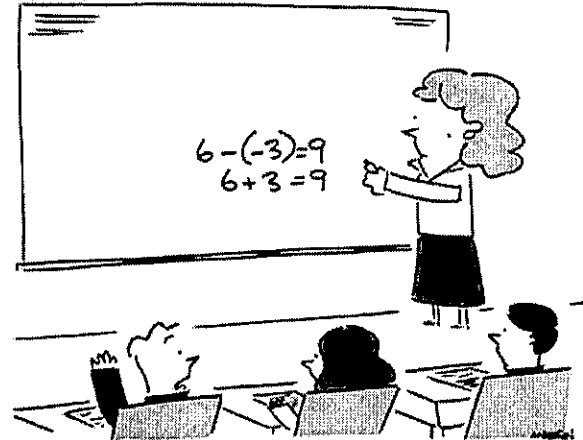


# ALGEBRA: UNIT 5—SYSTEMS OF EQUATIONS

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NAME: KEY



"So in English a double negative is bad, but in math it's a *positive*?"

## HOMEWORK CHECKLIST:

- \_\_\_\_\_ 6.1 Graphing Systems of Linear Equations by Hand
- \_\_\_\_\_ 6.2 Substitution (Kuta Software sheet)
- \_\_\_\_\_ 6.2 Substitution Review (Hidden Message)
- \_\_\_\_\_ 6.2 Tic Tac Toe Substitution
- \_\_\_\_\_ 6.3 Elimination Method (Kuta Software sheet)
- \_\_\_\_\_ 6.1-6.3 Practice (De-Coding Systems)
- \_\_\_\_\_ 6.1-6.3 Practice with Inconsistent and Consistent Systems
- \_\_\_\_\_ 6.4 Story Problems w/ Systems (Kuta Software sheet)
- \_\_\_\_\_ 6.4 Story Problems w/ Systems II
- \_\_\_\_\_ 6.1-6.4 Review
- \_\_\_\_\_ 6.5 Systems of Inequalities (Kuta Software Sheet)
- \_\_\_\_\_ 6.5 Story Problems w/ Systems of Inequalities
- \_\_\_\_\_ Mixed Review of Systems



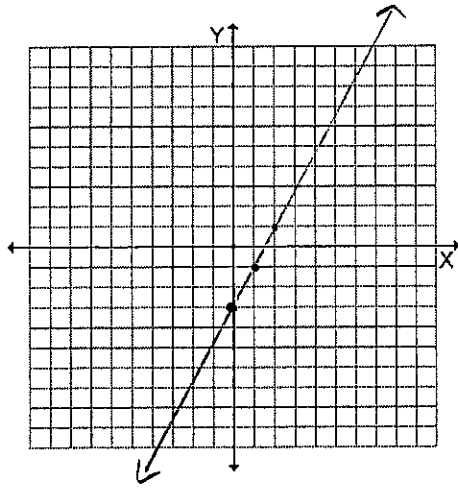
**Solving Systems by Graphing: 6-1 Homework**



**Find the solutions to the system by graphing.**

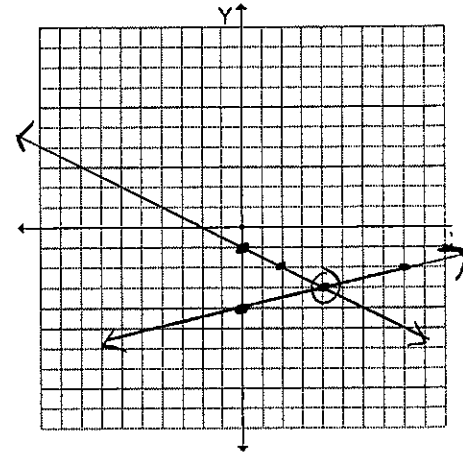
1. 
$$\begin{cases} y = 2x - 3 \\ 4x = 2y + 6 \end{cases}$$

*all  $\mathbb{R}$*



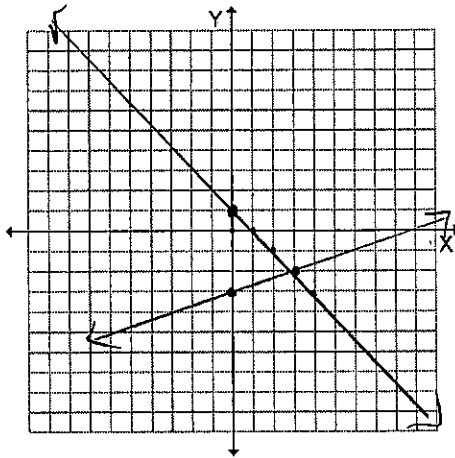
3. 
$$\begin{cases} y = -\frac{1}{2}x - 1 \\ y = \frac{1}{4}x - 4 \end{cases}$$

*(4, -3)*



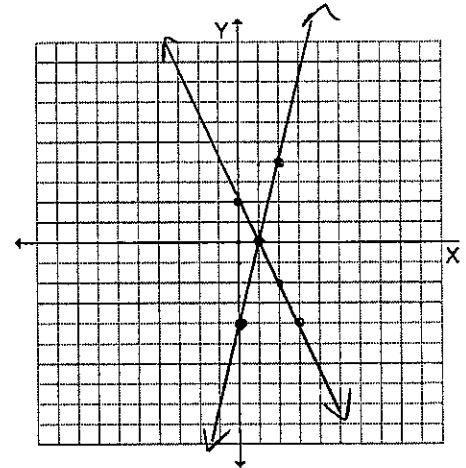
2. 
$$\begin{cases} y = \frac{1}{3}x - 3 \\ y = -x + 1 \end{cases}$$

*(3, -2)*



4. 
$$\begin{cases} y = -2x + 2 \\ 4x - y = 4 \end{cases}$$

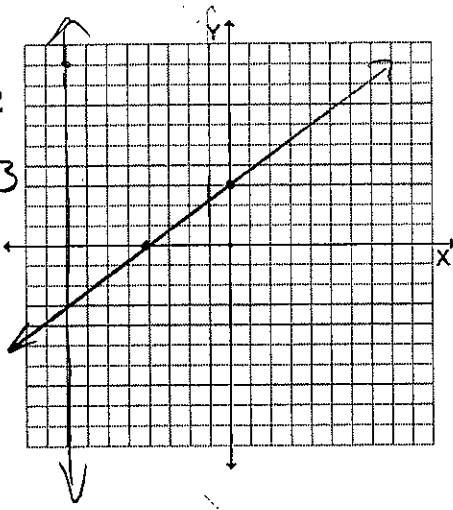
*(1, 0)*



$$5. \begin{cases} x = -8 \\ 3x - 4y = -12 \end{cases}$$

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

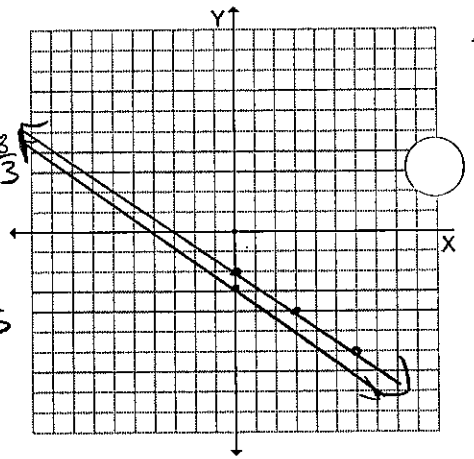
$(-8, -3)$



$$8. \begin{cases} y = -\frac{2}{3}x - 2 \\ 2x + 3y = -8 \end{cases}$$

$$y = -\frac{2}{3}x - \frac{8}{3}$$

No Solutions

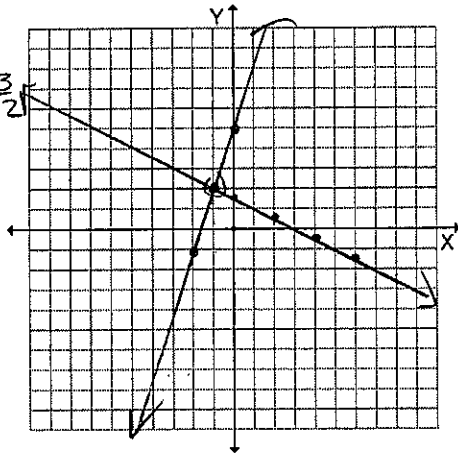


$$6. \begin{cases} x + 2y = 3 \\ 3x - y = -5 \end{cases}$$

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

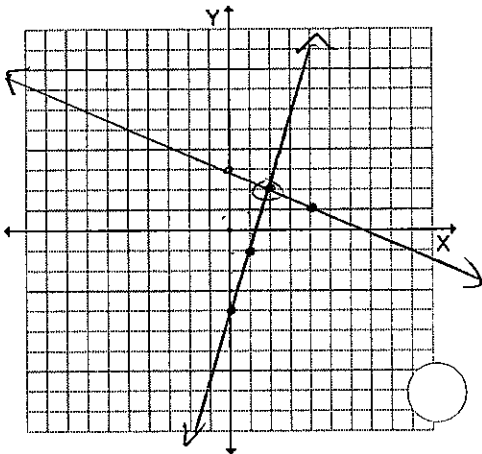
$$y = 3x + 5$$

$(-1, 2)$



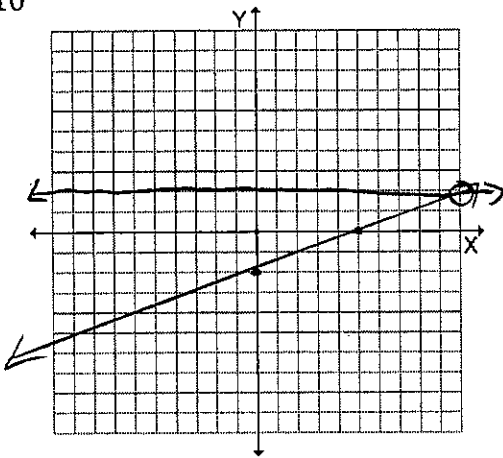
$$9. \begin{cases} y = 3x - 4 \\ y = -\frac{1}{2}x + 3 \end{cases}$$

