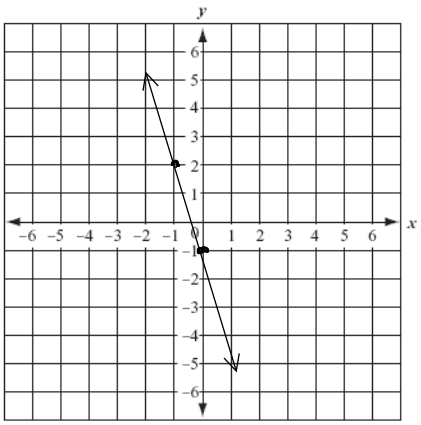
Name:_____Key _____ Date:_____ Grade:_____

Solving Systems of Linear Equations
Study Guide

Identify the number of solutions and graph the solution. SHOW YOUR WORK!!!

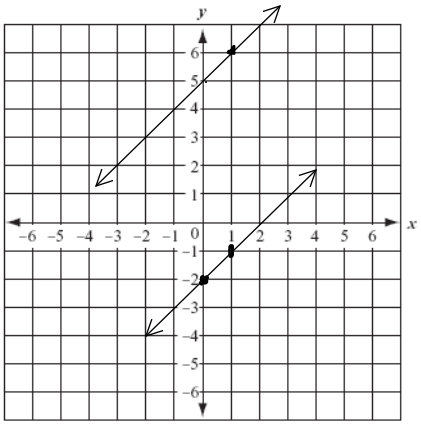
Hint: Both equations must be in slope intercept form. "y" must be alone.

1. 3x + y = -1 Same line Y = -3x -1
   -9x - 3y = 3



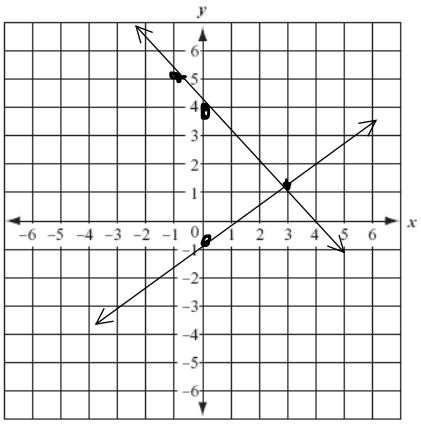
Same slop= Parallel lines: y = 1x -2

2. y = x + 5
   x – y = 2



Already in slope intercept form. Start graphing At the "y" intercepts.

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



Solution: (3, 1)

Use the substitution method to solve each system of linear equations. SHOW YOUR WORK!!!! "X" or "Y" must be alone. Choose the one with no coefficient.

4. $4x + y = 0$ (1, - 4)
$x + 2y = -7$

1. Change the second equation to get "x' by itself, because "x" does not have a coefficient.
2. Subtract 2y from both sides x = - 2y -7
New system: **4x + y =0**
X = -2y -7
3. Plug the second equation into the first equation Replacing "x" with – 2y -7. **4(-2y -7) + y =0**
4. Distribute the 4 into each term within the parentheses. **-8y -28 +y = 0**
5. Combine the like terms: -7y -28 = 0
6. Solve the two step equation. Add 28 to both sides of the Equal sign. -7y = 28
7. Divide both sides by -7. Y = -4
8. Plug -4 into the revised equation for "y":
x = -2(-4) -7
x = 8 -7
x = 1 solution: (1, -4)

5. $x + 14y = 84$ (14, 5)
$2x – 7y = -7$

1. Change the first equation to get "x' by itself.
2. Subtract 14y from both sides: x = -14y + 84
3. New system: x = -14y + 84
2x – 7y = -7
4. Plug the first equation into the second EQ
5. 2(-14y +84) -7y = -7
-28y + 168 – 7y = -7
6. Combine like terms: -35y + 168 = -7
7. Subtract 168 from both sides:-35y = -175
8. Divide both sides by -35: y = 5
9. Plug in 5 for "y" in the first equation.
x = -14(5) + 84
10. X = -70 + 84
11. X = 14

6. $y = 4x$ (1, 4)
$x + y = 5$

1. First equation already has the "y" by itself. Plug it into the second equation. x + 4x = 5
2. Combine the like terms: 5x = 5
3. Divide both sides by 5: x = 1
4. Plug 1 into the first equation for x: y = 4(1)
5. Y = 4
6. Solution: (5, 4)

Use the elimination method to solve each system of linear equations. SHOW YOUR WORK!!! You must have opposite Coefficients.

