**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

**U10 CW #1** Solving Multi-Step Linear Equations with Different Solving Outcomes

For the following to problems, write a what step we took IN YOUR OWN WORDS for each letter, then explain what the solution means in the context of the original equation.

1. $-6x+5=3x-19+3x$
	1. $-6x+5=3x+3x-19$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. $-6x+5=6x-19$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. $-6x-6x+5=6x-6x-19$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. $-12x+5=-19$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	5. $-12x+5-5=-19-5$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	6. $-12x=-24$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	7. $\frac{-12x}{-12}=\frac{-24}{-12}$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	8. $ x =2$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. $8x-7=3x-7+5x$
	1. $8x-7=3x+5x-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. $8x-7=8x-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. $8x-8x-7=8x-8x-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. $-7=-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. $6x+15=2x-7+4x$
	1. $6x+15=2x+4x-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. $6x+15=6x-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. $6x-6x+15=6x-6x-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	4. $15=-7$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Up to this point, we have solved linear equations with a unique solution (**one solution**). In this lesson, we encounter equations that when solved have **infinitely many solutions** and **no solutions**.

1. Consider the following model for the equation $2\left(x+3\right)= 2x+6 $:

|  |  |
| --- | --- |
|  |  |

1. Make some observations about the model above.
2. Solve the equation.
3. What happened when you solved the equation? What is it about the structure of the equation that led to the solution?
4. Build your own equation that would result in the same solution as the one above.
5. Solve the equation you built. What do you notice?
6. Consider the following model for the equation $2x+8=2x+4 $:

|  |  |
| --- | --- |
|  |  |

* 1. Make some observations about the model above.
	2. Solve the equation.
	3. What happened when you solved the equation? What is it about the structure of the equation that led to the solution?
	4. Build or draw your own equation using your tiles that would result in the same solution as the one above.
	5. Solve the equation you built. What do you notice?
1. **Directions:** Without solving completely, determine the number of solutions by examining the structure of the equation. (Think about the patterns we examined on the first page.)

|  |  |  |
| --- | --- | --- |
| 1. $6a-3=3(2a-1)$
 | 1. $5x-2=5x$
 | 1. $8x-2x+4=6x-1$
 |
| 1. $5m+2=3m-8$
 | 1. $2\left(3a-12\right)=3(2a-8)$
 | 1. $\frac{3x-12}{3}=x+4$
 |
| 1. $\frac{2x+2}{4}=\frac{x+1}{2}$
 | 1. $x+\frac{1}{5}=\frac{x+1}{5}$
 | 1. $\frac{x}{2}-4=\frac{1}{2}(x-8)$
 |

1. Consider the expression $4a-12$. Write 3 different expressions that if set equal to $4a-12$ would result in the equation having infinite solutions.
2. Consider the expression $x+1$. Write 3 different expressions that if set equal to $x+1$ would result in the equation having no solution.
3. Consider the expression $2x+6$. Write 3 different expressions that if set equal to $2x+6$ would result in the equation having one solution.
4. Determine whether the equation $7x=5x$ has one solution, infinitely many solutions, or no solution. If it has one solution, determine what the solution is.
5. **Directions:** Solve the following equations. If there is one solution, state what the solution is. Otherwise, state if there are infinitely many solutions or no solution.

|  |  |
| --- | --- |
| 1. $x-1=x+1$
 | 1. $5x-10=10-5x$
 |
| 1. $4\left(m-3\right)=10m-6(m+2)$
 | 1. $4\left(x-4\right)=4x-16$
 |
| 1. $2x-5=2(x-5)$
 | 1. $3x=3x-4$
 |
| 1. $3v+5+2v=5(2+v)$
 | 1. $5-\left(4a+8\right)=5-4a-8$
 |
| 1. $\frac{2x+8}{2}=x+4$
 | 1. $\frac{1}{3}\left(x-2\right)=\frac{x}{3}-\frac{2}{3}$
 |

What is it about the structure of the solution that leads to one solution, infinitely many solutions, or no solution? Provide examples to support your claim.