$(2, 2)$



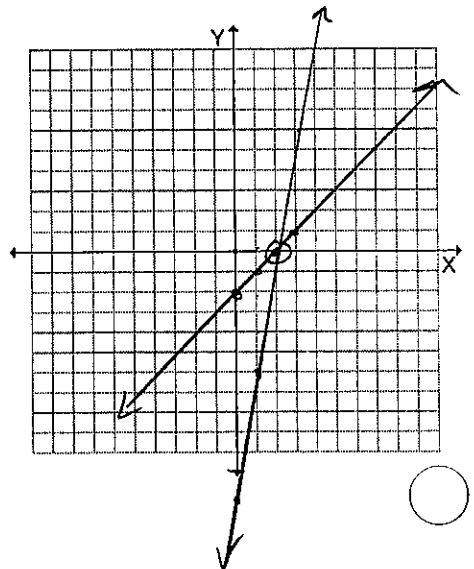
$$7. \begin{cases} 2x - 5y = 10 \\ y = 2 \end{cases}$$

$(10, 2)$



$$10. \begin{cases} 6x - y = 12 \\ y = x - 2 \end{cases}$$

$(2, 0)$



## Solving Systems of Equations by Substitution

Solve each system by substitution.

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

$(2, 1)$

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

$(4, 3)$

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

$(1, 2)$

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

$(-4, 3)$

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

$(3, -2)$

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

$(2, 3)$

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

$(-3, -6)$

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

$(3, -4)$

9)  $-5x + y = -2$   
 $-3x + 6y = -12$

$(0, -2)$

10)  $-5x + y = -3$   
 $3x - 8y = 24$

$(0, -3)$

$$\begin{aligned} 11) \quad & x + 3y = 1 \\ & -3x - 3y = -15 \end{aligned}$$

$$(7, -2)$$

$$\begin{aligned} 12) \quad & -3x - 8y = 20 \\ & -5x + y = 19 \end{aligned}$$

$$(-4, -1)$$

$$\begin{aligned} 13) \quad & -3x + 3y = 4 \\ & -x + y = 3 \end{aligned}$$

No solution

$$\begin{aligned} 14) \quad & -3x + 3y = 3 \\ & -5x + y = 13 \end{aligned}$$

$$(-3, -2)$$

$$\begin{aligned} 15) \quad & 6x + 6y = -6 \\ & 5x + y = -13 \end{aligned}$$

$$(-3, 2)$$

$$\begin{aligned} 16) \quad & 2x + y = 20 \\ & 6x - 5y = 12 \end{aligned}$$

$$(7, 6)$$

$$\begin{aligned} 17) \quad & -3x - 4y = 2 \\ & 3x + 3y = -3 \end{aligned}$$

$$(-2, 1)$$

$$\begin{aligned} 18) \quad & -2x + 6y = 6 \\ & -7x + 8y = -5 \end{aligned}$$

$$(3, 2)$$

$$\begin{aligned} 19) \quad & -5x - 8y = 17 \\ & 2x - 7y = -17 \end{aligned}$$

$$(-5, 1)$$

$$\begin{aligned} 20) \quad & -2x - y = -9 \\ & 5x - 2y = 18 \end{aligned}$$

$$(4, 1)$$

## ALGEBRA : SUBSTITUTION REVIEW

NAME: \_\_\_\_\_

HOUR: \_\_\_\_\_

SOLVE EACH SYSTEM, AND PUT THE CORRESPONDING LETTER above THE ANSWER ON THE PUZZLE ON THE BACK.

$$1. (E) \begin{cases} y = 4x - 9 \\ y = \frac{1}{3}x + 2 \end{cases}$$

$$x = 3 \quad y = 3$$

$$2. (N) \begin{cases} 5y = 25x - 50 \\ x = -\frac{1}{5}y - 6 \end{cases}$$

$$x = \del{-3}^{-2} \quad y = -20$$

$$3. (R) \begin{cases} x = 14y - 8 \\ \frac{1}{2}x - 3y = -12 \end{cases}$$

$$x = -36 \quad y = -2$$

$$4. (I) \begin{cases} 3x - y = 18 \\ 9x - 6y = 18 \end{cases}$$

$$x = 10 \quad y = 12$$

$$5. (S) \begin{cases} 2x + 3y = 14 \\ x + 26 = 4y \end{cases}$$

$$x = -2 \quad y = 6$$

$$6. (O) \begin{cases} \frac{1}{14}x + y = .5 \\ 3x - 9y = 21 \end{cases}$$

$$x = 7 \quad y = 0$$

$$7. (C) \begin{cases} x + y = \frac{1}{12} \\ 3x - 8y = -8 \end{cases}$$

$$x = -.6 \quad y = .75$$

$$8. (T) \begin{cases} 2x + y = -9 \\ y = \frac{1}{3}x - 2 \end{cases}$$

$$x = -3 \quad y = -3$$

$$9.(F) \begin{cases} x = -\frac{1}{6}y - 1 \\ 4x - y = -24 \end{cases}$$

$$x = -3, y = 12$$

$$10(I) \begin{cases} \frac{1}{2}x + \frac{1}{3}y = -6 \\ y = -2x \end{cases}$$

$$x = 36, y = -72$$

$$11(E) \begin{cases} y = 3x + 11 \\ y - \frac{1}{2}x = 6 \end{cases}$$

$$x = -2, y = 5$$

$$12(T) \begin{cases} x + 2y = -2 \\ \frac{1}{5}x + \frac{1}{3}y = 4 \end{cases}$$

$$x = 130, y = -66$$

$$13(P) \begin{cases} \frac{1}{3}x + y = 6 \\ x - \frac{1}{3}y = 8 \end{cases}$$

$$x = 9, y = 3$$

$$14(C) \begin{cases} 5x + 2y = 14 \\ 3x - y = -7 \end{cases}$$

$$x = 0, y = 7$$

$$15(I) \begin{cases} x = -2y + 2 \\ 12y - 9x = 7 \end{cases}$$

$$x = \frac{1}{3}, y = \frac{5}{6}$$

What is an important trait in mathematicians? to be...

P E R F E C T I O N I S T I C  
 (9,3) (-2,5) (-36,-2) (-3,12) (3,3) (-2/3,3/4) (130,-66) (10,12) (7,0) (-2,-20) (36,-72) (-2,6) (-3,-3) (1/3,5/6) (0,7)



**Tic Tac Toe Substitution!!!****Directions:**

1. Rock paper scissors (best of 3) to decide who gets to go first and is player "X".
2. The first player will select a square they want to place their X. In order to put an X in that square, the player must correctly find the solution to the system of equations using substitution. ALL WORK MUST BE SHOWN on the separate piece of paper.
3. In order to be correct, the "O" player will check the solution by plugging in the x and y values into the system of equations.
4. Then switch roles. Player "O" will select a square and solve for the solution and player "X" will check the answer.

|  |   |   |
|--|---|---|
| 1<br>$\begin{cases} y = x + 5 \\ 3x + y = 17 \end{cases}$<br>$x = 3 \quad y = 8$         | 2<br>$\begin{cases} m = 10n - 2 \\ m - 2n = 2 \end{cases}$<br>$M = 3 \quad N = \frac{1}{2}$ | 3<br>$\begin{cases} y = x + 3 \\ y = -2x + 21 \end{cases}$<br>$Y = 9 \quad X = 6$           |
| 4<br>$\begin{cases} x = \frac{1}{2}y \\ 4x + y = 30 \end{cases}$<br>$x = 5 \quad y = 10$ | 5<br>$\begin{cases} x - y = 3 \\ 2x - 3y = -1 \end{cases}$<br>$X = 10 \quad Y = 7$          | 6<br>$\begin{cases} h = v + 5 \\ h = -\frac{1}{2}v + 2 \end{cases}$<br>$H = 3 \quad V = -2$ |
| 7<br>$\begin{cases} y = 2x \\ 7x + 5y = 34 \end{cases}$<br>$x = 2 \quad y = 4$           | 8<br>$\begin{cases} y = 2x - 8 \\ x - y = 3 \end{cases}$<br>$x = 5 \quad y = 2$             | 9<br>$\begin{cases} x + y = 8 \\ x - y = 4 \end{cases}$<br>$x = 6 \quad y = 2$              |

## Solving Systems of Equations by Elimination

Solve each system by elimination.

