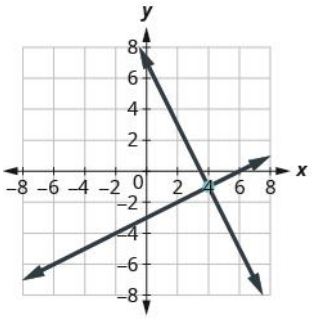
LESSON 3

SOLVING SYSTEMS OF LINEAR EQUATIONS: INFINITE OR NO SOLUTIONS

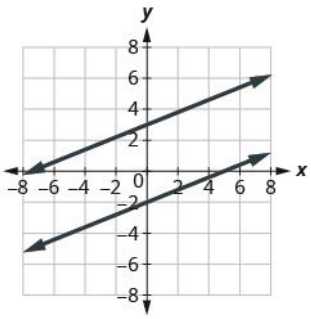
So far, we have looked at equations where there is exactly one solution. It is possible to have more than one solution in other types of equations that are not linear, but it is also possible to have no solutions or infinite solutions. No solution would mean that there is no answer to the equation. It is impossible for the equation to be true no matter what value we assign to the variable. Infinite solutions would mean that any value for the variable would make the equation true. The figure below shows the graph of equations with one solution, no solution, or infinite solutions.



One solution

The lines intersect.
Intersecting lines have one point in common.
There is one solution to this system.

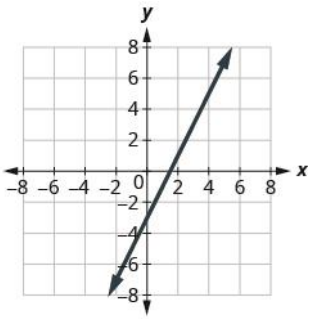
Consistent
Independent



No solution

The lines are parallel.
Parallel lines have no points in common.
There is no solution to this system.

Inconsistent



Infinitely many solutions

Both equations give the same line.
Because we have just one line, there are infinitely many solutions.

Consistent
Dependent

Example 1. No Solution

$4(8n-1)=19+32n$

$32n-4=19+32n$ By subtraction

$----------$

$-4=19$

Since - 4 cannot = 19, then this equation does not have a solution.

Example 2. No Solution

$x=9-2y \Rightarrow x+2y=9$

$x+2y=13 \Rightarrow x+2y=13$

$x+2y=9$

$x+2y=13$ By subtraction.

$------$

$0=-4$

Since 0 cannot = - 4 then this equation does not have a solution.

Example 3. Infinite Solutions

$9x-3y=12 \Rightarrow -3y=-9x+12 \Rightarrow y=3x-4$

$y=3x+4 \Rightarrow y=3x-4$

$y=3x-4$

$y=3x-4$

These are identical equations therefore they are the same line and as a result there are infinite solutions.

Example 4. Infinite Solutions

$x+3y=2 \Rightarrow x+3y=2$

$3x+9y=6 \Rightarrow x+3y=2$ Divide by 3.

These are identical equations therefore they are the same line and as a result there are infinite solutions.

Lesson 3 Exercise

State whether there is No Solution or there are Infinite Solutions for each equation.

1) $6x+3-6x=3$

2) $0=-4p+4p$

3) $1=5+p-p$

4) $a-a=-5$

5) $0=4x-4x$

6) $7=6-4r+4r$

7) $154=-4(8+6r)+24r$

8) $-28=-7(3x+4)+21x$

SOLUTIONS

Lesson 1 Exercise

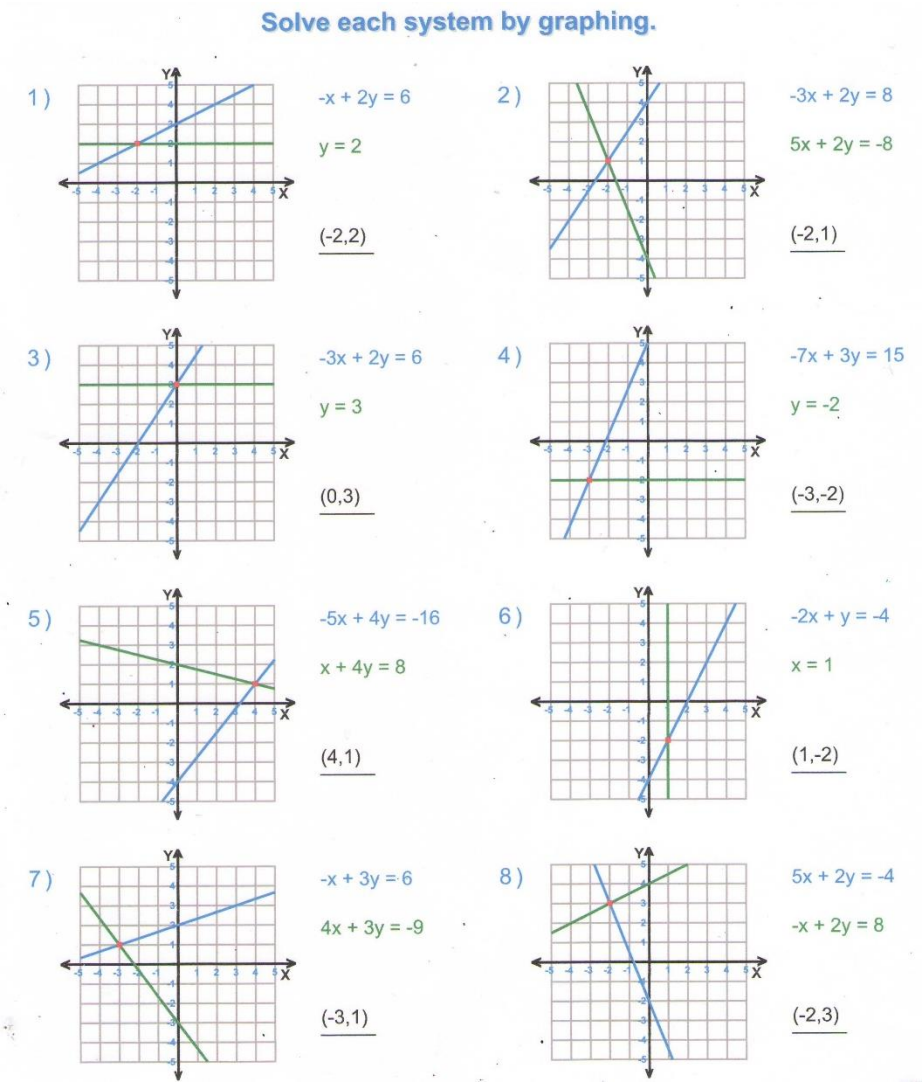
Solve by the Substitution Method

1. (2, 3)
2. (- .5, 1.25)
3. (1, 5)
4. (- 2, - 2)
5. (9.5, -4)
6. (0.33, 0)
7. (10, -3)
8. (6, -5)

Solve by the Elimination Method

1. (4, 2.4)
2. (3, - 3)
3. (-3.86, -4)
4. (1, 10)
5. (7, - 4)
6. (0.44, - 2)
7. (15, 0.5)
8. (8, 6)

Lesson 2 Exercise



Lesson 3 Exercise

1. Infinite Solutions.
2. Infinite Solutions
3. No Solution
4. No Solution
5. Infinite Solutions
6. No Solution
7. No Solution
8. Infinite Solutions
9. No Solutions
10. No Solution
11. No Solution
12. Infinite Solutions