equations by a number, so coefficients for 1 of the variables are opposite.(Your goal is to get one of the variables to cancel out)

2. Add the equations, eliminating one of the variables. Solve for the remaining variable.

3. Substitute this value into one of the original equations and solve for the other variable.

4. CHECK! (in original equations)

Ex. 2

a. $3x - 5y = -36$
$-3x - y = 0$

b. $2x + 3y = -1$
$5y - 5x = 15$

c $6x + 2y = 20$
$-4x + 3y = -22$

**Note: When solving a system of equations, if you come to a step that has:

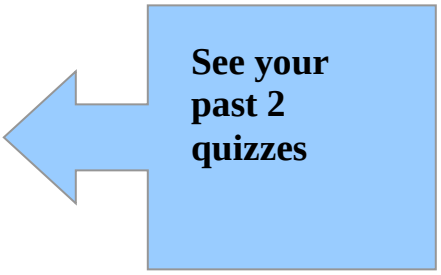
1) 6 = 7 , then there are no solutions.

2) 0 = 0 , then there are infinitely many solutions.

3) What is the 3rd option?

IN SUMMARY….
Three ways to solve a system of linear equations:

1. Graphing
2. Substitution
3. Linear Combination (Elimination)



Which one do you pick?

Graphing - Easy to graph – in slope intercept form or in an easy standard form.

Substitution - one of the variables has the coefficient of 1 or –1.

Elimination - coefficients in one equation is a multiple of the coefficient of the same variable in the other equation.

APPLY:

Ex. 3: You have $1.02 in nickels and pennies. The total number of coins is 26. How many do you have of each?

Ex. 4: You have 4 times as many quarters as you do dimes. The total value of coins together is $7.70. How many do you have of each?

Systems of Equations

For the problems below, solve utilizing any of the three approaches.

1)
$-x + y = 4$

$x + y = 4$

2)
$3x + y = 6$

$-x + y = -2$

3)
$y = x - 2$

$y + x = 4$

4)
$-x + y = 2$

$2x + y = 8$

5)
$4x + y = -4$

$y + 1 = -x$

6)
$y + 2 = x$

$y = -x - 4$

7)
$6x + 4y = 14$

$3x + 2y = 2$

8)
$3x - 2y = 3$

$-6x + 4y = -6$

9) A sporting goods store sells right-handed and left-handed baseball gloves. In one month, 12 gloves were sold for a total revenue of $561. Right-handed gloves cost $45 and left-handed gloves cost $52. Write a system of equations you could solve to find the number of each type of glove sold.

10) In a jar, there are twenty-seven coins. They are dollar coins and quarters. They total $17.25. How many of each coin of each are there?

Solve the following problem using <u>all three methods</u>:

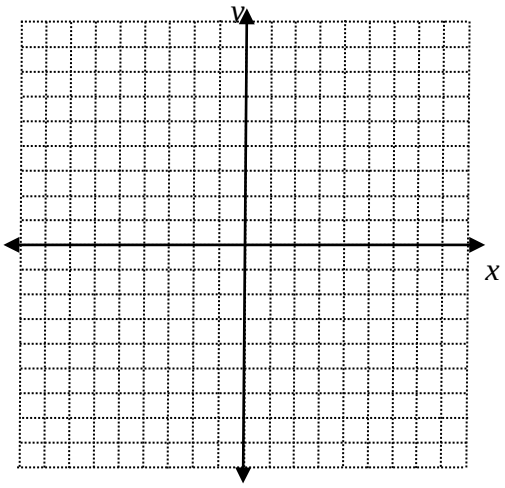
1) $6 = -2x + y$

$-4x + 2y = -6$

Elimination

Substitution

Graphing



Solve the following problem using <u>all three methods</u>:

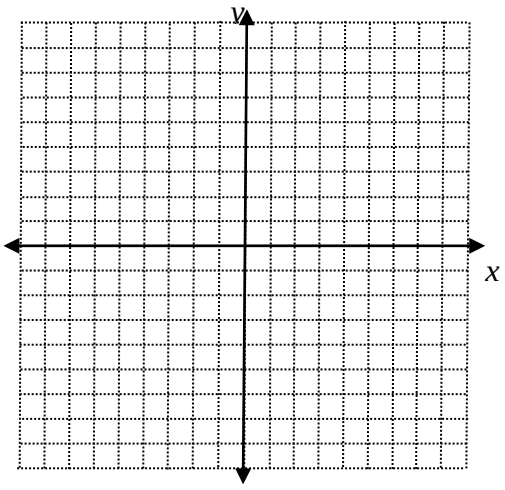
2) $0 = -6x - 6y + 12$

$-2y = -4 + 2x$

Elimination

Substitution

Graphing

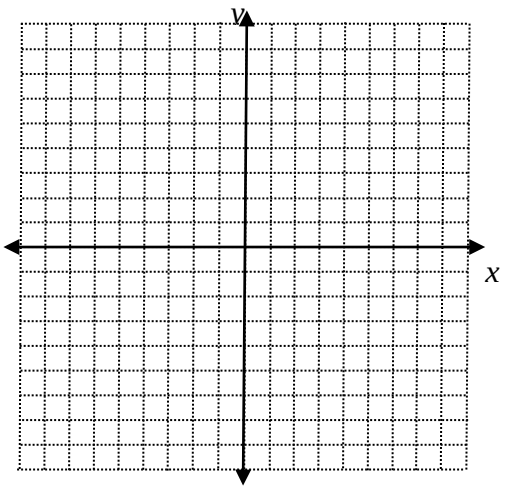


Solve the following problem using <u>all three methods</u>:

3) $6x-5y = 3$

$-2x + \frac{5}{3}y = 1$

Elimination | Substitution | Graphing

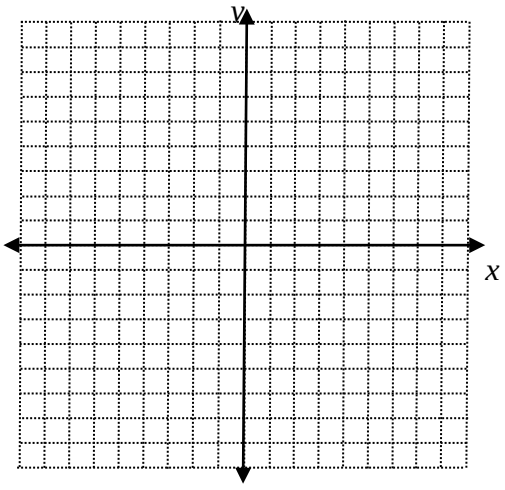


Solve the following problem using <u>all three methods</u>:

4) $x - 7y = 10$

$-6x + 22 + 4y = 0$

Elimination | Substitution | Graphing



Solve the following problem using <u>all three methods</u>:

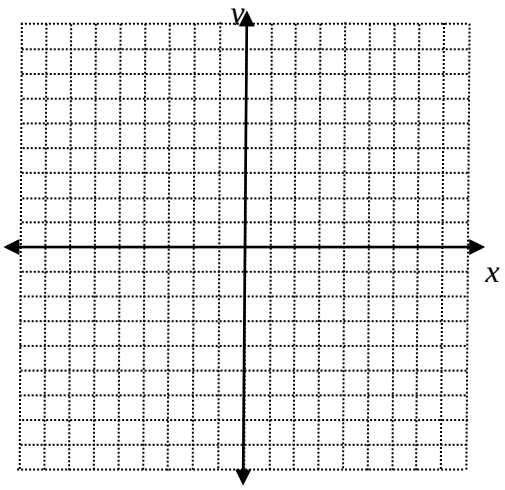
5) $x + 3y = -3$

$y + \frac{1}{3}x = 1$

Elimination

Substitution

Graphing



Solve the following problem using <u>all three methods</u>:

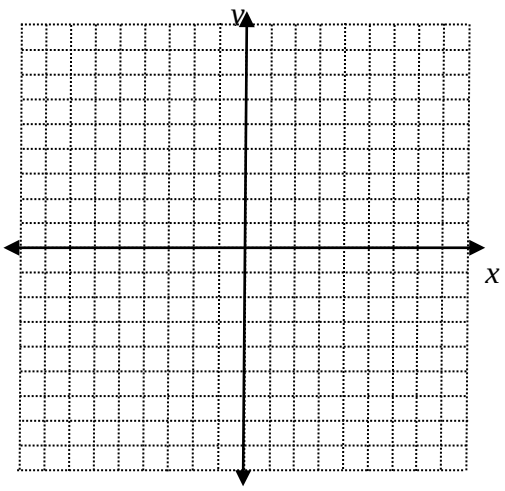
6) $3x - 9y = 2$

$2x - 6y = 5$

Elimination

Substitution

Graphing



Solve the following problem using <u>all three methods</u>:

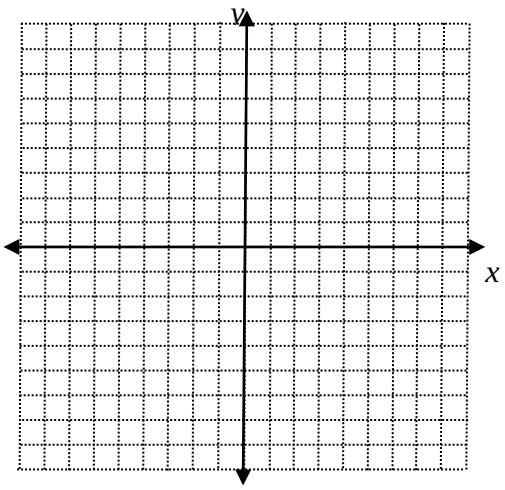
7) $\frac{3}{2}x + 3y = \frac{3}{4}$

$4y = 1 + 2x$

Elimination

Substitution

Graphing



6.5 Application

1. A roadside vegetable stand sells pumpkins for $5 each and squashes for $3 each. One day they sold 6 more squash than pumpkins, and their sales totaled $98. Write and solve a system of equations to find how many pumpkins and quash they sold?

2. Ramiro earns $20 per hour during the week and $30 per hour for overtime on the weekends. One week Ramiro earned a total of $650. He worked 5 times as many hours during the week as he did on the weekend. Write and solve a system of equations to determine how many hours of overtime Ramiro worked on the weekend.

3. Anya makes 14 baskets during her game. Some of these baskets were worth 2-points and others were worth 3-points. In total, she scored 30 points. Write and solve a system of equations to find how 2-points baskets she made.

4. A library contains 2000 books. There are 3 times as many non-fiction books as fiction books. Write and solve a system of equations to determine the number of nonfiction and fiction books.

5. The chess club has 16 members and gains a new member every month. The film club has 4 members and gains 4 new members every month. Write and solve a system of equations to find when the number of members in both clubs will be equal.

6. Tia and Ken each sold snack bars and magazine subscriptions for a school fund-raiser, as shown in the table. Tia earned $132 and Ken earned $190. What was the price per snack bar? Determine the reasonableness of your solution.

Item	Number Sold	
	Tia	Ken
snack bars	16	20
magazine subscriptions	4	6

7. How many liters of 15% acid and 33% acid should be mixed to make 40 liters of 21% acid solution?

Concentration of Solution	Amount of Solution (L)	Amount of Acid
15%	*x*	
33%	*y*	
21%	40	

8. Two stores are having a sale on T-shirts that normally sell for $20. Store S is advertising an *s* percent discount, and Store T is advertising a *t* dollar discount. Rose spends $63 for three T-shirts from Store S and one from Store T. Manny spends $140 on five T-shirts from Store S and four from Store T. Find the discount at each store.

Systems of Equations Application Problems

1) Find the value of two numbers if their sum is 12 and their difference is 4.

2) The difference of two numbers is 3. Their sum is 13. Find the numbers.

3) Flying to Denver with a tailwind a plane averaged 558 mph. On the return trip the plane only averaged 512 mph while flying back into the same wind. Find the speed of the wind and the speed of the plane in still air. (Tailwind means the wind is pushing you – adding to your speed)

4) The school that Freddy goes to is selling tickets to a spring musical. On the first day of ticket sales the school sold 30 senior citizen tickets and 10 child ticket for a total of $380. The school took in $520 on the second day by selling 30 senior citizen tickets and 20 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

5) The sum of the two numbers is 12. The difference of these numbers is -36. What are the two numbers?

6) 75 people attended a baseball game. Everyone there was a fan of either the home team or the away team. The number of home team fans was 90 less than 4 times the number of away team fans.
How many home team and away team fans attended the game?