1)  $-4x - 2y = -12$   
 $4x + 8y = -24$

$(6, -6)$

2)  $4x + 8y = 20$   
 $-4x + 2y = -30$

$(7, -1)$

3)  $x - y = 11$   
 $2x + y = 19$

$(10, -1)$

4)  $-6x + 5y = 1$   
 $6x + 4y = -10$

$(-1, -1)$

5)  $-2x - 9y = -25$   
 $-4x - 9y = -23$

$(-1, 3)$

6)  $8x + y = -16$   
 $-3x + y = -5$

$(-1, -8)$

7)  $-6x + 6y = 6$   
 $-6x + 3y = -12$

$(5, 6)$

8)  $7x + 2y = 24$   
 $8x + 2y = 30$

$(6, -9)$

9)  $5x + y = 9$   
 $10x - 7y = -18$

$(1, 4)$

10)  $-4x + 9y = 9$   
 $x - 3y = -6$

$(9, 5)$

11)  $-3x + 7y = -16$   
 $-9x + 5y = 16$

$(-4, -4)$

12)  $-7x + y = -19$   
 $-2x + 3y = -19$

$(2, -5)$

13)  $16x - 10y = 10$   
 $-8x - 6y = 6$

$(6, -1)$

14)  $8x + 14y = 4$   
 $-6x - 7y = -10$

$(4, -2)$

15)  $-4x - 15y = -17$   
 $-x + 5y = -13$

$(8, -1)$

16)  $-x - 7y = 14$   
 $-4x - 14y = 28$

$(6, -2)$

17)  $-7x - 8y = 9$   
 $-4x + 9y = -22$

$(1, -2)$

18)  $5x + 4y = -30$   
 $3x - 9y = -18$

$(-6, 0)$

19)  $-4x - 2y = 14$   
 $-10x + 7y = -25$

$(-1, -5)$

20)  $3x - 2y = 2$   
 $5x - 5y = 10$

$(-2, -4)$

21)  $5x + 4y = -14$   
 $3x + 6y = 6$

$(-6, 4)$

22)  $2x + 8y = 6$   
 $-5x - 20y = -15$

Infinite solutions

23)  $-14 = -20y - 7x$   
 $10y + 4 = 2x$

$(2, 0)$




24)  $3 + 2x - y = 0$   
 $-3 - 7y = 10x$






$(-1, 1)$

**Directions:**


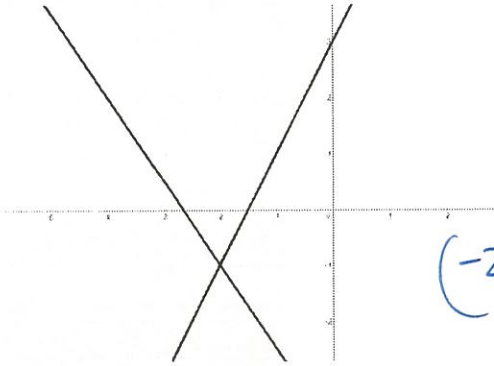



1. Answer each question.
2. Scan the qr code to enter your answer in a form.
3. If you answer the question correct, collect a clue.

**Question: What is mathematics???**

|   | Problem to solve   | QR code   | clue |
|---|--|---|------|
| 1 | Solve $\begin{cases} x = \frac{3}{4}y + 2 \\ x = \frac{1}{6}y - 12 \end{cases}$<br><br>$x = -16 \quad y = -24$ |   |      |
| 2 | Solve $\begin{cases} 3x - 6y = 12 \\ -x - 6y = 4 \end{cases}$<br><br>$x = 2 \quad y = -1$                      |  |      |
| 3 | Solve $\begin{cases} 5x + 4y = -20 \\ y = -5 \end{cases}$<br><br>$x = 0 \quad y = -5$                          |  |      |

|   |  |   |  |
|---|--|---|--|
| 4 | <p>Find the solution by Graphing</p> $\begin{cases} 4x + y = 2 \\ y = x - 3 \end{cases}$ $x = 1 \quad y = -2$                                      |    |  |
| 5 | <p>Solve</p> $\begin{cases} x + 7y = 0 \\ 2x - 8y = 22 \end{cases}$ $x = 7 \quad y = -1$   |    |  |
| 6 | <p>Solve</p> $\begin{cases} 4x = 40 - 16y \\ \frac{1}{2}x + y = 14 \end{cases}$ $x = 46 \quad y = -9$  |   |  |
| 7 | <p>Give a system with a solution of <math>(-2, 1)</math></p> <p>SAMPLE: <math display="block">\begin{cases} x = -2 \\ y = 1 \end{cases}</math></p> |  |  |
| 8 | <p>Solve</p> $\begin{cases} -3x - \frac{1}{2}y + 4z = -8 \\ y = 8 - 6x \\ z = \frac{1}{8}x + 2 \end{cases}$ $x = -24 \quad y = 152 \quad z = -1$   |  |  |



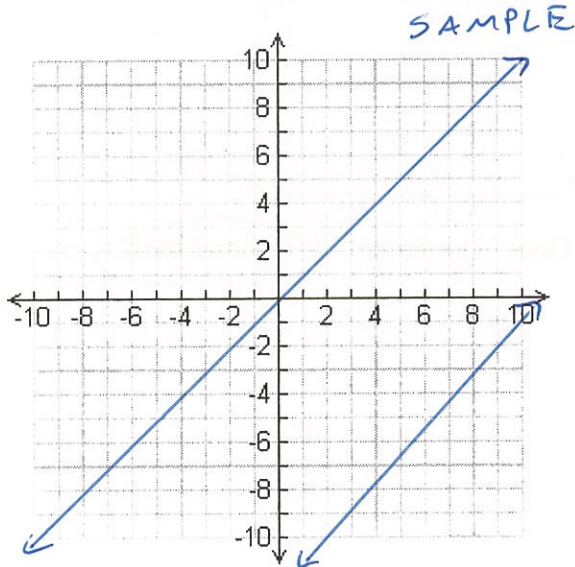
|             |  |   |  |
|-------------|--|---|--|
| 9<br>.      | Solve $\begin{cases} 4x - y = 20 \\ -2x - 2y = 10 \end{cases}$<br><br>$x=3 \quad y=-8$   |    |  |
| 1<br>0<br>. | Give the solution to the system below.<br><br> $(-2, -1)$ |    |  |
| 1<br>1<br>. | Solve $\begin{cases} -4y - 11x = 36 \\ 20 = -10x - 10y \end{cases}$<br><br>$x=-4 \quad y=2$  |  |  |
| 1<br>2<br>. | Solve $\begin{cases} 4x + 2y = 10 \\ x - y = 13 \end{cases}$<br><br>$x=6 \quad y=-7$   |  |  |

6.1-6.3 Practice  
~~Lesson 6.4~~: Inconsistent and Consistent Systems of Equations

Name \_\_\_\_\_ Hr \_\_\_\_\_

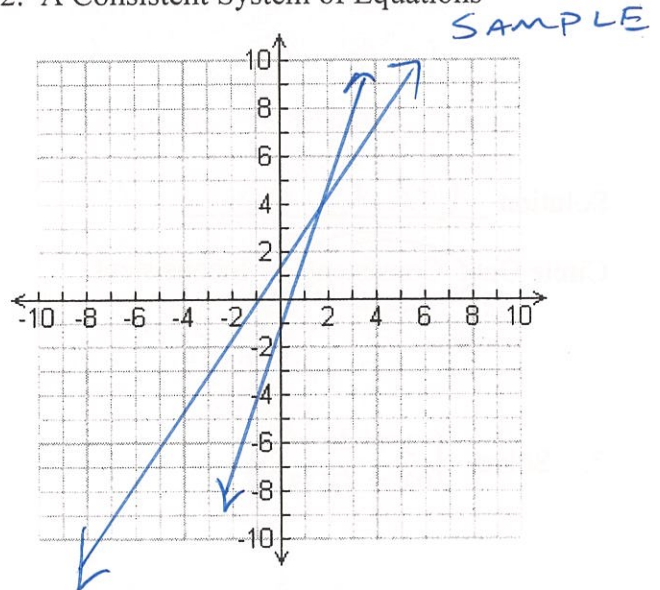
Directions: For problems 1 and 2 graph an example of the indicated system of equations. Justify your graph by using complete sentences to explain how your graph meets the criteria.

1. An Inconsistent System of Equations



This graph represents an inconsistent system of equations because the lines are parallel and will never cross. This means there are zero solutions.

2. A Consistent System of Equations



This graph represents a consistent system of equations because The graphs intersect at least once. This means there is at least one solution.

In problems 3 – 7, use the appropriate method to solve each system of equations. After solving, determine if the system is consistent or inconsistent and circle the appropriate answer.

