Algebra 1

Unit 1 – Part 3

Linear Functions

Monday	Tuesday	Wednesday	Thursday	Friday
Jan. 25th	Jan. 26th	Jan. 27th	Jan. 28th	Jan. 29th
			Unit 1 Part 2 Quiz	Solving Systems by Graphing
Feb. 1st	Feb. 2nd	Feb. 3rd	Feb. 4th	Feb. 5th
Solving Systems by Substitution	Solving Systems by Elimination Quiz	**Quiz due at midnight**	Systems of Equations Word Problems	Graphing Systems of Inequalities
Feb. 8th	Feb. 9th	Feb. 10th	Feb. 11th	Feb. 12th
Graphing Systems of Inequalities	Review Test	**Test due at midnight**	Factoring by GCF	Factoring

Introduction to Systems of Equations

A system of linear equations consists of _____ or more linear _____ that use the same _____.

The _____ to a system of equations is the _____ or _____ that make ALL of the equations true.

Remember, a point is represented by an _____, $(\#, \#)$.

Determine if the given ordered pair is a solution to the system of equations.

1) $3x + 7y = 12$ Point: $(-3, 3)$
$7x - y = -4$

2) $2x - 7 = -y$ Point: $(2, 3)$
$-5x + 13 = y$

When you are solving for a system of equations, you can have 3 different types of solutions:

► _____

► _____

► _____

Solving Systems of Equations by Graphing

Steps:

