4-8: Learning Goals

- Let's solve equations with different numbers of solutions.

4-8-1: Matching Solutions

Consider the unfinished equation $12(x-3)+18=$ _____. Match the following expressions with the number of solutions the equation would have with that expression on the right hand side.

A. $6(2x-3)$

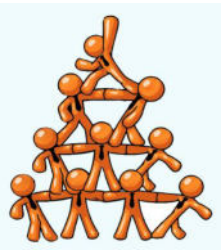
B. $4(3x-3)$

C. $4(2x-3)$

1. One solution?

2. No solutions?

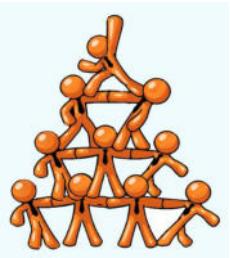
3. All solutions?



4-8-2: Thinking About Solutions Some More

Your teacher will give you some cards.

1. With your partner, solve each equation.
2. Then, sort them into categories.
3. Describe the defining characteristics of those categories and be prepared to share your reasoning with the class.



A	B
$7(x-5)=x+13$	$-6x=-5(x-1)-x$

4-8-3: Make Use of Structure

For each equation, determine whether it has no solutions, exactly one solution, or is true for all values of x (and has infinitely many solutions). If an equation has one solution, solve to find the value of x that makes the statement true.

1. a. $6x + 8 = 7x + 13$

   b. $6x + 8 = 2(3x + 4)$

   c. $6x + 8 = 6x + 13$

2. a. $\frac{1}{4}(12 - 4x) = 3 - x$

   b. $x - 3 = 3 - x$

   c. $x - 3 = 3 + x$

3. a. $-5x - 3x + 2 = -8x + 2$

   b. $-5x - 3x - 4 = -8x + 2$

   c. $-5x - 4x - 2 = -8x + 2$

4. a. $4(2x - 2) + 2 = 4(x - 2)$

   b. $4x + 2(2x - 3) = 8(x - 1)$

   c. $4x + 2(2x - 3) = 4(2x - 2) + 2$

5. a. $x - 3(2 - 3x) = 2(5x + 3)$

   b. $x - 3(2 + 3x) = 2(5x - 3)$

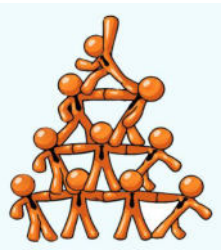
   c. $x - 3(2 - 3x) = 2(5x - 3)$

6. What do you notice about equations with one solution? How is this different from equations with no solutions and equations that are true for every x?

4-8: Lesson Synthesis

Write three equations with a variable term and a constant term on each side of the equation.

- one with no solution
- one with infinitely many solutions
- one with exactly one solution



4-8: constant term

In an expression like $5x+2$ the number 2 is called the constant term because it doesn't change when x changes.

4-8: Learning Targets

- I can solve equations with different numbers of solutions.

4-8-4: How Does She Know?

Elena began to solve this equation:

$$\frac{12x + 6(4x + 3)}{3} = 2(6x + 4) - 2$$
$$12x + 6(4x + 3) = 3(2(6x + 4) - 2)$$
$$12x + 6(4x + 3) = 6(6x + 4) - 6$$
$$12x + 24x + 18 = 36x + 24 - 6$$

When she got to the last line she stopped and said the equation is true for all values of x. How could Elena tell?