3. Solve 
$$\begin{cases} \frac{1}{5}x + \frac{1}{2}y = 1 \\ -4x + 10y = -20 \end{cases}$$

4. Solve 
$$\begin{cases} 6x + y = 6 \\ -3x - 2y = -7 \end{cases}$$

Solution (5, 0)

Circle One: Consistent / Inconsistent

Solution ( $\frac{5}{9}, \frac{8}{3}$ )

Circle One: Consistent / Inconsistent

5. Solve  $\begin{cases} 4x + 12y = 4 \\ y = 5x + 11 \end{cases}$

Solution  $(-2, 1)$

Circle One: Consistent / Inconsistent

6. Solve  $\begin{cases} 2y = -3x + 4 \\ 120x + 80y = 40 \end{cases}$

Solution  $\emptyset$

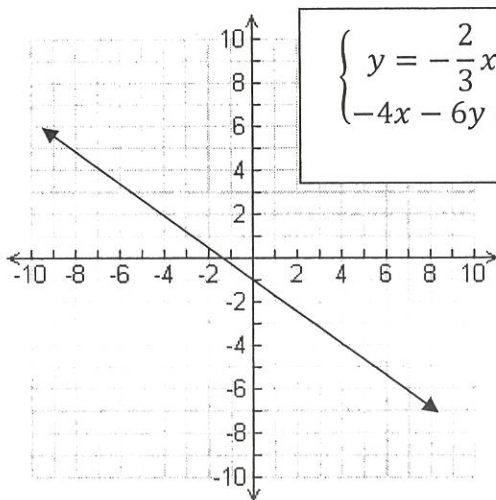
Circle One: Consistent / Inconsistent

7. Solve  $\begin{cases} y = 3x - 2 \\ 6x - 2y = 12 \end{cases}$

Solution  $\emptyset$

Circle One: Consistent / Inconsistent

8. Trina told Cheryl that the graph below represented an inconsistent system. Cheryl disagrees with Trina, she claims the system graphed is consistent. Explain who's correct and justify your explanation using accurate vocabulary and complete sentences.



Cheryl is correct. These lines overlap which means there are infinite solutions and therefore consistent.



## Systems of Equations Word Problems

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

$$\begin{cases} x+y=12 \\ x-y=8 \end{cases}$$

$$\begin{aligned} x &= 8 \\ y &= 4 \end{aligned}$$

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

$$\begin{cases} x-y=3 \\ x+y=13 \end{cases}$$

$$\begin{aligned} x &= 8 \\ y &= 5 \end{aligned}$$

- 3) Flying to Kampala with a tailwind a plane averaged 158 km/h. On the return trip the plane only averaged 112 km/h while flying back into the same wind. Find the speed of the wind and the speed of the plane in still air.

$$\begin{cases} x+y=158 \\ x-y=112 \end{cases}$$

$$\begin{aligned} \text{Plane: } & 135 \text{ km/h} \\ \text{Wind: } & 23 \text{ km/h} \end{aligned}$$

- 4) The school that Stefan goes to is selling tickets to a choral performance. On the first day of ticket sales the school sold 3 senior citizen tickets and 1 child ticket for a total of \$38. The school took in \$52 on the second day by selling 3 senior citizen tickets and 2 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

$$\begin{cases} 3x+y=38 \\ 3x+2y=52 \end{cases}$$

$$\begin{aligned} \text{child ticket: } & \$14 \\ \text{senior ticket: } & \$8 \end{aligned}$$

- 5) The sum of the digits of a certain two-digit number is 7. Reversing its digits increases the number by 9. What is the number?

~~$$\begin{cases} x+y=7 \\ \dots \end{cases}$$~~

SKIP

- 6) A boat traveled 210 miles downstream and back. The trip downstream took 10 hours. The trip back took 70 hours. What is the speed of the boat in still water? What is the speed of the current?

$$\begin{cases} x+y=21 \\ x-y=3 \end{cases}$$

$$\begin{aligned} \text{boat: } & 12 \text{ mph} \\ \text{Current: } & 9 \text{ mph} \end{aligned}$$

- skip 7) The state fair is a popular field trip destination. This year the senior class at High School A and the senior class at High School B both planned trips there. The senior class at High School A rented and filled 8 vans and 8 buses with 240 students. High School B rented and filled 4 vans and 1 bus with 54 students. 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.

$$\begin{cases} 8v + 8b = 240 \\ 4v + b = 54 \end{cases}$$

Van: 8  
Bus: 22

- 8) The senior classes at High School A and High School B planned separate trips to New York City. The senior class at High School A rented and filled 1 van and 6 buses with 372 students. High School B rented and filled 4 vans and 12 buses with 780 students. Each van and each bus carried the same number of students. How many students can a van carry? How many students can a bus carry?

$$\begin{cases} v + 6b = 372 \\ 4v + 12b = 780 \end{cases}$$

Van: 18  
Bus: 59

- 9) Brenda's school is selling tickets to a spring musical. On the first day of ticket sales the school sold 3 senior citizen tickets and 9 child tickets for a total of \$75. The school took in \$67 on the second day by selling 8 senior citizen tickets and 5 child tickets. What is the price each of one senior citizen ticket and one child ticket?

$$\begin{cases} 3x + 9y = 75 \\ 8x + 5y = 67 \end{cases}$$

child: \$7  
senior: \$4

- 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.

$$\begin{cases} 3x + 14y = 203 \\ 11x + 11y = 220 \end{cases}$$

small box: \$7  
large box: \$13

- 11) A boat traveled 336 miles downstream and back. The trip downstream took 12 hours. The trip back took 14 hours. What is the speed of the boat in still water? What is the speed of the current?

$$\begin{cases} x + y = 28 \\ x - y = 24 \end{cases}$$

boat: 26 mph  
current: 2 mph

- 12) DeShawn and Shayna are selling flower bulbs for a school fundraiser. Customers can buy bags of windflower bulbs and bags of daffodil bulbs. DeShawn sold 10 bags of windflower bulbs and 12 bags of daffodil bulbs for a total of \$380. Shayna sold 6 bags of windflower bulbs and 8 bags of daffodil bulbs for a total of \$244. What is the cost each of one bag of windflower bulbs and one bag of daffodil bulbs?

$$\begin{cases} 10x + 12y = 380 \\ 6x + 8y = 244 \end{cases}$$

Windflower bags: 14  
Daffodil bags: 20



## Solving Systems

- 1) Seven pounds of cheddar cheese and 8 pounds of pepper jack cheese sell for \$50. Five pounds of cheddar and 4 pounds of pepper jack sell for \$31. Find the price per pound of cheddar cheese and the price per pound of pepper jack cheese.

$$\begin{cases} 7x + 8y = 50 \\ 5x + 4y = 31 \end{cases}$$

cheddar = \$4  
pepper jack = \$2.75

- 2) Sixteen workers are employed on a bridge-repair project. The engineers make \$200 per day and the laborers make \$165 per day. The daily payroll is \$2745. Find the number of engineers and laborers.

$$\begin{cases} x + y = 16 \\ 200x + 165y = 2745 \end{cases}$$

13 laborers  
3 engineers

- 3) A Footlocker sells Nike running shoes at \$79 a pair. Adidas sell for \$65 a pair. In a single day, Footlocker brought in \$6289 on sales of 89 pairs of running shoes. How many pairs of each shoe did the store sell?

$$\begin{cases} x + y = 89 \\ 79x + 65y = 6289 \end{cases}$$

36 pairs of Nike  
53 pairs of Adidas

- 4) A 124 foot fir tree and a 70 foot redwood were growing side by side in northern California. The fir is growing at the rate of 3.2 feet per year. The redwood grows at the rate of 6.2 feet per year. When will the redwood pass the fir in height?

$$\begin{cases} y = 3.2x + 124 \\ y = 6.2x + 70 \end{cases}$$

18 years  
181.6 feet

- 5) A total of 7500 tickets were sold for Mr. Fechter's art show. Regular tickets were \$11 but V.I.P. tickets cost \$14. After the show, the total cash was \$90,000. How many of each type of ticket were sold?

$$\begin{cases} x + y = 7500 \\ 11x + 14y = 90000 \end{cases}$$

5000 regular  
2500 V.I.P

- 6) The sum of two numbers is 50. Three times the larger number decreased by twice the smaller number is 60. What are the two numbers?

$$\begin{cases} x + y = 50 \\ 3x - 2y = 60 \end{cases}$$

$$\begin{aligned} x &= 32 \\ y &= 18 \end{aligned}$$

~~A~~ (7)  
EL

Four song writers, Angie, Brianna, Crystal, and Deanna wrote a hit song. The song made \$100,000,000. They decide to divide it according to how much each woman wrote. Brianna gets \$4 million more than Angie. Crystal gets \$8 million more than Brianna, and Deanna gets twice as much as Crystal. How much money does each writer get?

$$\begin{cases} A + B + C + D = 100,000,000 \\ B = A + 4,000,000 \\ C = B + 8,000,000 \\ D = 2C \end{cases}$$

Angie = \$12,000,000  
Brianna = \$16,000,000  
Crystal = \$24,000,000  
Deanna = \$48,000,000

### Systems of Equations Review

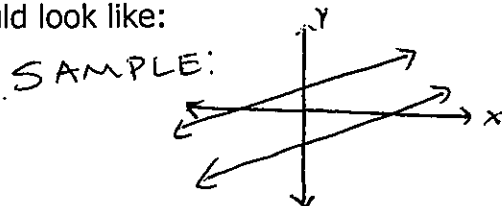
Directions: Use the vocabulary studied in this lesson and complete sentences to respond to the statement below.

Statement: Which method would you use to solve the following system of equations? Explain why you chose that method and then tell me how you would go about solving the system.

$$\begin{cases} 2x + y = 3 \\ -4x - 4y = -8 \end{cases}$$

Probably elimination, but multiple options possible.

1. Evelyn was solving a system of equations and her work led her to the statement  $2 = 10$ . If Evelyn were to solve that same system by graphing, draw a rough sketch of what those lines would look like:



- 2.) The dimes and quarters in Timmy's piggy bank are worth \$11.60. He has 32 more dimes than quarters. How many total coins are in the piggy bank? Let  $d$  represent the number of dimes and  $q$  represent the number of quarters.