7) The state fair is a popular field trip destination. This year the senior class at Oswego East and the senior class at Oswego High both planned trips there. The senior class at Oswego East rented and filled 8 vans and 8 buses with 240 students. Oswego High rented and filled 4 vans and 1 bus with 54students. Every van had the same number of students in it as did the buses. Find the number of students in each van and in each bus.

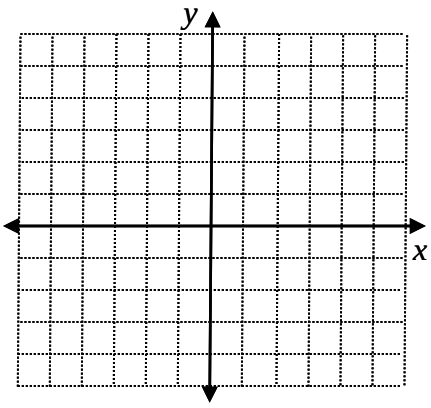
8) A test has twenty questions worth 100 points. The test consists of True/False questions worth 3 points each and multiple choice questions worth 11 points each. How many multiple choice questions are on the test?

9) The admission fee at a small fair is $1.50 for children and $4.00 for adults. On a certain day, 2200 people enter the fair and $5050 is collected. How many children and how many adults attended?

10) Matt and Ming are selling fruit for a school fundraiser. Customers can buy small boxes of oranges and large boxes of oranges. Matt sold 3 small boxes of oranges and 14 large boxes of oranges for a total of $203. Ming sold 11 small boxes of oranges and 11 large boxes of oranges for a total of $220. Find the cost each of one small box of oranges and one large box of oranges.

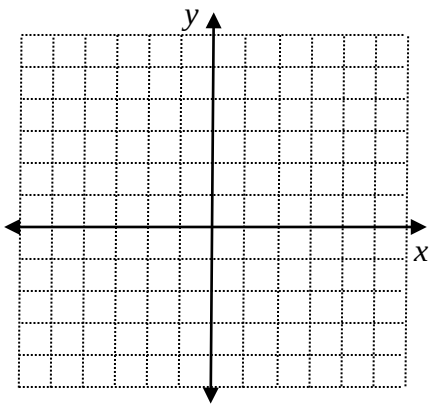
6.5 Review

1) Graph the equation $y < 2x - 3$ and give an example of a solution.



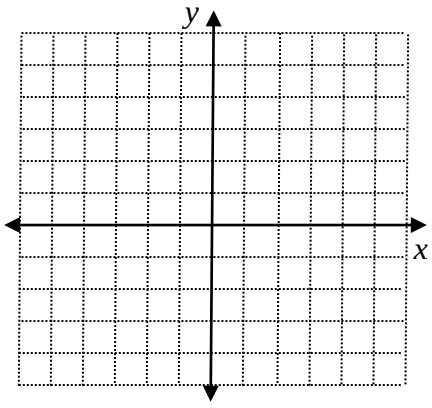
Example solution:

2) Graph the equation $y \geq 2x - 3$ and give an example of a solution.

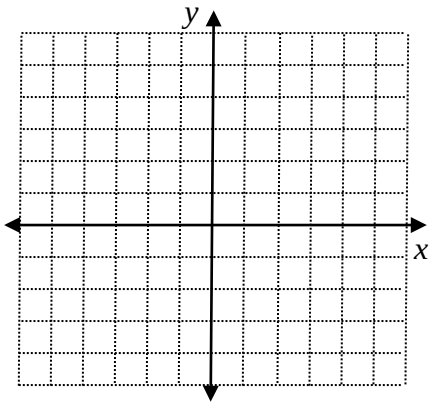


Example solution:

3) Graph the equation $y - 4 > -x$ and give an example of a solution.



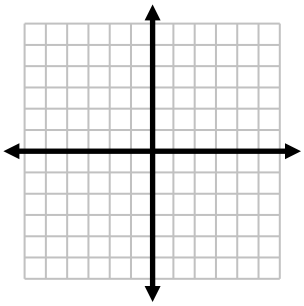
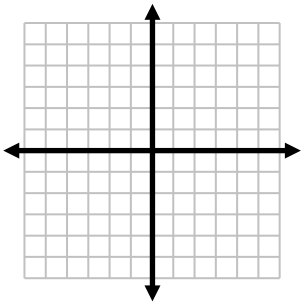
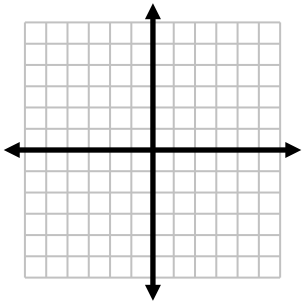
4) Graph the equation $y + x \leq -3$ and give an example of a solution.



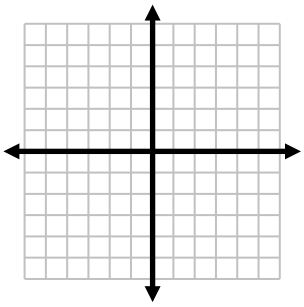
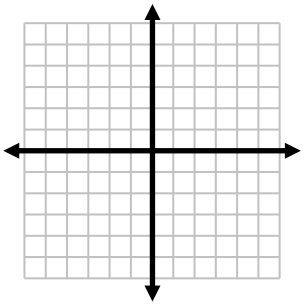
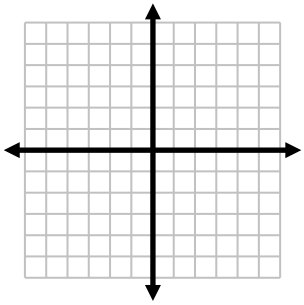
6.6 Graphing system of inequalities

Graph the indicated inequality.