1) _____

2) _____

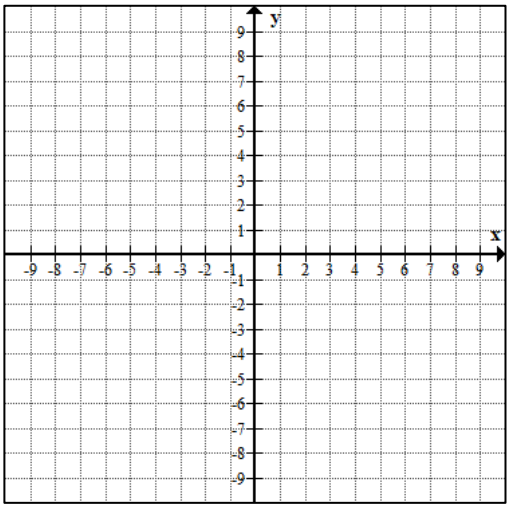
3) _____

4) _____

Examples

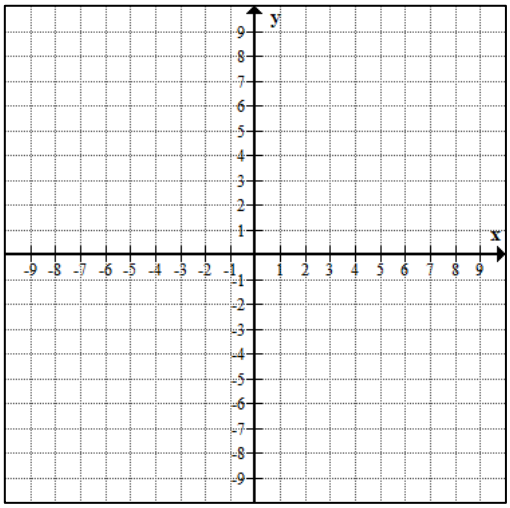
1) $2x - 2y = -8$

$2x + 2y = 4$



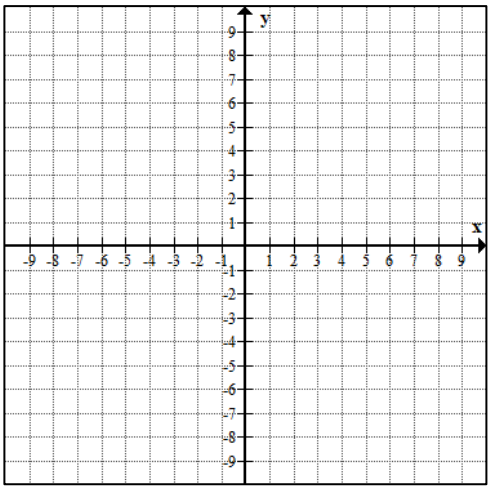
2) $y = -2x + 5$

$y = -2x + 1$



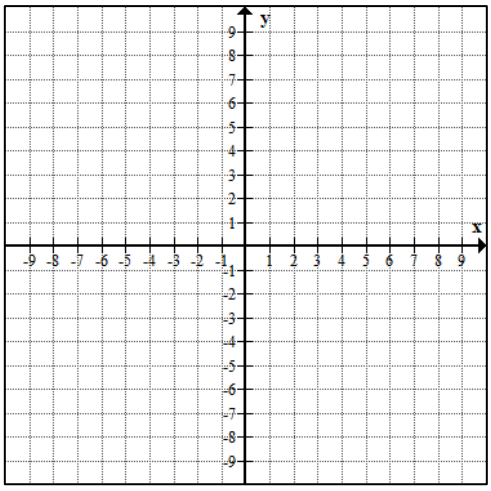
3) $x + y = -2$

$2x - 3y = -9$



4) $y = 5$

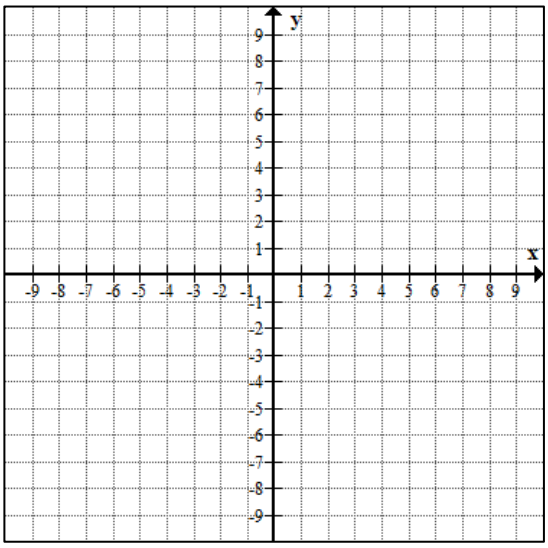
$2x + y = 1$



Graphing Systems of Equations Practice

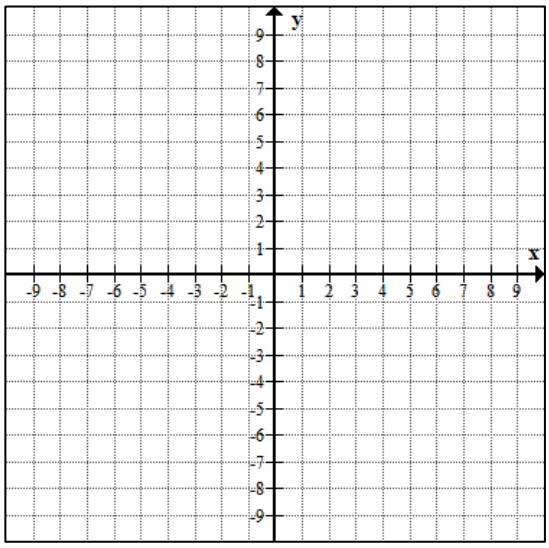
1) $y = 3x - 4$

$y = -3x + 2$



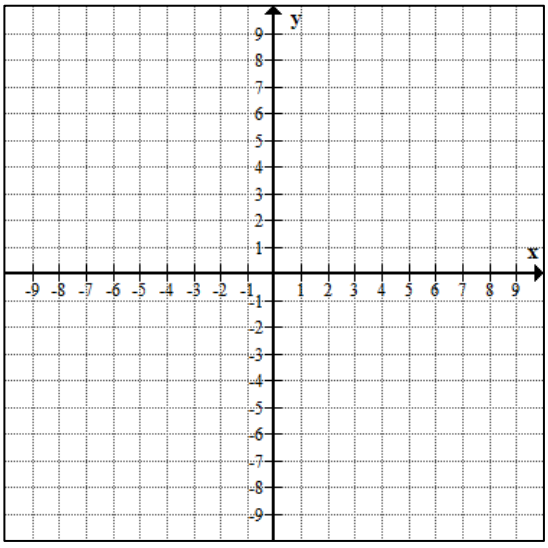
2) $y = \frac{4}{3}x + 3$

$y = -\frac{2}{3}x - 3$



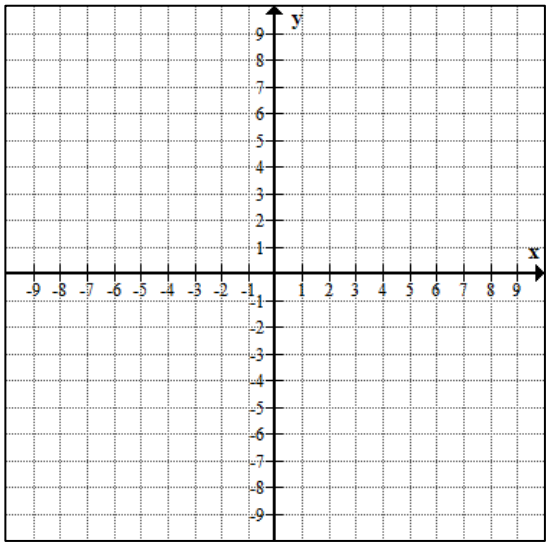
3) $y = \frac{5}{4}x - 2$

$y = \frac{5}{4}x - 1$



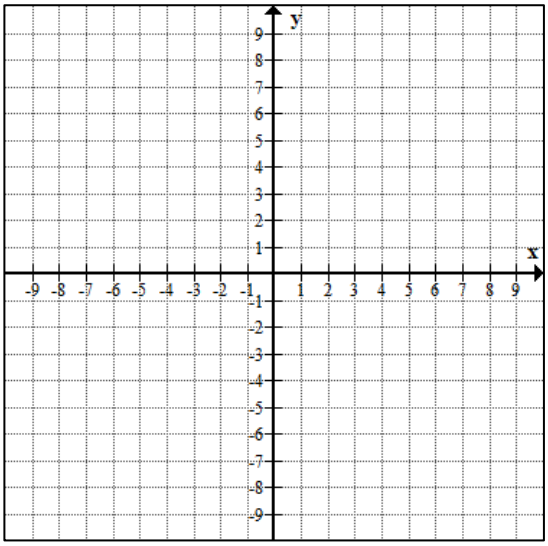
4) $y = \frac{1}{3}x + 2$

$y = -x - 2$



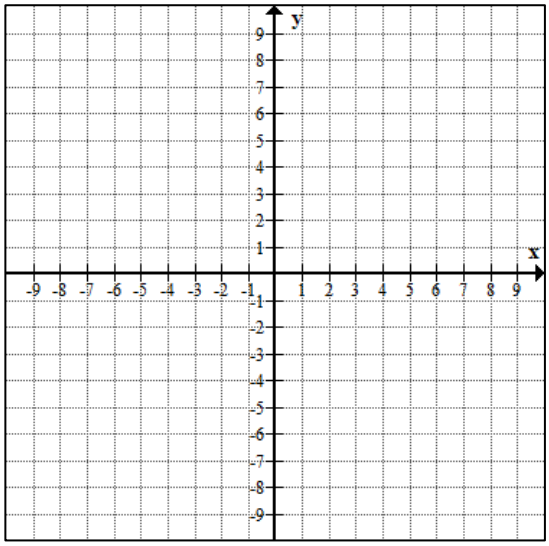
5) $y = -\frac{3}{2}x - 4$

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



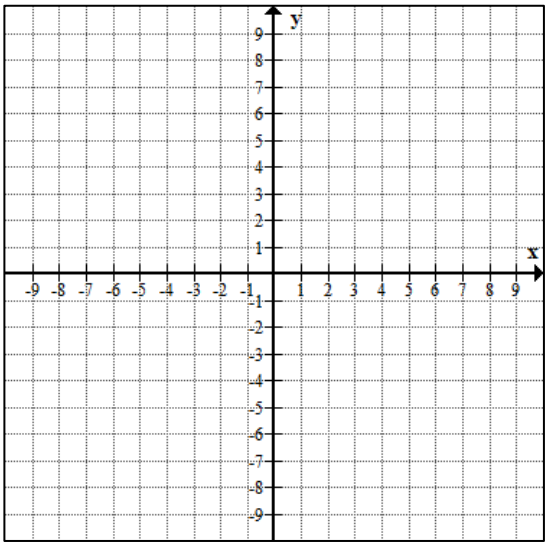
6) $y = 4x - 1$

$y = -x + 4$



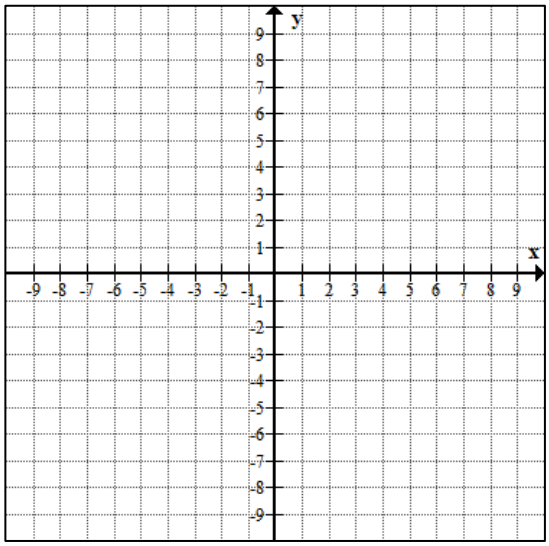
7) $y = \frac{3}{4}x + 1$

$y = -\frac{1}{2}x - 4$



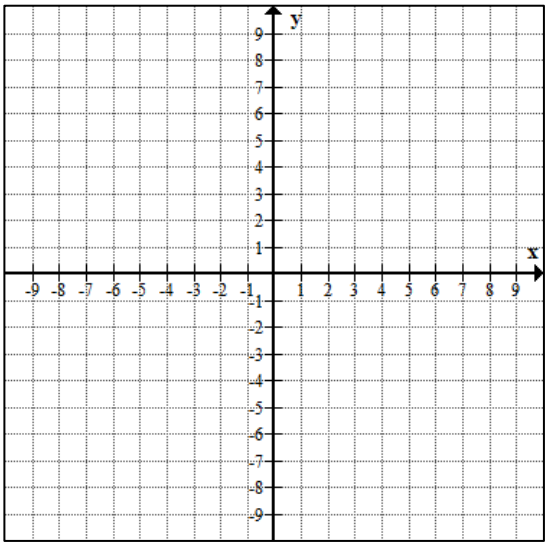
8) $2y + 3x = -6$

$2x + y = 2$



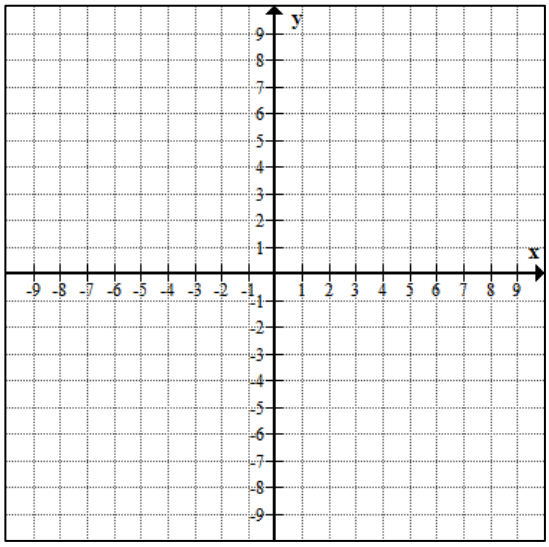
9) $-x + y = -4$

$x + y = 2$



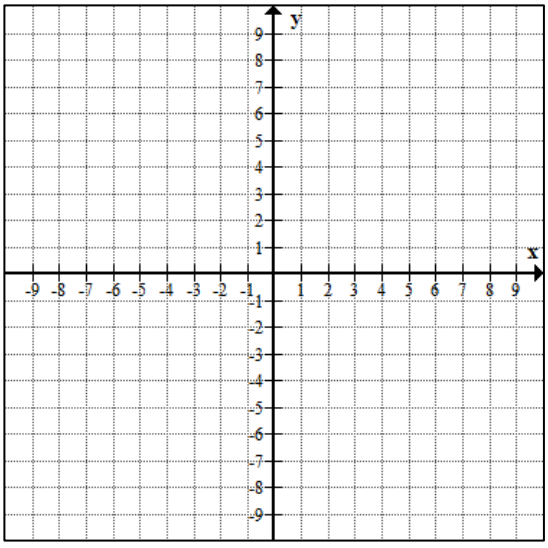
10) $y - 3x = 4$

$x + y = 4$



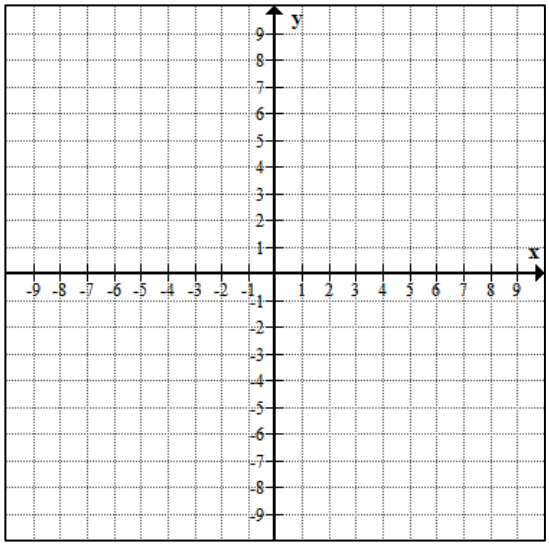
11) $y = -x + 1$

$x = -3$



12) $y = -4$

$x = 2$



What do you notice?

- ► If two lines have the SAME SLOPE (m), and the SAME Y-INTERCEPT (b), then the system has _____
