

Lesson 7: Classification of Solutions

Classwork

Exercises

Solve each of the following equations for *x*.

1. 7x - 3 = 5x + 5

2. 7x - 3 = 7x + 5

3. 7x - 3 = -3 + 7x



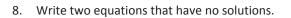
Give a brief explanation as to what kind of solution(s) you expect the following linear equations to have. Transform the equation into a simpler form if necessary.

4. 11x - 2x + 15 = 8 + 7 + 9x

5. 3(x - 14) + 1 = -4x + 5

6. -3x + 32 - 7x = -2(5x + 10)

7.
$$\frac{1}{2}(8x+26) = 13 + 4x$$



9. Write two equations that have one unique solution each.

10. Write two equations that have infinitely many solutions.



Lesson Summary

There are three classifications of solutions to linear equations: one solution (unique solution), no solution, or infinitely many solutions.

Equations with no solution will, after being simplified, have coefficients of x that are the same on both sides of the equal sign and constants that are different. For example, x + b = x + c, where b, c are constants that are not equal. A numeric example is 8x + 5 = 8x - 3.

Equations with infinitely many solutions will, after being simplified, have coefficients of x and constants that are the same on both sides of the equal sign. For example, x + a = x + a, where a is a constant. A numeric example is 6x + 1 = 1 + 6x.

Problem Set

- 1. Give a brief explanation as to what kind of solution(s) you expect the linear equation to have: $18x + \frac{1}{2} = 6(3x + 25)$. Transform the equation into a simpler form if necessary.
- 2. Give a brief explanation as to what kind of solution(s) you expect the linear equation to have: 8 - 9x = 15x + 7 + 3x. Transform the equation into a simpler form if necessary.
- 3. Give a brief explanation as to what kind of solution(s) you expect the linear equation to have: 5(x + 9) = 5x + 45. Transform the equation into a simpler form if necessary.
- 4. Give three examples of equations where the solution will be unique, that is, only one solution is possible.
- 5. Solve one of the equations you wrote in problem 4 and explain why it is the only solution.
- 6. Give three examples of equations where there will be no solution.
- 7. Attempt to solve one of the equations you wrote in problem 6 and explain why it has no solution.
- 8. Give three examples of equations where there will be infinitely many solutions.
- 9. Attempt to solve one of the equations you wrote in problem 8 and explain why it has infinitely many solutions.