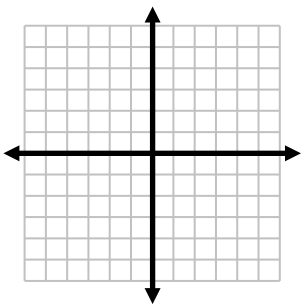
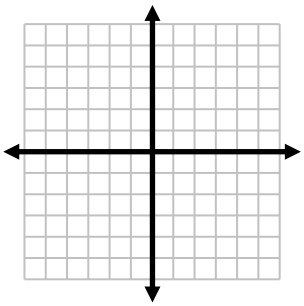
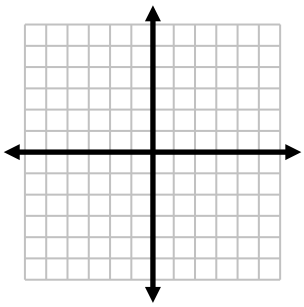
1)

Color 1	*Color 2*	Now draw both of the graphs from the left on this one coordinate plane. The region shaded in **both colors** (the overlapping region) is the graph of the system of the inequalities.
$y \leq 2x + 1$	$y \geq \frac{1}{2}x - 2$	
		

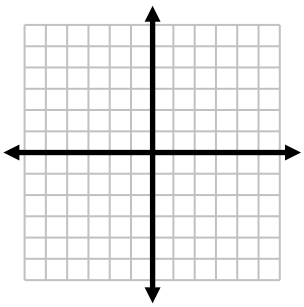
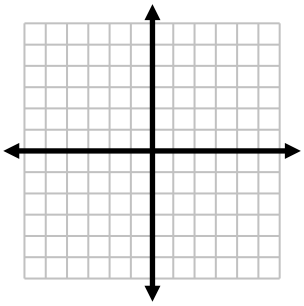
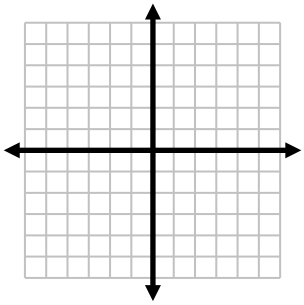
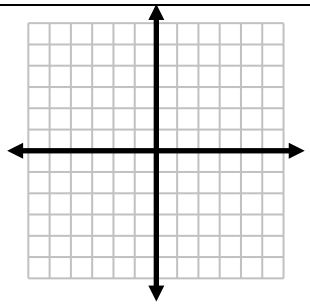
2)

$y < 4$	$y \geq -3$	Graph the system of inequalities by graphing the overlapping region.
		

3)

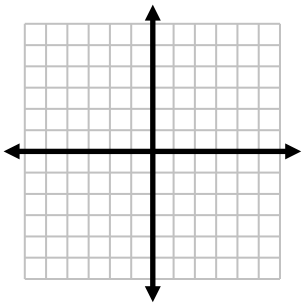
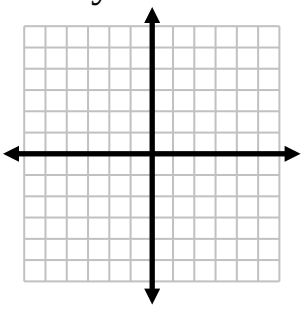
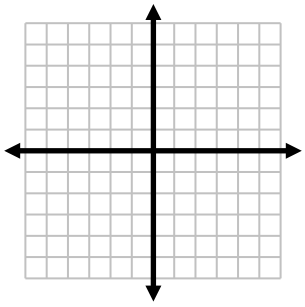
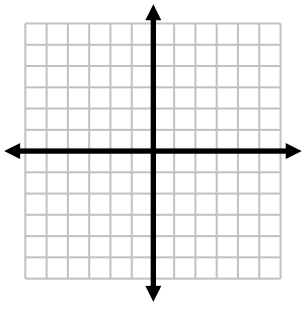
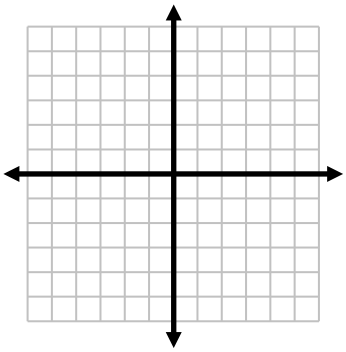
$x < 4$	$x \geq -3$	Graph the system of inequalities by graphing the overlapping region.
		

4)

$y - 2 \leq \frac{1}{2} x$	$y \geq -\frac{1}{2} x - 2$	$x \leq 3$
		
Now graph this system of three inequalities on this one coordiante plane shading **only** the **overlapping** regions.		

Use the techniques from the previous examples to graph the system of four inequalities:

5)

$y \leq - x + 2$	$y + 3 \geq x$	Now graph this system of four inequalities on this one coordiante plane shading **only** the **overlapping** regions.
		
$x < 1$ 	$x > -1$ 	

6.6 Graphing and solving systems of Linear Inequalities

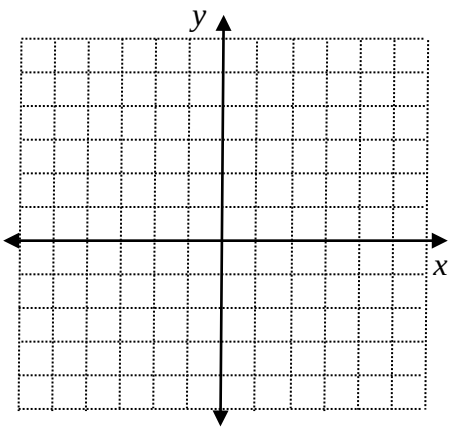
Recall the coloring worksheet…

Remember: 1) < or > is dashed and ≤ or ≥ is solid

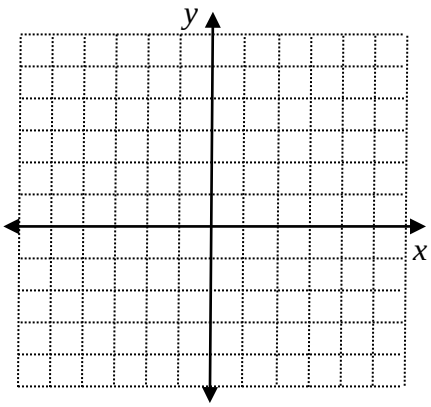
2) Graph and shade each line individually

3) Your answer (the solutions) is the shaded overlap.