- ► If two lines have the SAME SLOPE (m), but DIFFERENT Y-INTERCEPTS (b), then the system has _____
- ► If the lines have DIFFERENT SLOPES (m), then the system has _____ _____ regardless of if the y-intercepts are the same or different

What were the headlines after a mad scientist trained two eggs to attack a candy store with sharp sticks?

Directions: Solve each of the equations below by graphing. Cross out the box containing your answer. When you finish, print the remaining boxes in the spaces at the bottom of the page.

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

2) $y = -2x + 1$
$y = x - 5$

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

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

5) $x + y = 0$
$3x + y = -4$

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

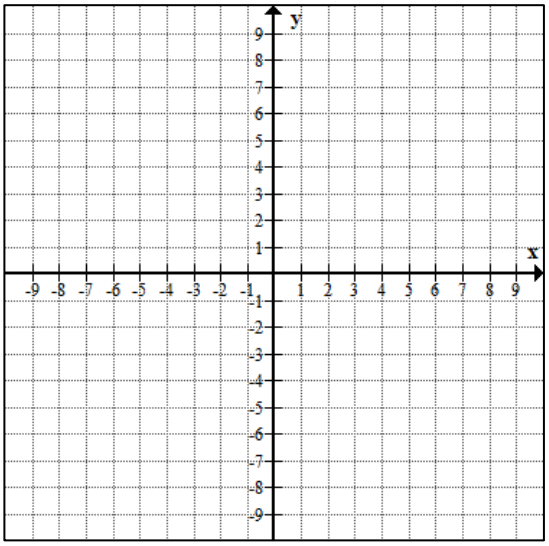
7) $x + 2y = -4$
$4y = 3x + 12$

8) $y = -2$
$2x - 5y = 20$

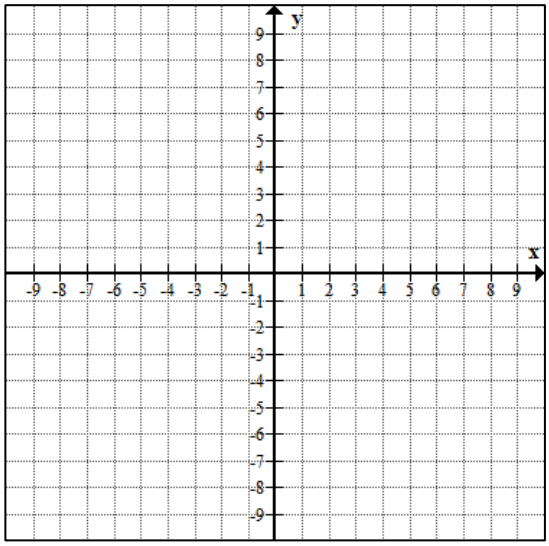
9) $4x + 3y = -15$
$y = x + 2$

T W $(-4, 0)$	E G $(-4, -5)$	O S *no solution*	G S $(4, 1)$	W E $(3, 1)$	E T $(-2, -4)$	S P $(-1, 6)$	T R $(-3, -1)$
E A $(-3, 5)$	T S $(1, 2)$	R A $(0, 3)$	T I $(2, -3)$	M I $(4, -3)$	S S $(5, -2)$	N T $(-1, 0)$	U P $(-2, 2)$

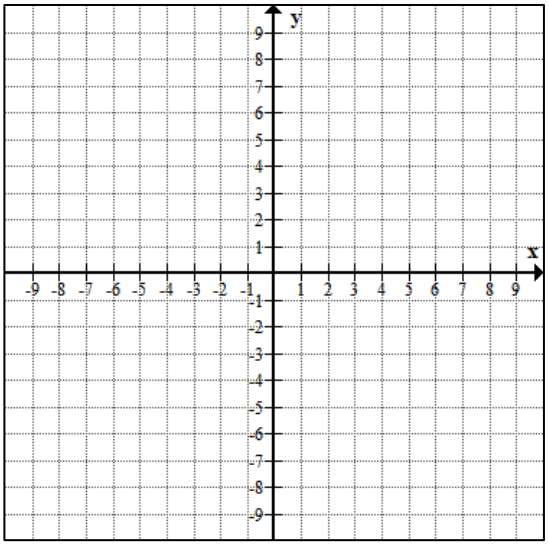
1)



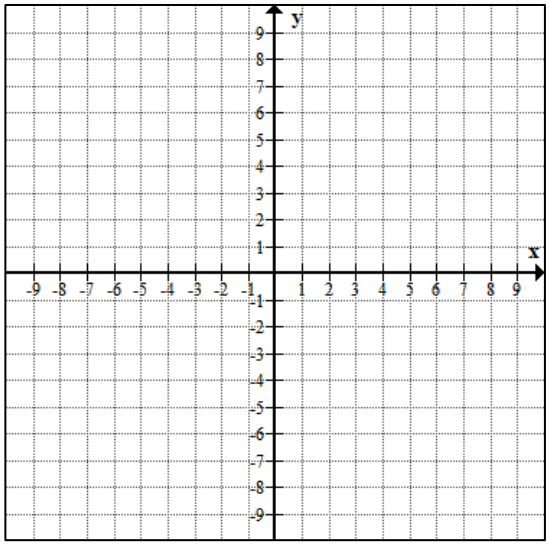
2)



3)



4)



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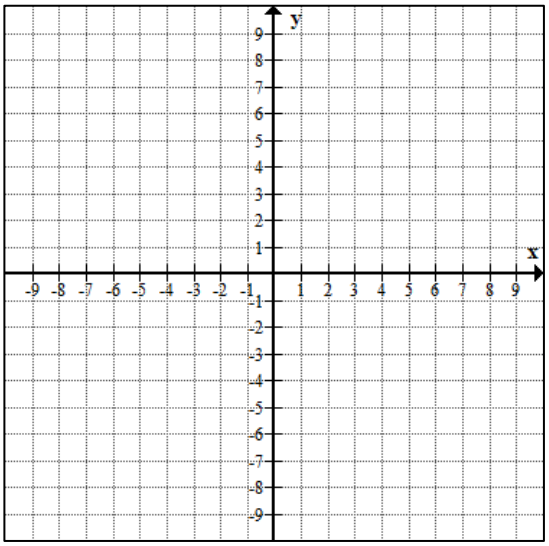

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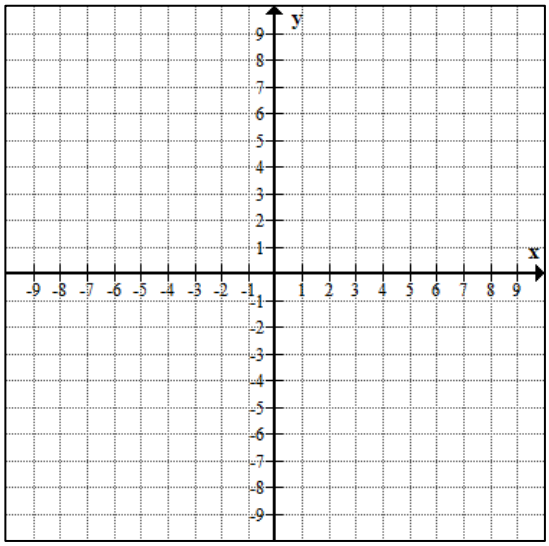

