## Unit 4 - Lesson 7

Classification of Solutions

Name: $\qquad$
Date: $\qquad$ Period: $\qquad$

Focus Standard: 8.EE.C. 7 Solve linear equations in one variable.
a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x=a$, $a=a$, or $a=b$ result (where $a$ and $b$ are different numbers).
b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

## Student Outcomes

- Students know the conditions for which a linear equation will have a unique solution, no solution, or infinitely many solutions.


## Exercises

Solve each of the following equations for $x$.

1. $7 x-3=5 x+5$
2. $7 x-3=7 x+5$
3. $7 x-3=-3+7 x$

Without solving the equations, identify the number of solutions, if any, each will have:

$$
3 x+4=8 x-9
$$

$12-15 x=-2-15 x$
$\qquad$
$-2 x+5=-2 x+5$
$6 x+5=8+6 x$
$\qquad$
$\frac{5}{4} x-1=1+\frac{5}{4} x$
$10 x-4=-4+10 x$
$\qquad$
$-4 x-5=6-11 x$
$\qquad$
$9+\frac{1}{2} x=5 x-1$
$\qquad$

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. $11 x-2 x+15=8+7+9 x$
5. $3(x-14)+1=-4 x+5$
6. $-3 x+32-7 x=-2(5 x+10)$
7. $\frac{1}{2}(8 x+26)=13+4 x$
8. Write two equations that have no solutions.
9. Write two equations that have one unique solution each.
10. Write two equations that have infinitely many solutions.

## Problem Set

1. Give a brief explanation as to what kind of solution(s) you expect for the linear equation $18 x+\frac{1}{2}=6(3 x+25)$. Transform the equation into a simpler form if necessary.
2. Give a brief explanation as to what kind of solution(s) you expect for the linear equation $8-9 x=15 x+7+3 x$. Transform the equation into a simpler form if necessary.
3. Give a brief explanation as to what kind of solution(s) you expect for the linear equation $5(x+9)=5 x+45$. Transform the equation into a simpler form if necessary.

4a. Give an example of an equation where the solution will be unique, that is, only one solution is possible.

4b. Solve the equation you wrote in Problem 4a, and explain why it is the only solution.

5a. Give an example of an equation where there will be no solution.

5b. Attempt to solve the equation you wrote in Problem 5a, and explain why it has no solution.

6a. Give an example of an equation where there will be infinitely many solutions.

6b. Attempt to solve the equation you wrote in Problem 6b, and explain why it has infinitely many solutions.