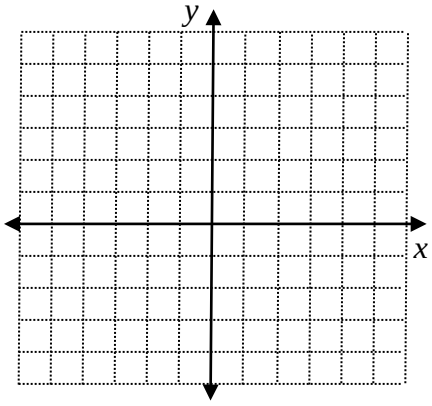
Ex. 1: $x \geq -1$
$y > 2x + 2$



Ex. 2: $x \geq 0$
$y \geq 0$
$4x + 3y \leq 12$



Ex. 3: $x \geq 5$
$y > 0$
$x > 2$
$2x - 3y < 12$

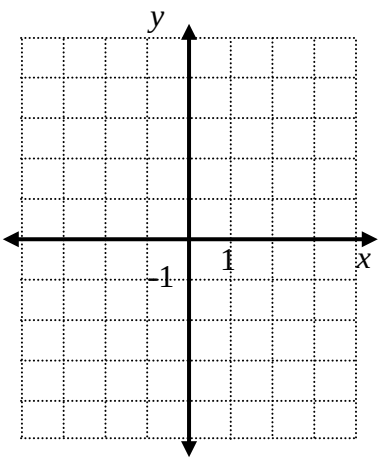


6.6 Practice

1) Graph the system of linear inequalities.

$y \le -\frac{5}{2}x + 4$

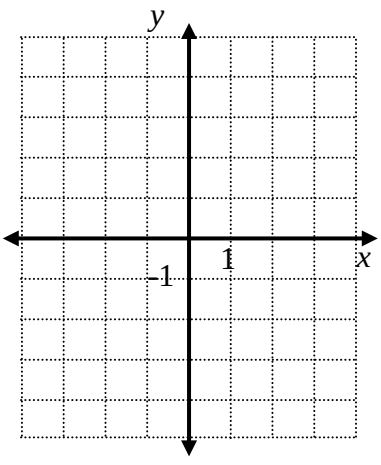
$y > -\frac{1}{2}x - 2$



2) Graph the system of linear inequalities.

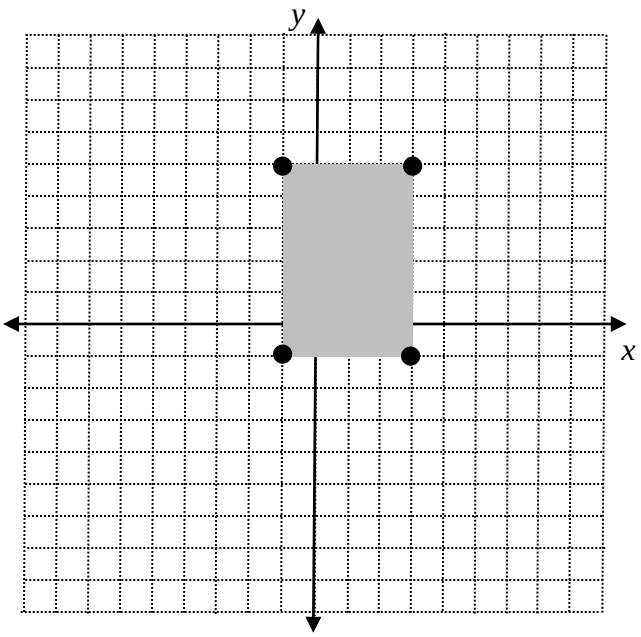
$y - 2 \le -\frac{1}{2}x$

$8x > -4 + 4y$

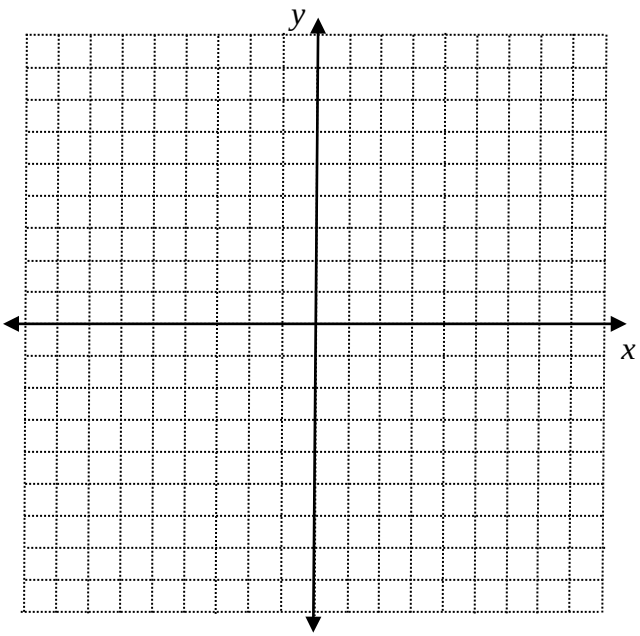


Plot the points and draw line segments connecting the points to create the polygon(#1 is plotted for you). Then write a system of linear inequalities that defines the polygonal region.

1) Rectangle: (-1, 5), (-1, -1), (3, -1), (3, 5)

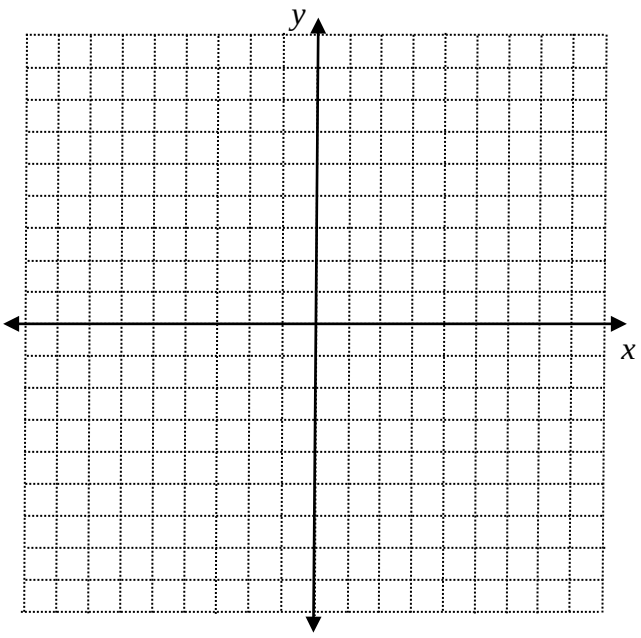


2) Triangle: (-2, 4), (4, 1), (-2, -1)



Plot the points and draw line segments connecting the points to create the polygon. Then write a system of linear inequalities that defines the polygonal region.

1) Trapezoid: (-2, 1), (2, 1), (4, -4), (-4, -4)



2) Meghan has 30 coins in dimes and nickels which are worth $2.05. How many of each coin does she have?