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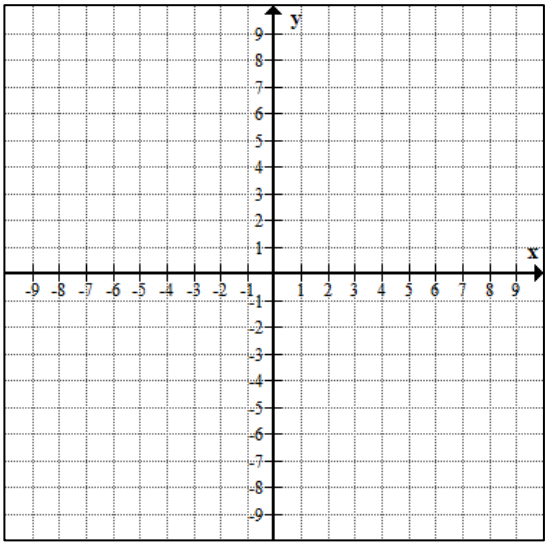
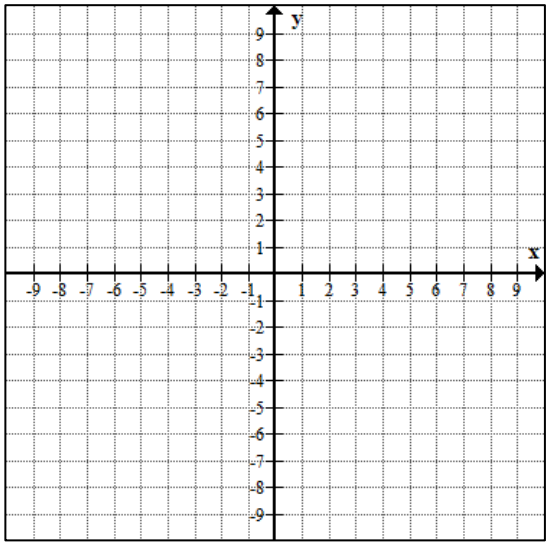
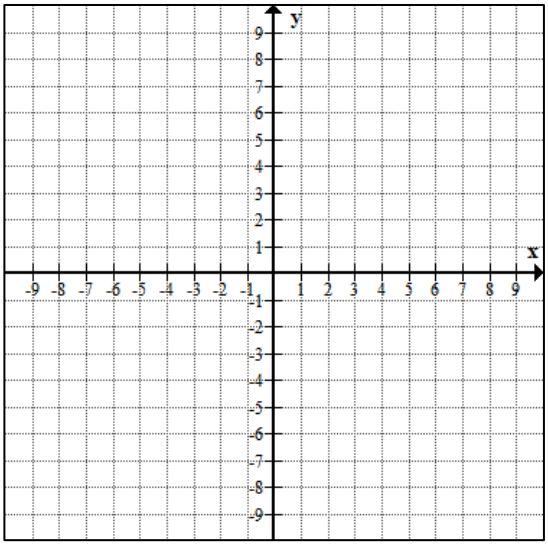

y
x
-9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9
9 8 7 6 5 4 3 2 1 -1 -2 -3 -4 -5 -6 -7 -8 -9

8)


y
x
-9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9
9 8 7 6 5 4 3 2 1 -1 -2 -3 -4 -5 -6 -7 -8 -9

9)


y
x
-9 -8 -7 -6 -5 -4 -3 -2 -1 1 2 3 4 5 6 7 8 9
9 8 7 6 5 4 3 2 1 -1 -2 -3 -4 -5 -6 -7 -8 -9

Solving Systems of Equations by Substitution

Steps

Example: $y = x + 3$
$-3x + 3y = 4$

1) Substitution is used when you have a variable by itself: identify that variable	
2) Look at the other equation and identify where you can substitute the equation from step one	
3) Substitute and solve	
4) Substitute for the variable you solved for in step 3 and solve for the remaining variable	
5) Write your solution as an ordered pair	

Steps

Example: $2x - 3y = -24$
$x + 6y = 18$

1) Substitution is used when you have a variable with a coefficient of 1: identify that variable	
2) Solve for the variable that has a coefficient of one	
3) Identify the variable that you can substitute your newly solved equation	
4) Substitute and Solve	
5) Substitute for the variable you solved for in step 3 and solve for the second variable	
6) Write your solution as an ordered pair	

Solving Systems of Equations by Substitution Practice

Solve each system by substitution.

1) $y = 6x - 11$
$-2x - 3y = -7$

2) $2x - 3y = -1$
$y = x - 1$

3) $y = -3x + 5$
$5x - 4y = -3$

4) $-3x - 3y = 3$
$y = -5x - 17$

5) $y = -2$
$4x - 3y = 18$

6) $y = 5x - 7$
$-3x - 2y = -12$

7) $-4x + y = 6$
$-5x - y = 21$

8) $-7x - 2y = -13$
$x - 2y = 11$

Why Does the President Put Vegetables in His Blender?

Directions: Solve each system of equations below by the substitution method. Find the solution in the nearest answer column and notice the two letters next to it. Print these letters in the two boxes at the bottom of the page that contain the number of that exercise.

Answers 1-6
$(4,2)$ LD
$(6,-1)$ NG
$(1,2)$ TR
$(4,8)$ HE
$(1,-3)$ HO
$(6,-3)$ NT
$(5,3)$ FO
$(9,2)$ PI
$(7,3)$ TH
$(5,2)$ IS

1) $y = 2x$
$x + y = 12$

2) $x = 3y - 1$
$x + 2y = 9$

3) $y = 2x - 5$
$4x - y = 7$

4) $2x - 3y = 12$
$x = 4y + 1$

5) $y = -x + 5$
$x - 4y = 10$

6) $x - y = 2$
$4x - 3y = 11$

7) $-2x + 3y = 14$
$x + 2y = 7$

8) $6x - y = -4$
$2x + 2y = 15$

9) $x + y = 1$
$2x - y = -2$

10) $5x - 3y = -11$
$x - 2y = 2$

11) $x - y = 3$
$6x + 4y = 13$

12) $2x - y = 16$
$-x + 2y = -8$

Answers 7-12
$\left(\frac{1}{2}, -3\right)$ IN
$\left(8, -\frac{1}{2}\right)$ VE
$\left(-\frac{1}{3}, \frac{4}{3}\right)$ RL
$(8,0)$ AS
$(-3,4)$ TE
$\left(\frac{1}{2}, 7\right)$ HI
$\left(\frac{5}{2}, \frac{4}{3}\right)$ LO
$(-1,4)$ RW
$\left(\frac{5}{2}, -\frac{1}{2}\right)$ PE
$(-4,-3)$ ED

1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	12	12

Solving Systems of Equations by Elimination

In order to _____ on of the _____, you must have the same _____ for that variable but with _____.

Example: $5x + y = 9$
$10x - 7y = -18$

Steps	
1) Align like-variables so that they are on top of each other (if necessary)	
2) Check to see if one of the variables can cancel – if so, skip to step 5	
3) Determine which variable would be easiest to cancel	
4) Multiply one (or both) of the equations by a # (or #s) so that one of the variables will cancel (so they will have the same coefficient but with opposite signs)	
5) Add the 2 equations together	
6) Solve for the variable that did NOT cancel	
7) Take the variable you solved for from step 6 and plug it into one of the original equations. Then solve for the remaining variable	
8) State solution as an ordered pair	

Examples:

1) $2x - 2y = -8$
$2x + 2y = 4$

2) $3x + 2y = 7$
$-3x + 4y = 5$

3) $-6x - 5y = -4$
$-7y + 6x = -20$

4) $4x + 10y = -4$
$-10y + 25x = 120$

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

6) $-4x + 9y = 9$
$-3y + x = -6$

Solving Systems of Equations by Elimination Practice

Solve each system by elimination.