7. $– 6x + 3y = - 6$ (3, 4)
$2x + 6y = 30$

1. Multiply the second equation by 3 to cancel out the "x"
2. New System: -6x + 3y = -6
6x + 18y = 90
3. "X" value will cancel out leaving: 3y = -6
+18y = 90
4. Add the equations: 21y = 84
5. Divide sides by 21: y = 4
6. Plug the value of "y" into the first equation.
7. -6x + 3(4) = -6 → -6x + 12 =-6
8. Subtract 12 from both sides: -6x = -18
10. Divide both sides by -6: x = 3

8. $3x + 5y = -16$ (3 – 5)
$- 2x + 6y = - 36$

1. Change both equations to get opposite coefficients.
2. Multiply the first eqation by 2 second equation by 3.
3. 6x + 10y = -32
-6x + 18y = -108
4. Add the equations
28y = -140
5. Divide each side by 28
y = -5
6. Plug in the value of "y" into the First equation: 3x + 5(-5) = -16
3x -25 = -16
7. Add 25 to each side: 3x = 9
8. Divide each side by 3: x = 3

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

1. Multiply the first equation by -2: $-2x + 6y = 8$
2. New system: $-2x + 6y = 8$
$2x + 6y = 4$
3. Add the equations: $12y = 12$
4. Divide each equation by 12: $y = 1$
5. Plug in the value of "y" into the first equation: $x - 3(1) = -4$
6. $x - 3 = -4$ Add 3 to both sides:. $X = -1$

Fill in the blank.

10. Intersecting lines have exactly _____one_____ solutions.

11. If the lines are the same, there will be ____Many_____ solutions.

12. If the lines have the same slope, but different y-intercepts, there will be_____no /parallel lines_____ solutions.

Tell whether the ordered pair is a solution of the linear system. Plug in the "x" and "y" values. Both equations must balance for it to be a solution to the system.

(3, 5)
13. $-15x + 7y = 1$
$3x - y = 1$

$-15(3) + 7(5) = 1$
$-45 + 35 = 1$
$-10 = 1$
They do not match. Therefore, (3, 5) is not a solution for this system.

(- 4, - 1)
14. $-5x + y = 19$
$x - 7y = 3$

$-5(-4) + (-1) = 19$
$20 - 1 = 19$
$19 = 19$
They macth for the first one, but the ordered pair must match for both equations to be a solution for the system. Plug the ordered pair into the second equation.
$-4 - 7(-1) = 3$
$-4 + 7 = 3$
$3 = 3$
The solution match for both equations. Therefore, it is a solution to the system.

(6, 1)
15. $-2x + y = 11$
$-x - 9y = -15$
$-2(6)+1 = 11$
$-12 + 1 = 11$
$-11 = 11$
They do not match for the first equation. Therefore, it is not a solution to the system.

Write a linear equation for each situation and answer the given question. **Show all work!!!!**

16. The sum of two numbers is 24. The second number is 6 less than the first. What are the two numbers? Yield Word

X = first number
Y = second number

Solution (15 and 9)

First equation
x + y =24

Second equation
y = x -6

System: Best method to use is substitution because "y" is by itself.

x + y =24
y = x -6

Plug the second equation into the first equation.
x + x -6 = 24
Combine the like terms: 2x – 6 = 24
Solve the two step equation: Add 6 to both sides: 2x = 30 Divide each side by 2: x = 15
Plug in the value for "x" into the second equation: y = 15 – 6: y = 9

17. Kerry and Luke biked a total of 18 miles in one weekend. Kerry biked 4 miles more than Luke. How far did each boy bike? Yield word

X = Kerry
Y = Luke

Solution: Kerry 11 miles and Luke 7 miles

Total miles equation
x + y = 18

Kerry's miles Equation
x = y +4

System: Best method to use is substitution because "x" is by itself.

x + y = 18
x = y +4

Plug the second equation into the first equation.
y + 4 + y = 18
Combine the like terms: 2y + 4 = 18
Solve the two step equation: Subtract 4 from both sides: 2y = 14 Divide each side by 2: y = 7
Plug in the value for "y" into the second equation: x = 7 + 4: x = 11

18. If a system of linear equations has infinitely (many) solutions, then the graph of the system is _____one or same ____ line.

19. When solving a system of equation by substitution, the equations must have _____opposite_____ coefficients.

20. If the result, when solving a system of equations by elimination or substitution is, 4=4. What is the solution is solution._____Many/Infinite_____

21. If there are no solutions to a system of linear equations then the graph of that system will have _____Parallel lines_____.

22. What is the solution to a system called? _____ordered pair_____

Identify the system of equations that has one solution, no solution and infinite solutions.

23. $-3x + y = -1$
$y = 3x + 4$

Best method to use substitution.
1. Plug the second equation into the first.
2. $-3x + 3x + 4 = -1$
3. Combine like terms:-3x and 3x cancel each other out.
4. $4 = 1$ They do not match.
No solution to the system.

24. $2x - y = -3$
$-4x + 2y = 6$

24. Best method is elimination
1. Multiply the first equation by -2: $4x - 2y = -6$
2. New system: $4x - 2y = -6$
$-4x + 2y = 6$
3. Add the equations: $0 = 0$
4. Many/ Infinite Solutions

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

The "y" values are already opposites. Therefore, the best method is elimination of the "y" value. $x = -6$
$2x = -3$

1. Add the equations: $x = -6$
$2x = -3$
$3x = -9$
2. Divide each side by 3: $x = -3$
3. Plug in the value for "x" into the first original equation: $-3 - 3y = -6$
4. Add 3 to both sides of the equal sign. $-3y = -3$ Divide each side by -3: $y = -1$