- A.) Describe the situation with a system of equations

$$\begin{cases} .1d + .25q = 11.60 \\ d = q + 32 \end{cases}$$

- B.) Solve the system and then answer the question.

$$\begin{aligned} q &= 24 \\ d &= 56 \end{aligned}$$

3. All together, there are 11 books in the Harry Potter and the Lord of the Rings series combined. There are 3 more books in the Harry Potter series than there are in the Lord of the Rings series. How many books are there in the Harry Potter series? How many books are there in the Lord of the Rings Series? Do you like either series?

a. Define your variables and set up a system of equations to model this situation.

$$\begin{cases} l+h=11 \\ h=l+3 \end{cases}$$

$$\begin{aligned} l &= \text{\# of Lord of the Rings} \\ h &= \text{\# of Harry Potter} \end{aligned}$$

b. Solve the system and answer the questions. (be specific with your answers)

$$\begin{aligned} l &= 4 \\ h &= 7 \end{aligned}$$

There are 4 books in the Lord of the Rings series and 7 books in the Harry Potter series.

4. Last week, the Arrowhead Girls Basketball Team beat Sussex Hamilton in a battle of ranked teams. It was a defensive battle and a low-scoring game. Combined, the teams scored 58 points. Arrowhead ended up winning the game by 6 points. What was the final score?

a. Define your variables and set up a system of equations to solve this problem.

$$A = \text{AHS score} \quad H = \text{Sussex Hamilton score}$$

$$\begin{cases} A+H=58 \\ A=H+6 \end{cases}$$

b. Solve the system and answer the question.

$$H = 26$$

$$A = 32$$

5. The height of a rectangular doorway is 3 times the width. Find the dimensions (length and width) if the perimeter is 20 feet. (draw a picture if necessary)

$$\begin{cases} H=3w \\ 20=2H+2w \end{cases}$$

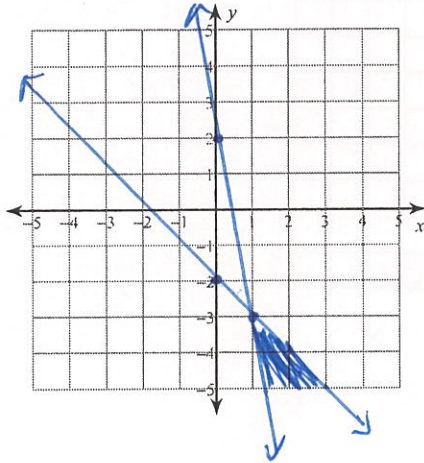
$$\begin{aligned} H &= 7.5 \text{ feet} \\ w &= 2.5 \text{ feet} \end{aligned}$$



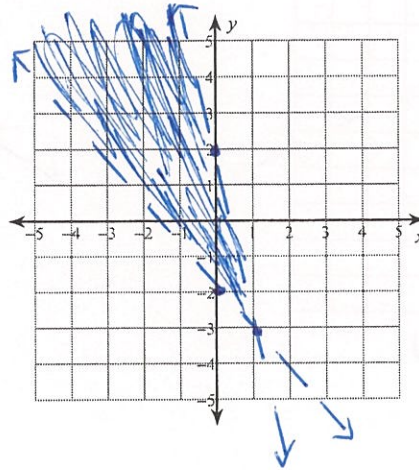
# Solving Systems of Inequalities

Sketch the solution to each system of inequalities.

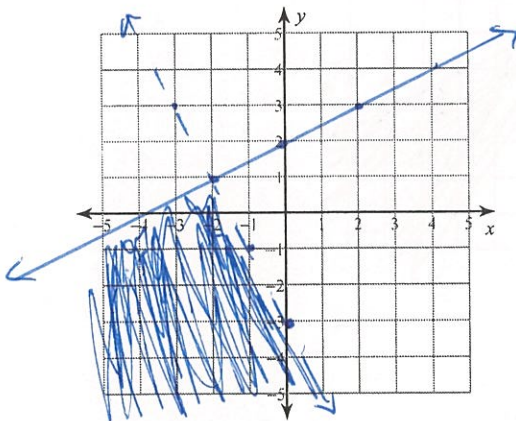
1)  $y \leq -x - 2$   
 $y \geq -5x + 2$



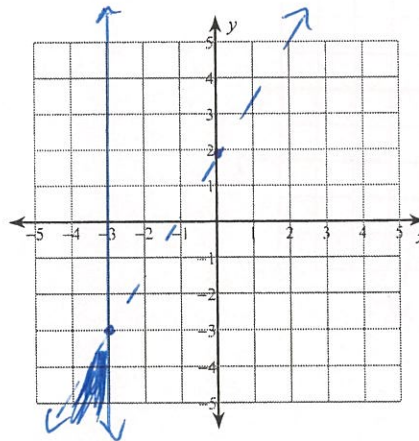
2)  $y > -x - 2$   
 $y < -5x + 2$



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



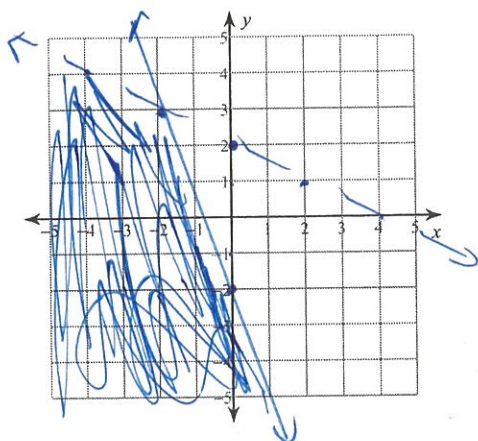
4)  $x \leq -3$   
 $y < \frac{5}{3}x + 2$