1) $8x - 4y = -20$
$8x + 4y = 4$

2) $10x - 2y = 2$
$-10x + 7y = 18$

3) $-6x - y = -21$
$6x + 2y = 24$

4) $3x + 2y = 5$
$3x + 9y = -9$

5) $-6x + 8y = -30$
$5x + 8y = -19$

6) $3x - 7y = -4$
$x - 7y = -6$

7) $5x + 2y = 30$
$-15x + 6y = 30$

8) $-10x - 2y = 21$
$20x + 4y = -28$

9) $6x - 8y = -22$
$-2x - 16y = 26$

10) $7x - 6y = -18$
$9x - 5y = 4$

11) $-5x + 6y = -23$
$-4x + 7y = -14$

12) $-4x + 20y = 8$
$-10x + 50y = 20$

Solving Systems of Equations – Matching

Solve the following using any method. Once you solve each system, record the letter that corresponds to the answer in the blank provided. Each answer will only be used once. There are blank graphs provided if you wish to graph.

Answers:

A: $(24, 3)$ B: $(8, 4)$ C: $(12, 17)$ D: No Solution E: $(2, 1)$ F: $(3, 5)$

G: $(8, 2)$ H: $(-6, -1)$ I: $(4, 1)$ J: Infinitely Many Solutions

1) $x - 2y = 0$ Answer: _____
$2x - 5y = -4$

2) $y = 8 - x$ Answer: _____
$4x - 3y = -3$

3) $y = x + 5$ Answer: _____
$y = 2x - 7$

4) $x + y = 3$ Answer: _____
$2x + 2y = 6$

5) $x + 3y = 14$ Answer: _____
$-5x + 6y = -28$

6) $-2x + 6y = 6$ Answer: _____
$y = 2x + 11$

7) $x = 8y$ Answer: _____
$x - 4y = 12$

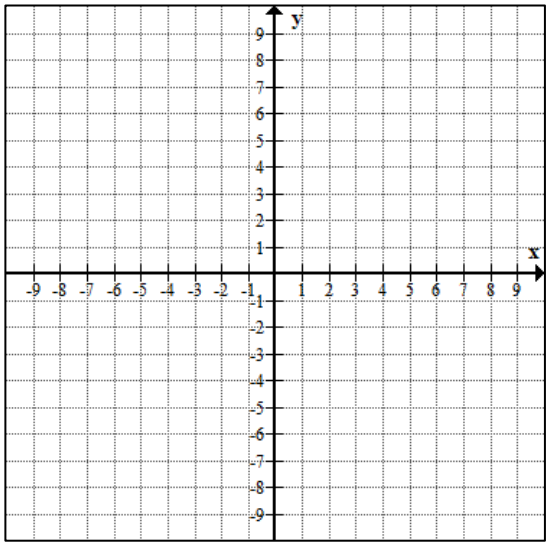
8) $4x - y = 7$ Answer: _____
$5x - 8y = 2$

9) $y = 2x - 3$ Answer: _____
$-2x + y = 6$

10) $-3x - y = -13$ Answer: _____
$x + 2y = 6$

If you decide to use a graph, please number them.

#_____



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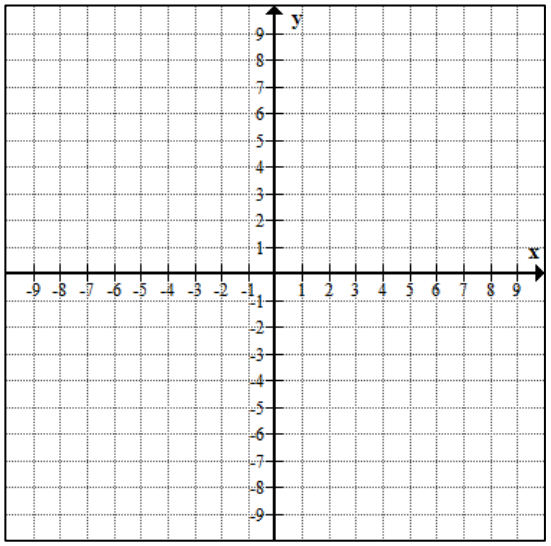

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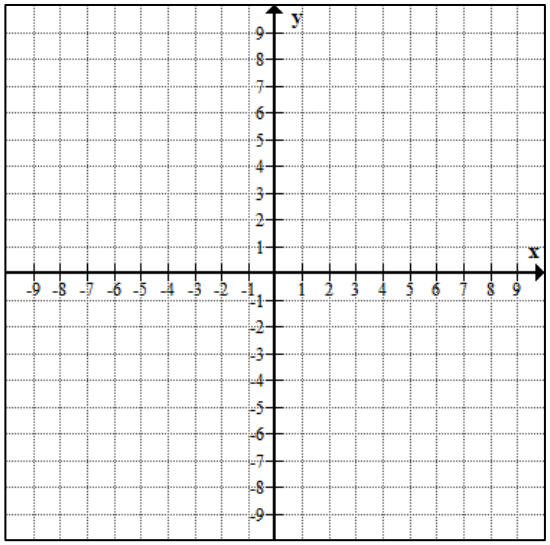

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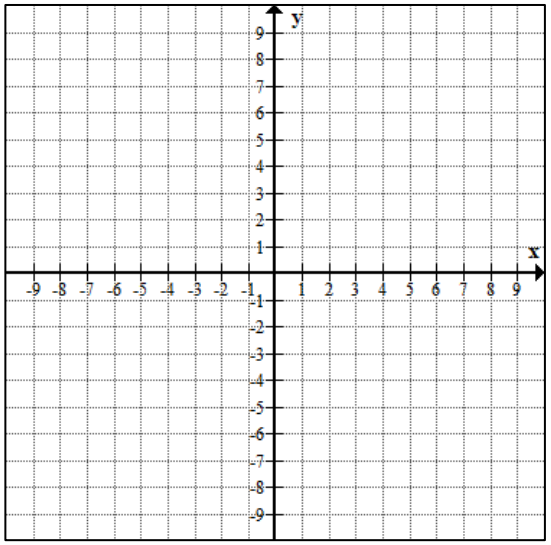

Extra Room for Scratch Work:

Writing Systems of Equations

Step 1: Define the variables.

Step 2: Write 2 equations from the phrases.

Step 3: Use substitution, elimination, or graphing to solve for variables.

Step 4: Answer question using proper units.

Slope Intercept Form: Scenarios that lend themselves to fit the y = mx + b format.

Example: You pay $2 to ride in a taxi and $.20 per mile.

Total Items Form: Scenarios that deal with buying two or more types of items.

Example: You are buying cokes and sprites for 10 people.

Total Price Form: Scenarios that deal with buying two or more types of items and paying a total price.

Example: You are buying hot dogs for $2 each and hamburgers for $3 each. You spend $13 total.

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1) The difference of two numbers is 7. The sum of the two numbers is 29. Find the two numbers.

2) You have 25 coins in your pocket, all nickels and dimes. Total, the coins add up to $2.10. How many of each do you have?

3) You went to Pizza Hut. The first time, you bought 3 breadsticks and 2 pizzas; it cost you $26. The second time, you bought 1 breadstick and 5 pizzas; it cost you $39. How much does a single breadstick cost? How much does a single pizza cost?

4) You are selling tickets for a high school play. Student tickets cost $4 and general admission tickets cost $6. You sell 31 tickets and collect $170. How many of each type did you sell?

5) Two planes are currently landing at Hartsfield. One plane is descending at 300 feet per minute from 9000 feet. The other is descending at 200 feet per minute from 6000 feet. When will they be at the same height and at what time will that be?

Systems of Linear Equations – Word Problems – Practice #1

1) You worked 18 hours last week and earned a total of $124 before taxes. Your job as a lifeguard pays $8 per hour, and your job as a cashier pays $6 per hour. How many hours did you work at each job?

x : _____ y: _____

2) A math test is to have 20 questions. The test format uses multiple choice worth 5 points each and problem solving word 6 points each. The test has a total of 100 points. How many of each type of questions are used?

x : _____ y: _____

3) Resort A charges $70 per night, plus a one-time surcharge of $5. Resort B charges $65 per night, plus a one-time surcharge of $20. After how many nights will the total cost be the same?

x : _____ y: _____

4) A vendor sold 200 tickets for an upcoming concert. Floor seats were $36 and stadium seats were $28. The vendor sold $6,080 in tickets. How many $36 and $28 tickets did the vendor sell?

x : _____ y: _____

5) A hair salon receives a shipment of 84 bottles of hair conditioner to use and sell to customers. The two types of conditioners received are Type A, which is used for regular hair, and Type B, which is used for dry hair. Type A costs $6.50 per bottle and Type B costs $8.25 per bottle. If the hair salon's invoice for the conditioner is $588, how much of each type are in the shipment?

x : _____ y: _____

6) Your school sells short sleeve T-shirts that cost the school $5 each and are sold for $8 each. Long sleeve T-shirts cost the school $7 each and are sold for $13 each. The school spends a total of $2,450 on T-shirts and sells all of them for $4,325. How many of each type of T-shirt are sold?

x : _____ y: _____

Systems of Linear Equations – Word Problems – Practice #2

1) You sell tickets for admission to your school play and collect a total of $104. Admission prices are $6 for adults and $4 for children. You sold 21 tickets. How many adult tickets and how many children tickets did you sell?