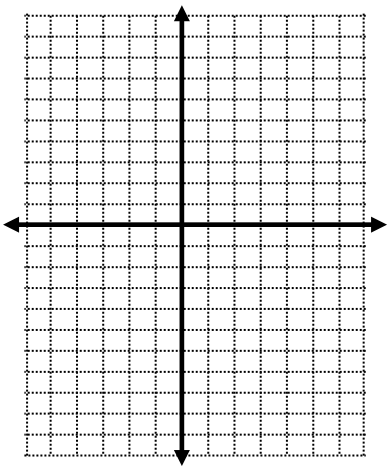
3) Ford is projecting that its new Mustang will average 20 miles per gallon in the city and 27 mi/gal on the highway. The fuel tank size is 13 gallons. As you are interested in buying this car, you leased it for the weekend. You drove a total of 309 miles on a full tank and brought it back completely empty. Write and solve a system of equations to determine the number of miles you drove on the highway.

4) In the 2012 Presidential election in a particular district, results showed that Barack Obama had three times as many votes than Mitt Romney. If 1,500 total people in that district voted, how many voted for Romney, and how many for Obama?

Unit 3 Review #1

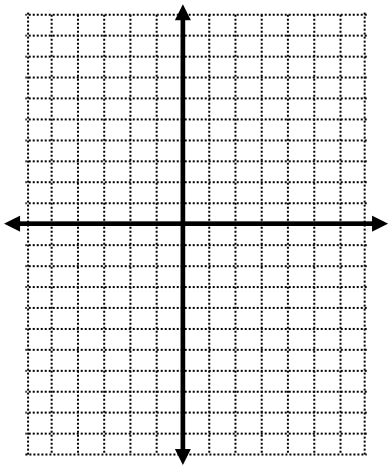
Be sure to read all directions!!!! You may need a separate sheet of paper to do your work.
For problems 1 - 3, graph and check to solve the linear system.

1. $y = 5$
   $x = -2$



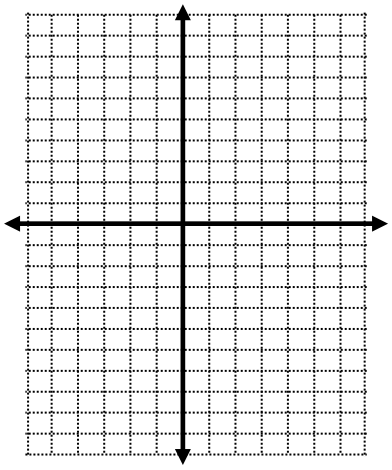
1. _____

2. $x = 1$
   $y + 3x = 7$



2. _____

3. $y = \frac{1}{2}x + 5$
   $y - 2 = -3(x - 1)$



3._____

For problems 4- 7, use substitution to solve the linear systems. (remember to isolate a variable)

4. $x = 5y$
   $2x + 3y = -13$

4. _____

5. $y = -2x$
   $x + y = 7$

5. _____

6. $x + y = 9$
   $x - y = 3$

6. _____

7. $2a + 3b = 3$
   $a - 6b = -6$

7. _____

For problems 8- 11, use elimination to solve the linear systems. (remember to line them up)

8. $3x + 3y = 6$
   $2x - 3y = 4$

9. $3y = 2 - x$
   $-x + 2y = 3$

10. $3x - 2y = 1$
    $2x + 2y = 4$

11. $v - w = -5$
    $v + 2w = 4$

8. _____ 9. _____ 10. _____ 11. _____

For problems 12-14, use **any method** to solve the linear system and tell how many solutions the system has.

12. $x = 4 - y$
    $2x + 3y = 9$

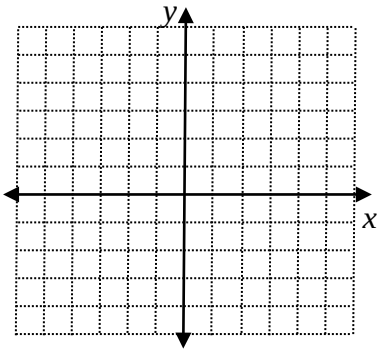
13. $x + y = 6$
    $3x + 3y = 3$

14. $x + 2y = 5$
    $3x - 15 = -6y$

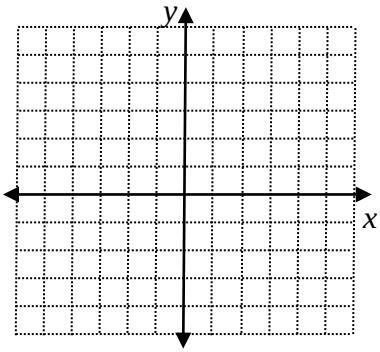
12. _____ 13. _____ 14. _____

For 15 & 16, solve the system of linear inequalities.

15. $x \geq -1$
    $y > 2x + 2$

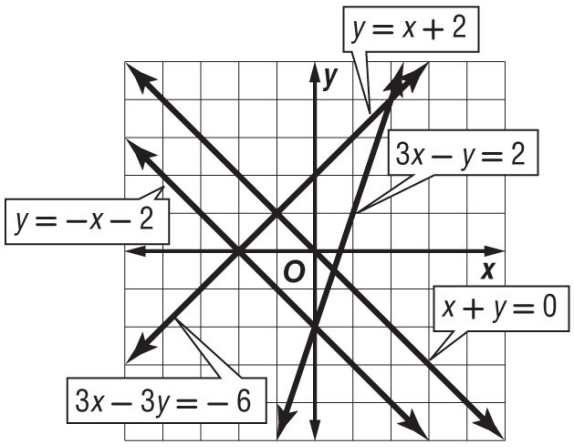


16. $4x + 3y \leq 12$
    $-5 < y$



Unit 3 Review #2 (Multiple Choice)

Use the graph for Questions 1-4.