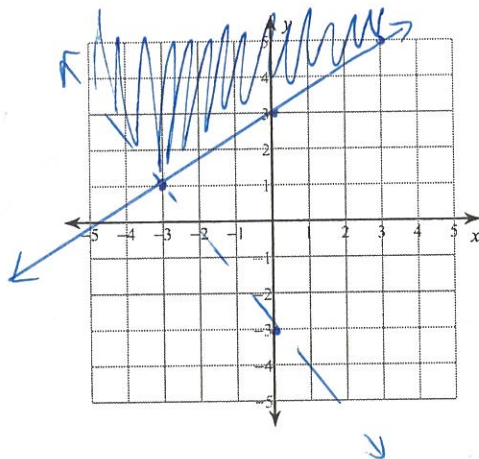
$$5) y \leq -\frac{5}{2}x - 2$$

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



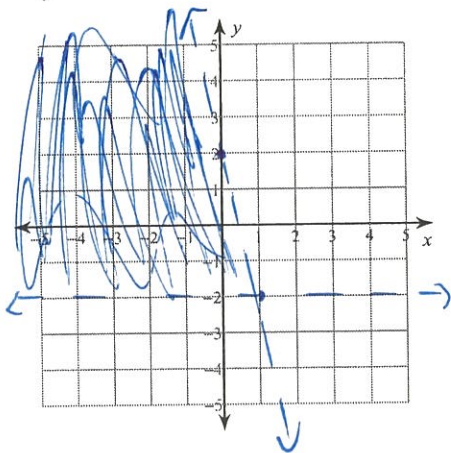
$$6) y \geq \frac{2}{3}x + 3$$

$$y > -\frac{4}{3}x - 3$$



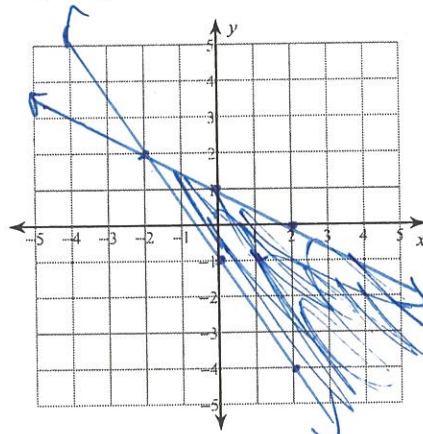
$$7) 4x + y < 2$$

$$y > -2$$



$$8) 3x + 2y \geq -2$$

$$x + 2y \leq 2$$



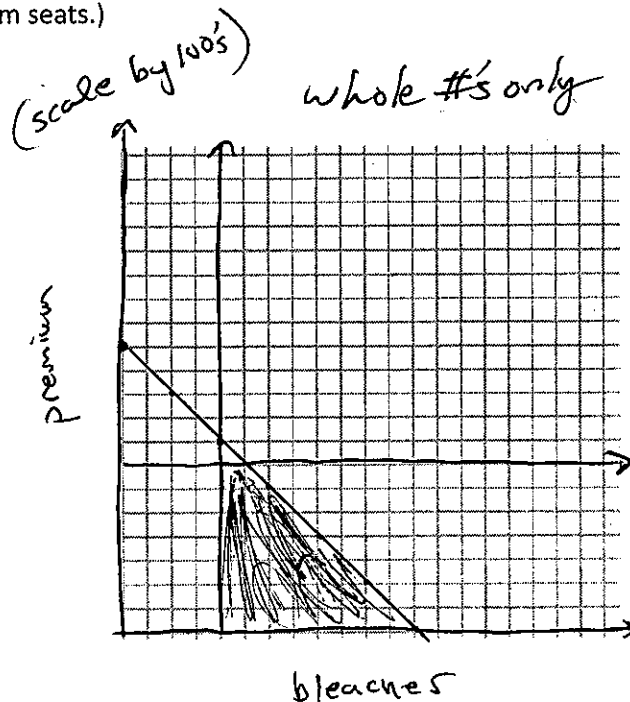


## 6.5 day 2 Inequalities Story Problems Practice

NAME: \_\_\_\_\_

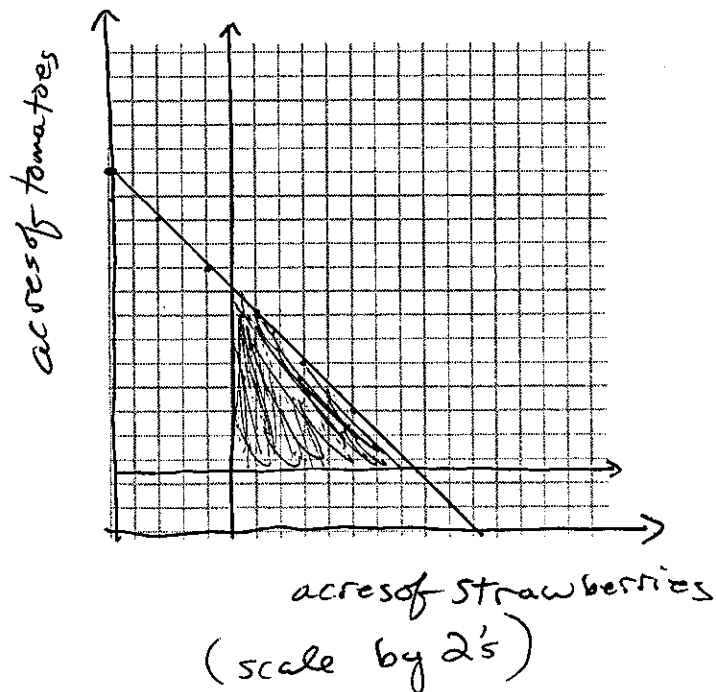
You are designing a concert hall that will seat no more than 1200 people. You want at least 400 bleacher seats. You also want no more than 700 premium seats. Set up a system of inequalities that represents this situation and then graph it. (Let  $x$  = bleacher seats and  $y$  = premium seats.)

$$\begin{cases} y \leq -x + 1200 \\ x \geq 400 \\ y \leq 700 \end{cases}$$



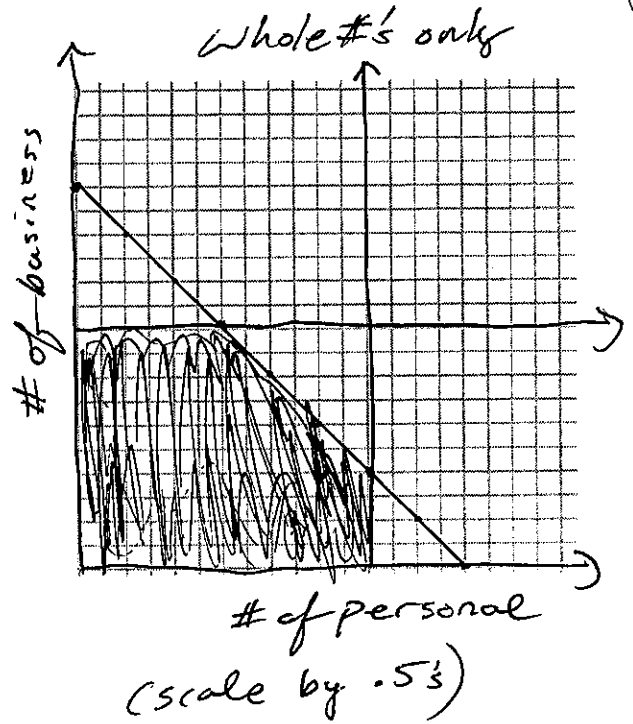
You have 30 total acres to grow strawberries and tomatoes. You want at least 10 acres to grow strawberries. You want at least 5 acres to grow tomatoes. Set up a system of inequalities that represents this situation and then graph it. (Let  $x$  = acres of strawberries and  $y$  = acres of tomatoes.)

$$\begin{cases} y \leq -x + 30 \\ x \geq 10 \\ y \geq 5 \end{cases}$$



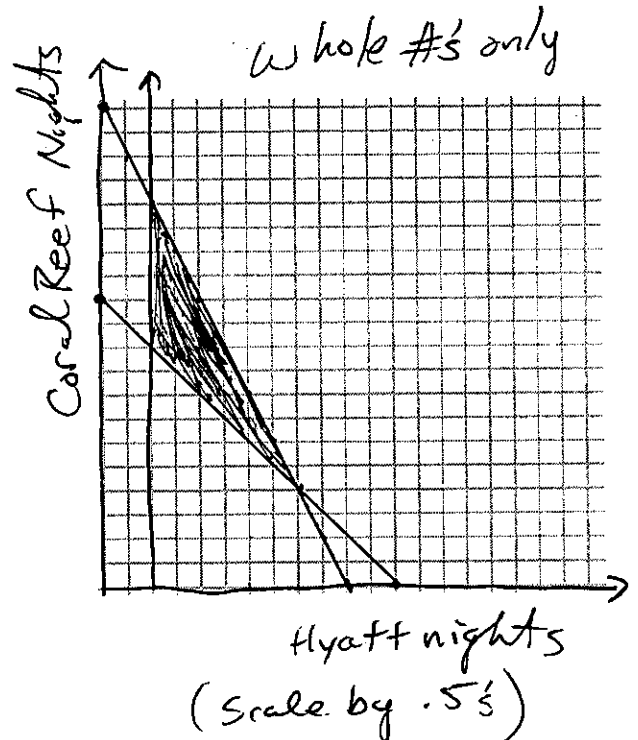
- 3) A small computer company manufactures two models of computers. One model is for business use and the other model is for personal use. The company can make no more than eight computers per day. They want to build no more than five business computers and no more than six personal computers per day. Set up a system of inequalities that represents this situation and then graph it. (Let  $x$  = # personal and  $y$  = # business).

$$\begin{cases} y \leq -x + 8 \\ x \leq 6 \\ y \leq 5 \end{cases}$$



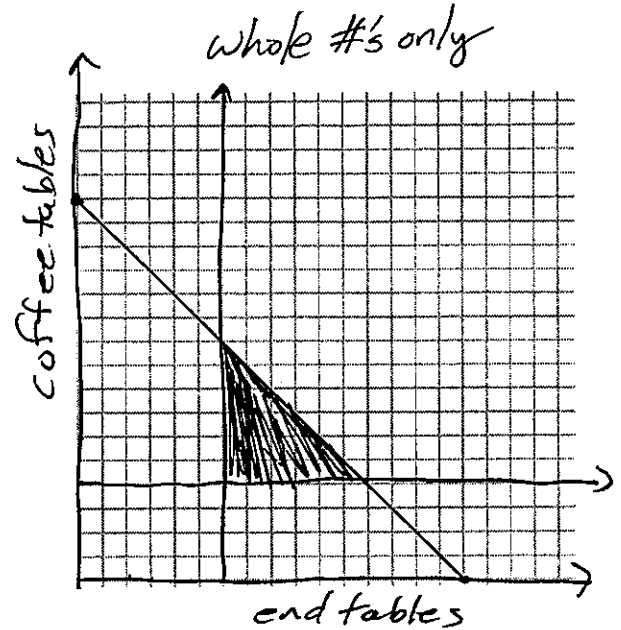
- 4) Alana wants to spend no more than \$650 for hotels while vacationing in Hawaii. She wants to stay at the Hyatt Resort at least 1 night and at the Coral Reef for the remainder of her stay. The Hyatt Resort costs \$130 per night and the Coral Reef Resort costs \$65 per night. If she wants to stay in Hawaii at least 6 nights, how many nights could she spend at each hotel and still stay within her budget? Set up a system of inequalities and then graph it. (Let  $x$  = # nights at Hyatt and  $y$  = # nights at Coral Reef).

$$\begin{cases} 130x + 65y \leq 650 \\ x \geq 1 \\ x + y \geq 6 \end{cases}$$



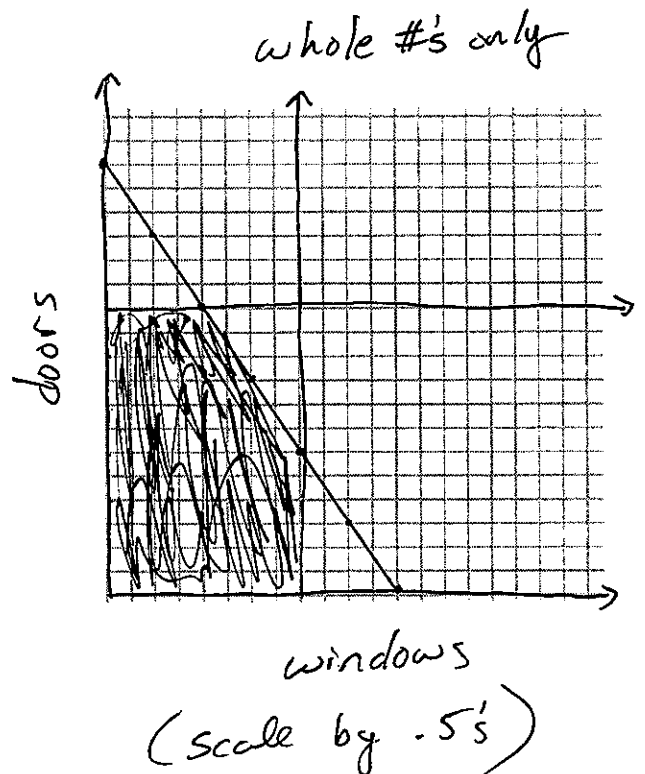
- 5) You own a company that makes furniture. Your company makes end tables and coffee tables. Each week you must make at least 6 end tables and at least 4 coffee tables. Your company can make at most 16 tables total (end and coffee) per week. Set up a system of inequalities that represents this situation and then graph it. (Let  $x$  = end tables and  $y$  = # coffee tables).

$$\begin{cases} x + y \leq 16 \\ x \geq 6 \\ y \geq 4 \end{cases}$$



- 6) A glassmaker makes windows and doors. Each day he has enough glass to make no more than 4 windows, or no more than 6 doors. Each day he receives only 18 sheets of glass to work with. With that, he is able to produce 2 doors and 3 windows. Set up a system of inequalities that represents this situation and then graph it. (Let  $x$  = # windows and  $y$  = # doors).