2) Your family goes to a restaurant for dinner. There are 6 people in your family. Some order the chicken dinner for $14.80 and some order the steak dinner for $17. If the total bill was $91, how many people ordered each type of dinner?

3) You bought the meat for Saturday's cookout. A package of hotdogs cost $1.60 and a package of hamburger costs $5. You bought a total of 8 packages of meat and you spent $23. How many packages of hamburger meat did you buy?

4) Casey orders 3 pizzas and 2 orders of breadsticks for a total of $29.50. Rachel orders 2 pizzas and 3 orders of breadsticks for a total of $23. How much does a pizza cost?

5) Rent-A-Car rents compact cars for a fixed amount per day plus a fixed amount for each mile driven. Benito rented a car for 6 days, drove it 550 miles, and spent $337. Lisa rented the same car for 3 days, drove it 350 miles and spent $185. What is the charge per day and the charge per mile for the compact car?

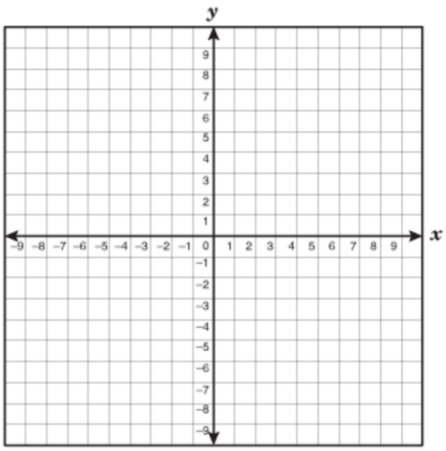
6) Beach Hotel in Cancun is offering two weekend specials. One includes a 2-night stay with 3 meals and costs $195. The other includes a 3-night stay with 5 meals and costs $300. What is the cost of a single meal?

Graphing Linear Inequalities

Graph each linear inequality. Then determine which of the given ordered pairs is a solution. Check all that apply. ★ Remember, solutions lie in the shaded region (on a solid line touching the shaded region is okay, on a dashed line touching the shaded region is not okay) ★

	solid line	dashed line
shade above	$\geq$	$>$
shade below	$\leq$	$<$

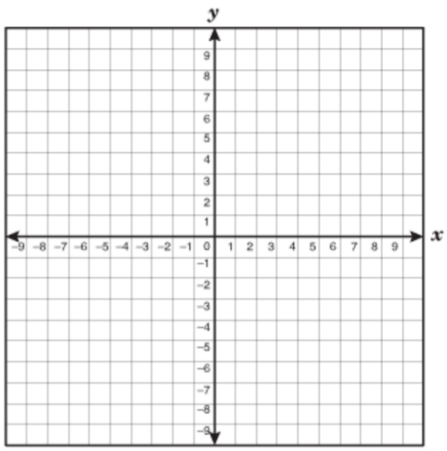
1) $y < -\frac{1}{2}x - 2$



Solutions:

- ☐ $(-9, 2)$
- ☐ $(-5, 0)$
- ☐ $(0, -2)$
- ☐ $(3, -2)$

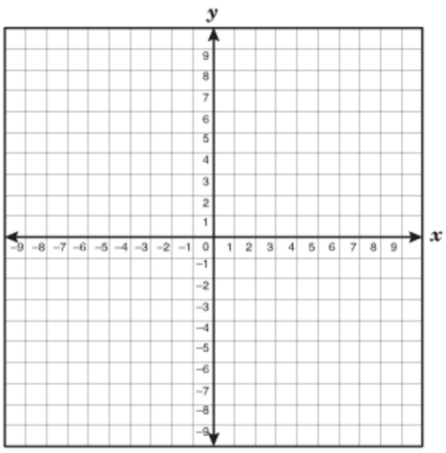
2) $y \geq 2x - 5$



Solutions:

- ☐ $(-2, -9)$
- ☐ $(0, -4)$
- ☐ $(3, -2)$
- ☐ $(5, -10)$

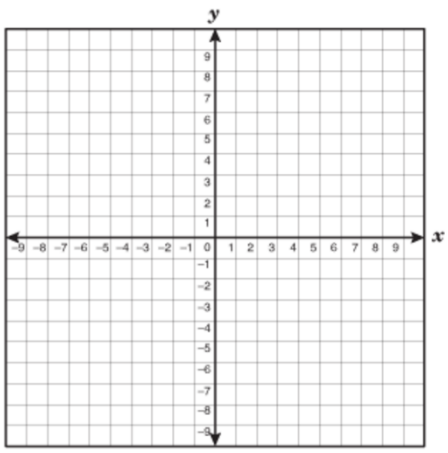
3) $2x + 3y \leq 9$



Solutions:

- ☐ $(-7, 0)$
- ☐ $(0, 7)$
- ☐ $(7, 0)$
- ☐ $(0, -7)$

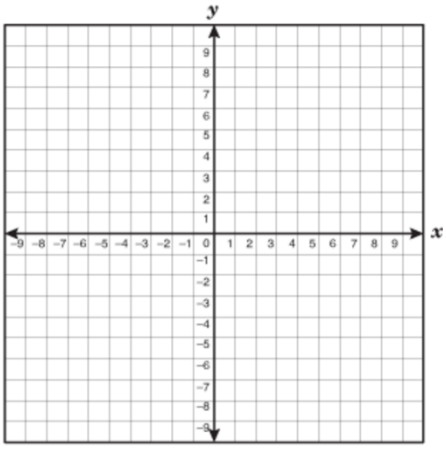
4) $x - y > 4$



Solutions:

- ☐ $(-4, 0)$
- ☐ $(0, 4)$
- ☐ $(0, -4)$
- ☐ $(4, 0)$

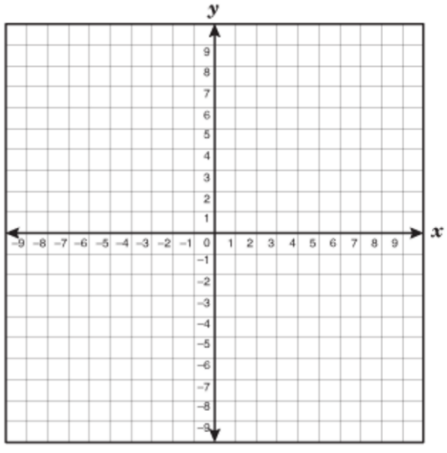
5) $4x - 2y < -6$



Solutions:

- ☐ $(5, 1)$
- ☐ $(1, 5)$
- ☐ $(-5, -1)$
- ☐ $(-1, 5)$

6) $9x - 6y > -24$



Solutions:

- ☐ $(-2, 3)$
- ☐ $(-3, -2)$
- ☐ $(0, 0)$
- ☐ $(2, 5)$

Graphing Systems of Linear Inequalities

Steps:

1) Graph and shade the first inequality
2) Graph and shade the second inequality
3) Find solutions

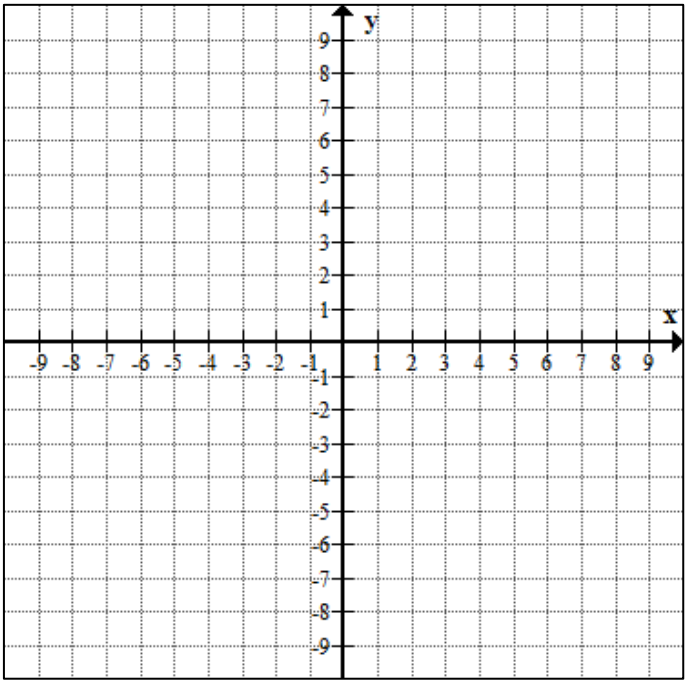
	solid line	dashed line
shade above	$\geq$	$>$
shade below	$\leq$	$<$

★ Remember, solutions lie in the double shaded region (on a solid line touching the double shaded region is okay, on a dashed line touching the double shaded region is not okay) ★

Example 1: Graph the following system of inequalities.