1. How many solutions exist for the system of equations?

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

A) no solution B) one solution
C) infinitely many solutions D) cannot be determined

2. How many solutions exist for the system of equations?

$x + y = 0$
$3x - y = 2$

A) no solution B) one solution
C) infinitely many solutions D) cannot be determined

3. The solution to which system of equations has an x value of –1?

A) $x + y = 0$
 $3x - y = 2$
B) $3x - y = 2$
 $y = -x - 2$
C) $x + y = 0$
 $3x - 3y = -6$
D) $y = -x - 2$
 $x + y = 0$

4. The solution to which system of equations has a y value of –2?

A) $x + y = 0$
 $3x - y = 2$
B) $3x - y = 2$
 $y = -x - 2$
C) $x + y = 0$
 $3x - 3y = -6$
D) $y = -x - 2$
 $x + y = 0$

5. When solving the system of equations, which expression could be substituted for y in the second equation?

$3x + y = 14$
$x + 4y = 3$

A) $3 - 4y$ B) $\frac{3 - x}{4}$ C) $\frac{14 - y}{3}$ D) $14 - 3x$

6. If $x = 5y - 1$ and $2x + 5y = -32$, what is the value of y?

A) –2 B) 2 C) 1 D) –1

7. Which multiplication will work to eliminate the variable x in the system of equations?

$3x - 2y = 1$
$4x + 7y = -8$

A) multiply the first equation by 2 and the second equation by -2
B) multiply the first equation by 3 and the second equation by -4
C) multiply the first equation by 4 and the second equation by -3
D) multiply the first equation by 7 and the second equation by 2

8. Which is the best method for solving the following system?

$3x + 5y = 16$
$8x - 5y = 28$

A) substitution
B) elimination using subtraction
C) elimination using addition
D) elimination using multiplication

9. Which is the best method for solving the following system?

$x - 4y = 1$
$x + 2y = 19$

A) substitution
B) elimination using subtraction
C) elimination using addition
D) elimination using multiplication

10. The substitution method should be used to solve which system of equations?

A) $5x - 7y = 16$, $2x - 7y = 12$
B) $4x + 3y = -5$, $6x - 3y = 2$
C) $x = 3y + 1$, $2x + y = 7$
D) $2x + 6y = 3$, $3x + 2y = -1$

11. Solve the system for x.

$4x + 7y = -14$
$8x + 5y = 8$

A) $\frac{7}{2}$
B) $-\frac{3}{2}$
C) 8
D) –4

12. Solve the system for y.

$5x + 4y = -10$
$3x + 6y = -6$

A) –2
B) –5
C) 0
D) 2

13. Solve the system.

$x = 2y + 1$
$6x - 5y = 20$

A) (2, 5)
B) (–5, –2)
C) (5, 2)
D) (–2, –5)

14. Solve the system. What is the value of $x + y$?

$2x + 3y = 1$
$5x - 4y = -32$

A) 1
B) -1
C) 3
D) -4

15. Solve the system. What is the value of $x + y$?

$6x + 3y = 12$
$5x + 3y = 0$

A) –20
B) 12
C) 8
D) -8

16. Colortime Bakers wants to make 30 pounds of a berry mix that will cost a total of $90 to use in their pancake mix. They are using blueberries that cost $2 per pound and blackberries that cost $3.50 per pound. How many pounds of blackberries should be used in this mixture?

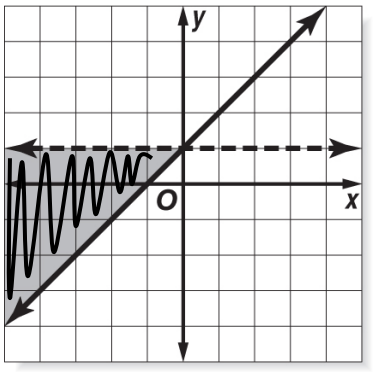
A) 15 lb B) 20 lb C) 10 lb D) 30 lb

17. Your teacher is giving a test that has x three–point questions and y five–point questions. The test is worth 100 points and contains 50 total questions. Which system represents this information?

A) $x + y = 100$, $3x + 5y = 50$ B) $x + y = 50$, $5x + 3y = 100$ C) $x - y = 50$, $3x + 5y = 100$ D) $x + y = 50$, $3x + 5y = 100$

18. What system of inequalities is represented in the graph?

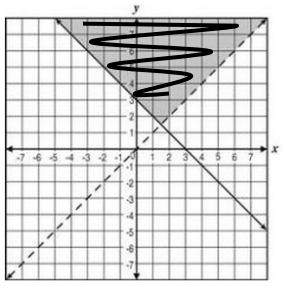
A) $y \le 1$, $y \ge x + 1$ B) $y > 1$, $y \le x + 1$ C) $y < 1$, $y \ge x + 1$ D) $y \ge 1$, $y \ge x + 1$

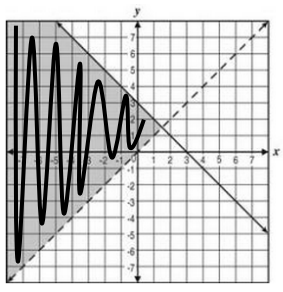


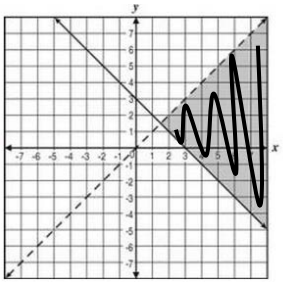
19. Which graph represents the system of inequalities shown below?

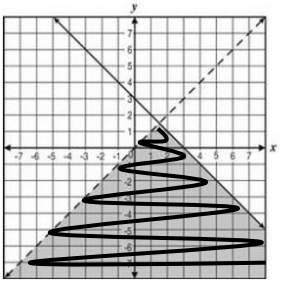
$y < x$

$y \ge -x + 3$

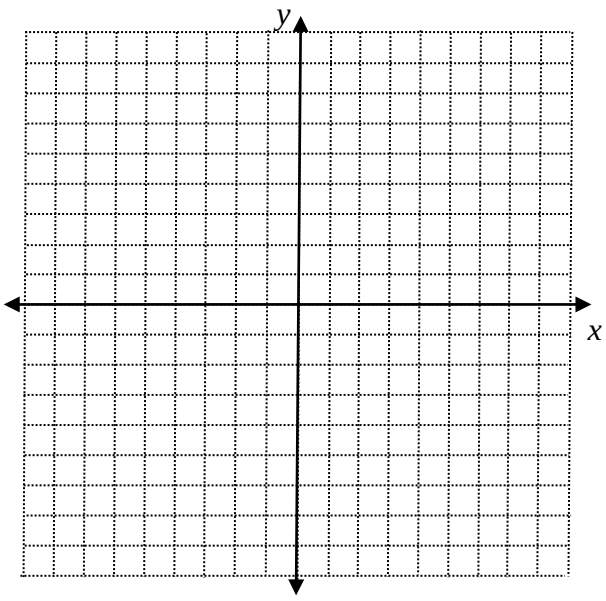
A) 