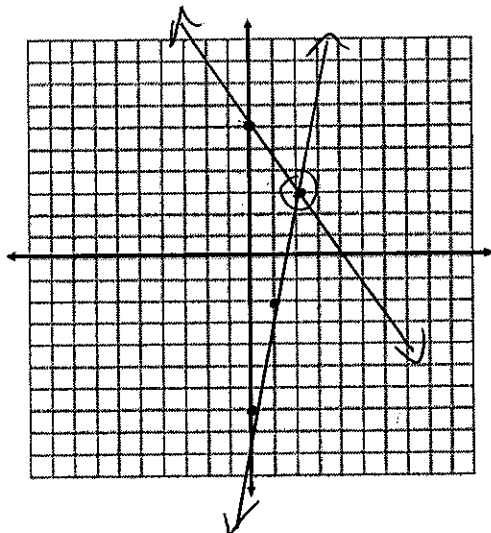
$$\begin{cases} 3x + 2y \leq 18 \\ x \leq 4 \\ y \leq 6 \end{cases}$$



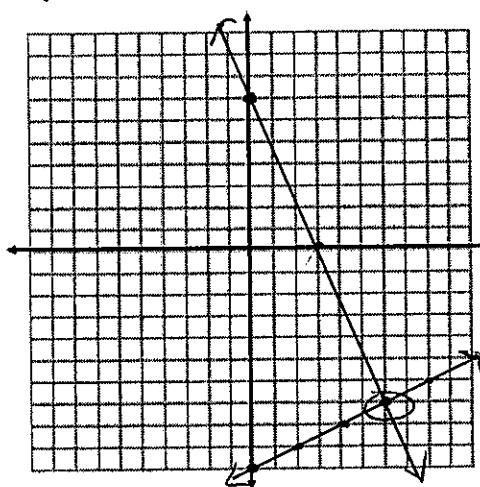
## Mixed Review of Systems Worksheet

In #1 and 2, solve the systems using the graphing method discussed in class.

1)  $\begin{cases} y = 5x - 7 \\ y = 6 - \frac{3}{2}x \end{cases}$  Solution:  $(2, 3)$



2)  $\begin{cases} y = \frac{-7}{3}x + 7 \\ y = \frac{1}{2}x - 10 \end{cases}$  Solution:  $(6, -7)$



In #3-4, solve the systems using the substitution method. Make sure that you check your answer.

3)  $\begin{cases} y = 4x - 9 \\ y = x - 3 \end{cases}$

$(2, -1)$

4)  $\begin{cases} x = 11 + 2y \\ -7x - 2y = -13 \end{cases}$

$(3, -4)$

In #5-6, solve the systems using the elimination method. Make sure that you check your answer.

5)  $\begin{cases} -2x + 3y = 15 \\ -6x + 6y = 18 \end{cases}$

$(-1.2, 4.2)$

6)  $\begin{cases} 5x + 4y = -14 \\ 3x + 6y = 6 \end{cases}$

$(-6, 4)$

In #7-10, write a system of equations to represent the word problem. Then use substitution or elimination to solve the system. Make sure that you check your answer.

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

$$\begin{cases} x+y=12 \\ x-y=4 \end{cases} \quad (8,4)$$

8) The school that Stefan goes to is selling tickets to a choral performance. On the first day of ticket sales the school sold 3 senior citizen tickets and 1 child ticket for a total of \$38. The school took in \$52 on the second day by selling 3 senior citizen tickets and 2 child tickets. Find the price of a senior citizen ticket and the price of a child ticket.

$$\begin{cases} 3s + 1c = 38 \\ 3s + 2c = 52 \end{cases}$$

\$14 child tickets  
\$8 senior tickets

9) Noah got the results of tests on mathematics and verbal achievement. His verbal score is 70 points less than his mathematics score. His total score for the two parts is 1250. Find Noah's two scores.

$$\begin{cases} m - 70 = v \\ m + v = 1250 \end{cases}$$

math = 660  
verbal = 590

10) The state fair is a popular field trip destination. This year the senior class at High School A and the senior class at High School B both planned trips there. The senior class at High School A rented and filled 8 vans and 8 buses with 240 students. High School B rented and filled 4 vans and 1 bus with 54 students. 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.

$$\begin{cases} 8v + 8b = 240 \\ 4v + 1b = 54 \end{cases}$$

22 students per bus  
and 8 students per  
van.

Solve the following systems. Pick any method.

$$1. \begin{cases} x = 11 + 2y \\ -7x - 2y = -13 \end{cases}$$

$$x = 3 \quad y = -4$$

$$2. \begin{cases} y = -2x + 3 \\ 6x + 3y = 9 \end{cases}$$

$\infty$  solutions

$$3. \begin{cases} 3y = 12x - 18 \\ \frac{1}{4}x + \frac{1}{2}y = -21 \end{cases}$$

$$(-8, -38)$$

$$4. \begin{cases} -2x + 3y = 15 \\ -6x + 6y = 18 \end{cases}$$

$$(6, 9)$$

$$5. \begin{cases} 5x + 4y = -14 \\ 3x + 6y = 6 \end{cases}$$

$$(-6, 4)$$

$$6. \begin{cases} 2x - 4y = -32 \\ \frac{1}{8}x - \frac{1}{4}y = -2 \end{cases}$$

$\infty$  solutions

Describe the graph and tell the number of solutions.

7. When solving a system of equations, the correct algebra cancels out the variables leaving the following statements.

A.  $-18 = -18$

$\infty$  solutions: overlapping lines

B.  $18 = -18$

$\emptyset$  solutions: parallel lines

FOR THE FOLLOWING STORY PROBLEMS,

- 1) DEFINE THE VARIABLES
- 2) GIVE THE SYSTEM OF EQUATIONS
- 3) ANSWER THE QUESTION

8. For breakfast, Randy had two Egg McMuffins and a hash brown, totaling 750 calories. Jack only had one Egg McMuffin and a hash brown, totaling 450 calories. How many calories are in each item?

$x = \# \text{ of eggmc muffins}$   
 $y = \# \text{ of hash browns}$

$$\begin{cases} 2x + y = 750 \\ x + y = 450 \end{cases}$$

$x = 300$   
 $y = 150$

9. 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?

$x = \# \text{ of T/F}$   
 $y = \# \text{ of MC}$

$$\begin{cases} x + y = 20 \\ 3x + 11y = 100 \end{cases}$$

15 T/F  
 5 MC

10. Design Graphics charges \$8 for the design and \$4.50 for each shirt. Stellar Shirts charges \$5 for the design and \$5.25 for each shirt. How many shirts will it cost the same at either store?

$C = \text{cost}$   
 $n = \# \text{ of shirts}$

$$\begin{cases} C = 8 + 4.5n \\ C = 5 + 5.25n \end{cases}$$

4 shirts

11. A group of people bought movies tickets at the AMC Century City. They bought a total of 7 tickets, some adult and some kid tickets. They spent a total of \$72. If adult tickets cost \$12 and kid tickets cost \$9, how much of each were purchased?

$x = \# \text{ of adult tickets}$   
 $y = \# \text{ of child tickets}$

$$\begin{cases} x + y = 7 \\ 12x + 9y = 72 \end{cases}$$

3 adult, 4 children

12. Consider the equation  $y = -2x + 4$

A. Create a second equation so that the system would have *infinite solutions*

B. Create a second equation so that the system would have *one solution*

C. Create a second equation so that the system has *no solutions*

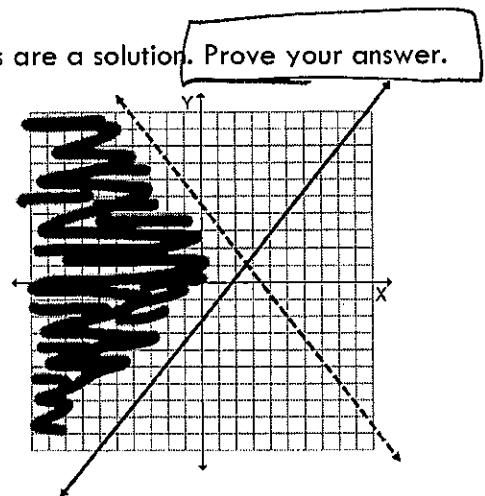
D. Create a second line that would have *many solutions (but not infinite)*

impossible!