$y > 2x - 2$

$y \leq -\frac{1}{4}x + 3$



For the list of ordered pairs below, check off each ordered pair that is a solution to the system of equations.

□ $(0,0)$ □ $(0,2)$ □ $(0,-2)$

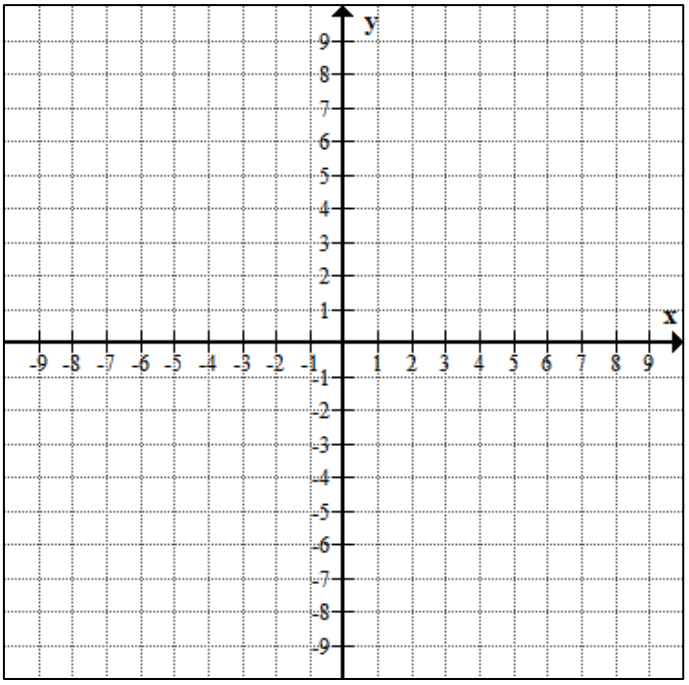
□ $(8,3)$ □ $(4,-2)$ □ $(-,2-4)$

□ $(-4,4)$ □ $(4,2)$ □ $(1,6)$

Example 2: Graph the following system of inequalities.

$y < 3x - 4$

$y \leq 3x + 2$



For the list of ordered pairs below, check off each ordered pair that is a solution to the system of equations.

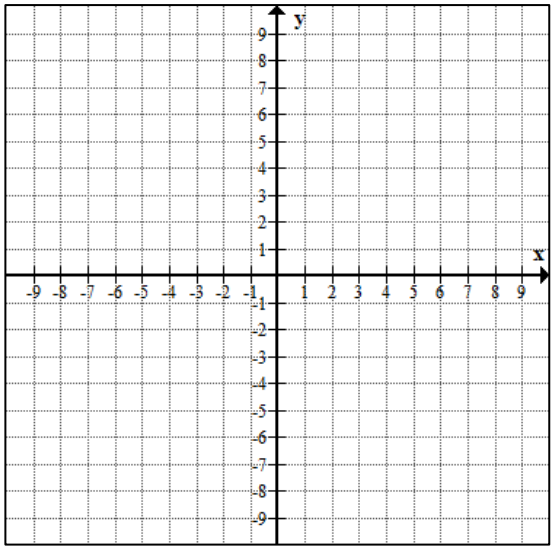
□ $(0,2)$ □ $(0,-4)$ □ $(4,-2)$

□ $(-1,-2)$ □ $(-2,1)$ □ $(-,2-4)$

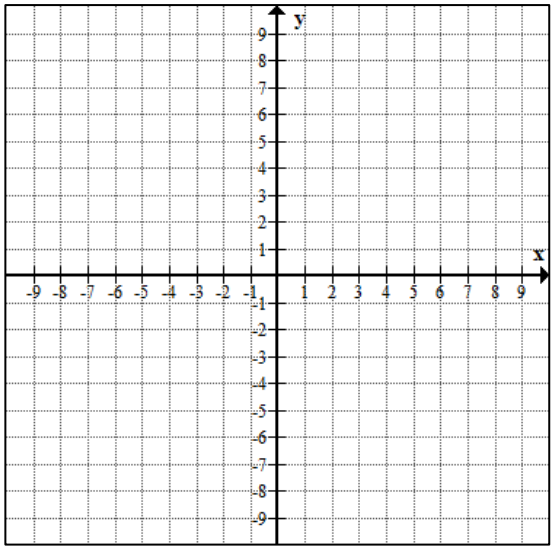
□ $(2,1)$ □ $(8,0)$ □ $(0,8)$

Graph each system of inequalities.