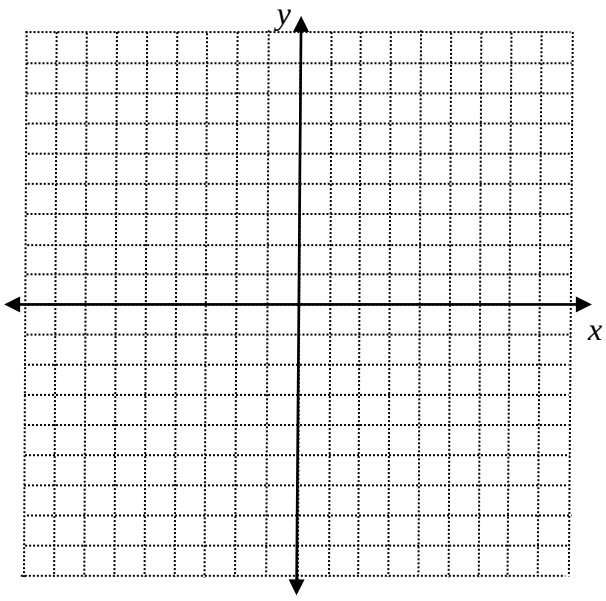
B) 

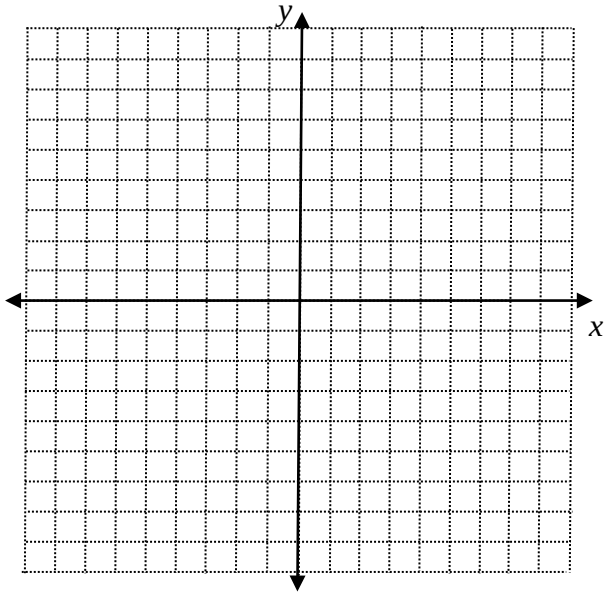
C) 

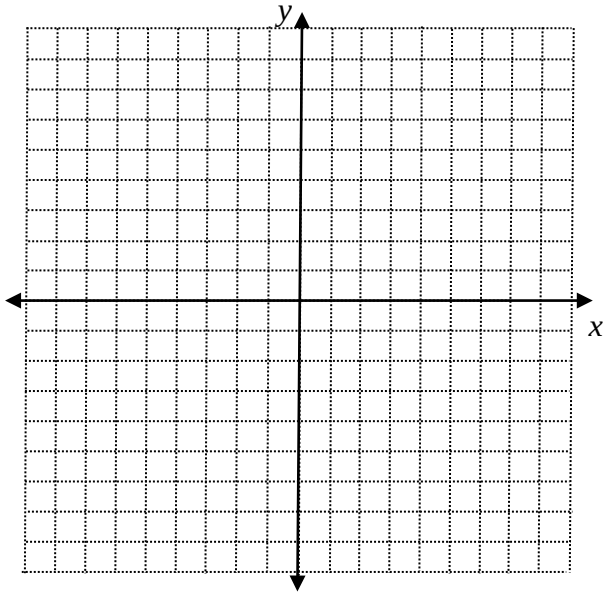
D) 

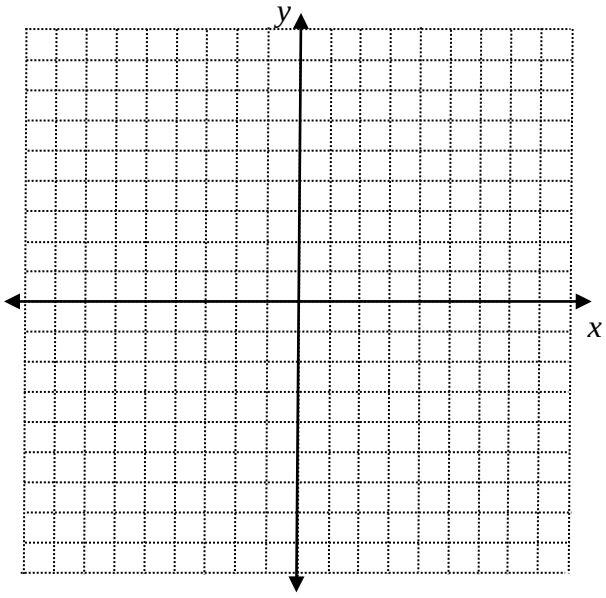
Extra Graphs

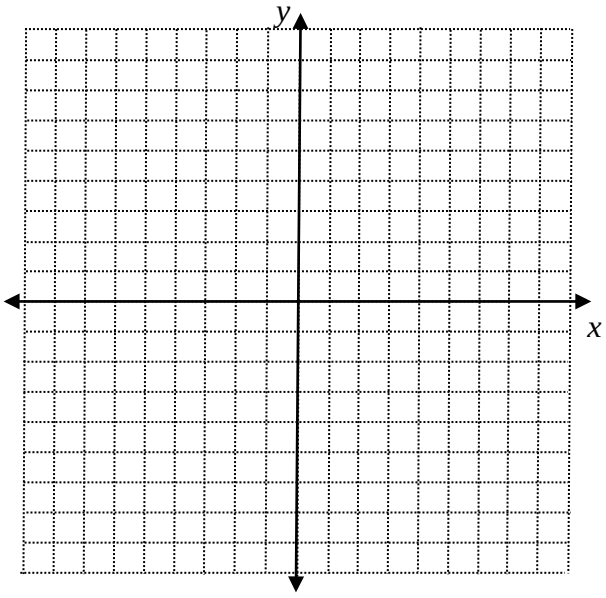












Add on problems or addition examples:

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