13. Consider the given graph. Tell whether or not the following points are a solution. Prove your answer.

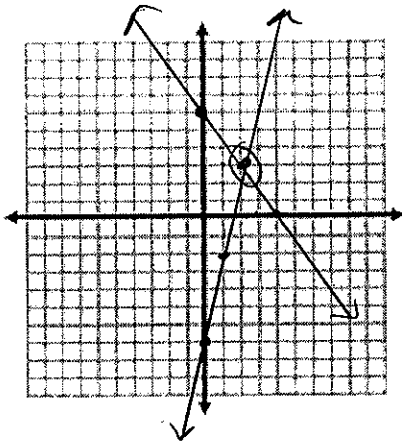
- A. (2, 0) *yes*
- B. (0, -2) *yes*
- C. (-2, -2) *yes*
- D. (2, 2) *no*

*no*

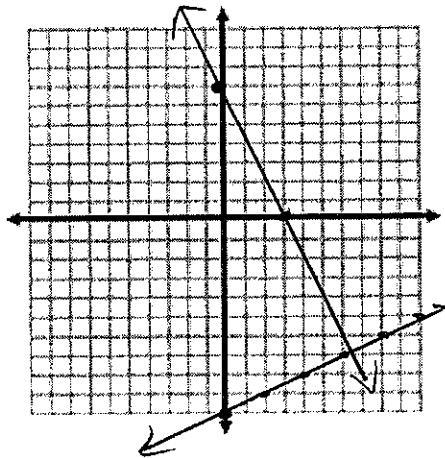


14. Graph the systems and state the solution.

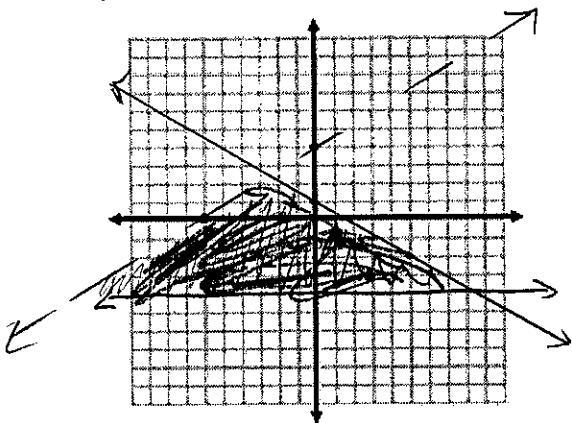
A.  $\begin{cases} y = 5x - 7 \\ y = 6 - \frac{3}{2}x \end{cases}$  Solution: (2, 3)



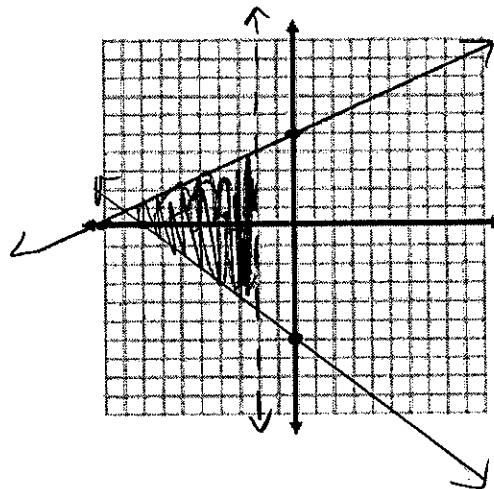
B.  $\begin{cases} y = \frac{-7}{3}x + 7 \\ y = \frac{1}{2}x - 10 \end{cases}$  Solution: (6, -7)



C.  $\begin{cases} 2x - 3y > -12 \\ y \leq -\frac{3}{5}x + 1 \\ y \geq -4 \end{cases}$  Solution: SAMPLE: (0, -1)

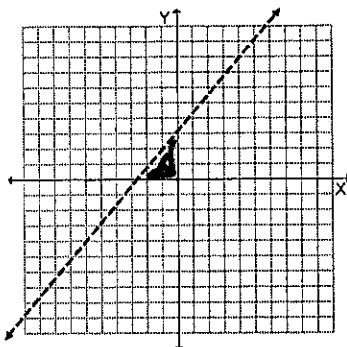


D.  $\begin{cases} -x + 2y \leq 10 \\ 3x + 4y \geq -24 \\ x < 2 \end{cases}$  Solution: SAMPLE: (-3, 0)

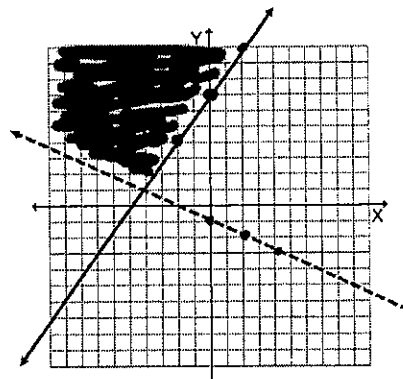


15. Write the system of equations that represents the given graph.

A.  $\begin{cases} x \leq 0 \\ y \geq 0 \\ y < -\frac{2}{3}x + 3 \end{cases}$



B.  $\begin{cases} y \geq \frac{3}{2}x + 7 \\ y > -\frac{1}{2}x - 1 \end{cases}$





16. State if the following points are a solution to the system Prove your answer!

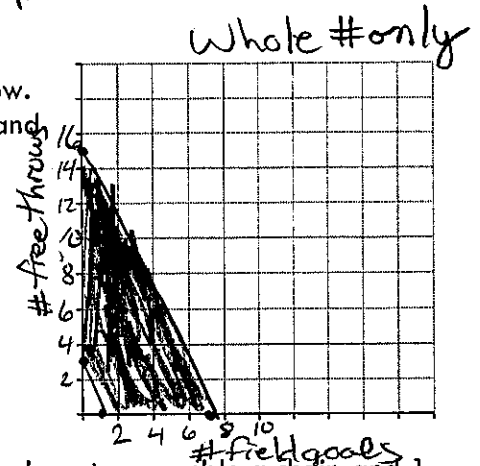
$$\begin{cases} y < \frac{2}{3}x - 4 \\ 2x + y \geq 12 \\ x < 8 \end{cases}$$

- A. (9, -1) NO  $\rightarrow 9 \neq 8$   
 B. (6, -10) NO  $\rightarrow 2 \neq 12$   
 C. (-3, -8) NO  $\rightarrow -8 \neq -6$

17. In basketball you score 2 points for a field goal and 1 point for a free throw. Suppose that you have scored at least 3 points in every game this season, and have a season high score of 15 points in one game. How many field goals and free throws could you have made in any one game?

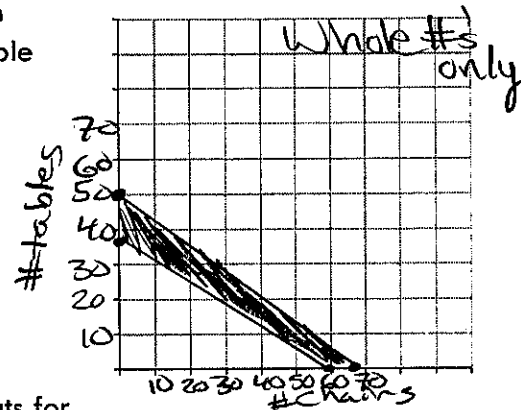
$$\begin{cases} 2x + y \geq 3 \\ 2x + y \leq 15 \end{cases}$$

SAMPLE!  
 4 field goals  
 2 free throws



18. During the spring, Mr. Wilson assembles lawn furniture. It takes him  $\frac{3}{4}$  of an hour to assemble a chair, and 1 hour to assemble a table. He earns \$50 for each chair and \$80 for each table. He works no more than 50 hours each week, but he likes to assemble enough lawn furniture to generate more than \$3000 income each week.

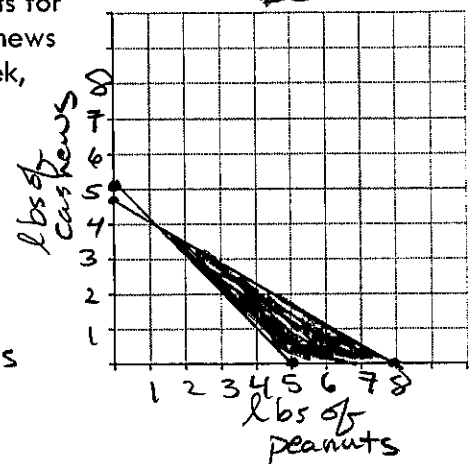
$$\begin{cases} .75x + y \leq 50 \\ 50x + 80y \geq 3000 \end{cases}$$



19. Jim loves nuts. He plans to spend at most \$24 to buy cashews and peanuts for after work snacks. The Nut Shoppe sells peanuts for \$3 a pound and cashews for \$5 a pound. If Jim needs to have at least 5 pound of nuts for the week, how many of each type can he buy?

$$\begin{cases} 3x + 5y \leq 24 \\ x + y \geq 5 \end{cases}$$

SAMPLE!  
 5 lb of peanuts  
 1 lb of cashews



20. A grandmother wants to spend at least \$40 but no more than \$60 on school clothes for her grandson. T-shirts sell for \$10 and pants sell for \$20. How many T-shirts and pants could she buy?

$$\begin{cases} 10x + 20y \geq 40 \\ 10x + 20y \leq 60 \end{cases}$$

SAMPLE!  
 4 shirts &  
 1 pair of pants