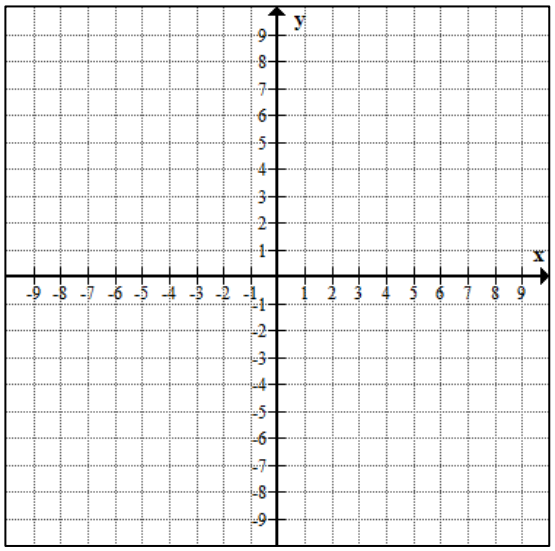
1) $x + y > 5$
$2x - 4y > 4$



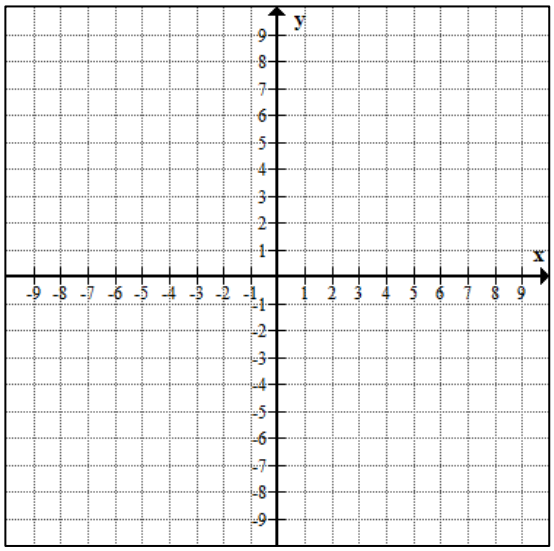
2) $y \geq x + 2$
$x \leq -2$



3) $y \leq 2x + 1$
$y > -2x + 5$



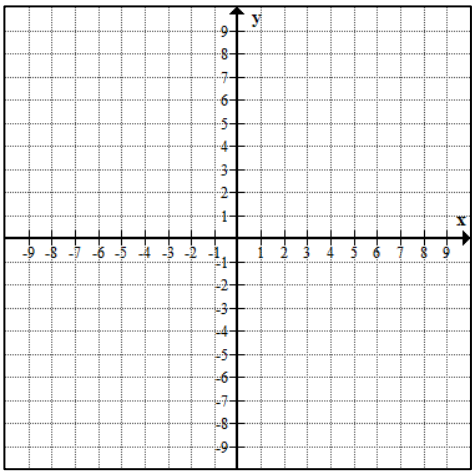
4) $y > 2x + 1$
$y \leq -2x + 5$



Graphing Systems of Inequalities Practice

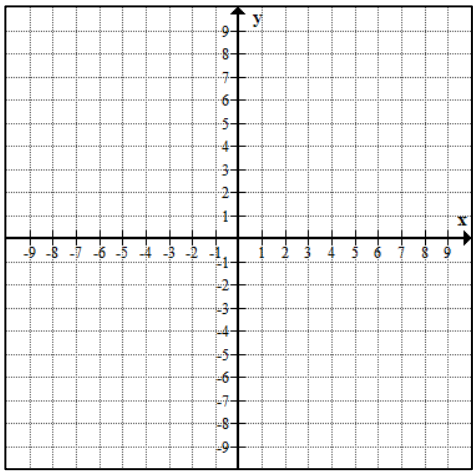
1) $y > 4x - 3$

$y \geq -2x + 3$



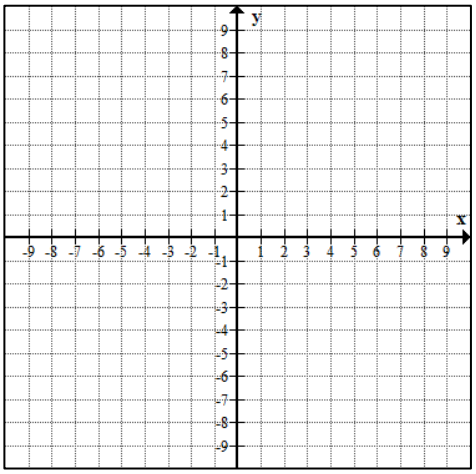
2) $y \geq -5x + 3$

$y > -2$



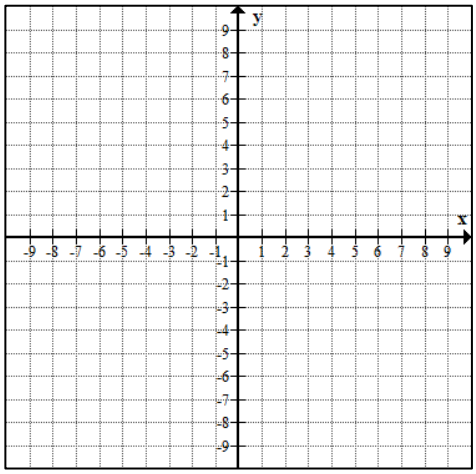
3) $y < 3$

$y \leq -x + 1$



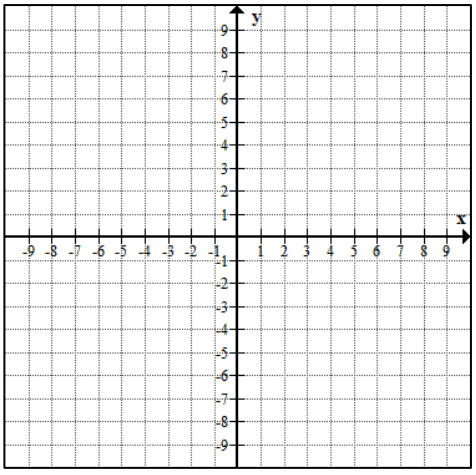
4) $y \geq x - 3$

$y \geq -x - 1$



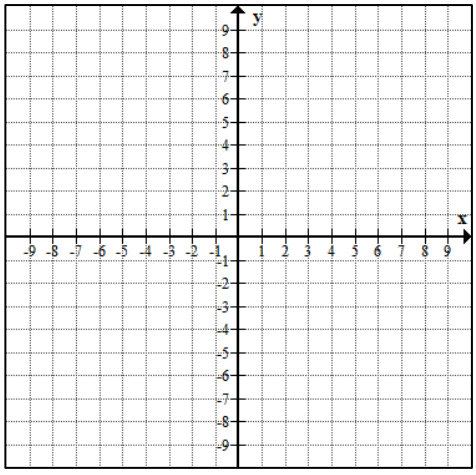
5) $x \leq -3$

$5x + 3y \geq -9$



6) $4x - 3y < 9$

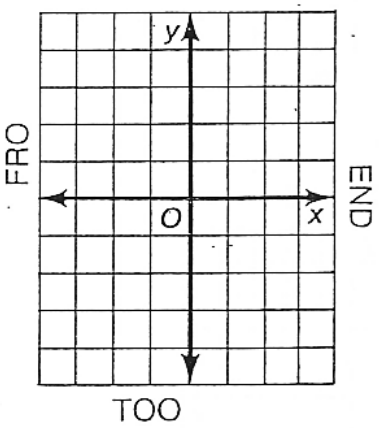
$x + 3y > 6$



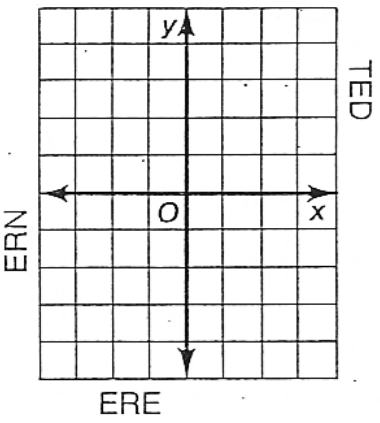
What did the Toothless Old Termite Say When He Entered a Tavern?

Graph each pair of inequalities below and indicate the solution set of the system with shading. The shading, if extended, would cover a set of three letters. Print these letters in the three boxes at the bottom of the page that contain the exercise number.

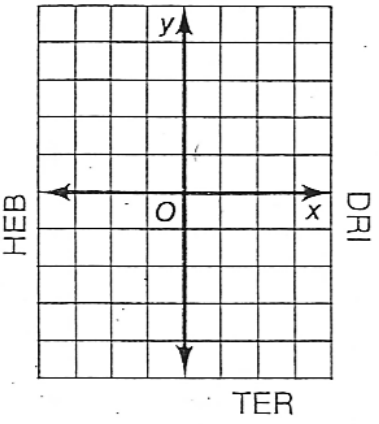
① $y \leq x - 1$
$y \geq -3$



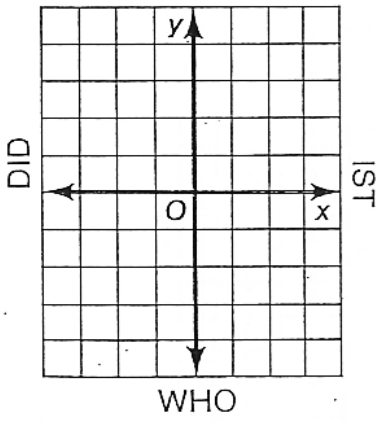
② $x \leq 2$
$y \leq \frac{2}{3}x - 1$



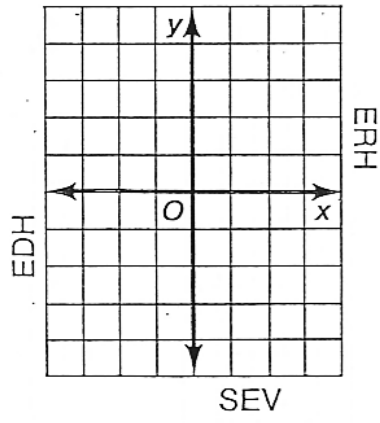
③ $y < -x + 1$
$y > \frac{1}{2}x - 2$



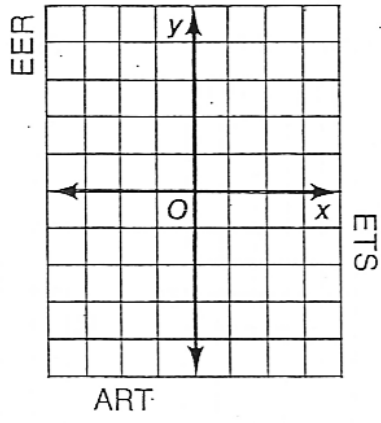
④ $y < x$
$3x + 2y > 4$



⑤ $x - 3y \leq 12$
$x > 2$



⑥ $y \leq 1$
$2x + y < 1$



4	4	4	3	3	3	6	6	6	1	1	1	5	5	5	2	2	2