Solving 1-Variable Equations

A.REI.3 Solve linear equations and inequalities in one variable including equations with coefficients represented by letters.*For example, given ax + 3 = 7, solve for x.*

What am I learning today?

How to solve and explain an equation with variables on both sides

How will I show that I learned it?

Solve a 2-step equation explaining the property for each step

INB - "Simplifying Expressions"

An Algebraic Expression DOES NOT HAVE an = SIGN.

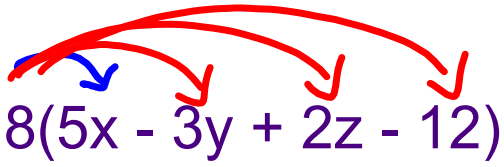
We can't **solve** an expression;
we can only **simplify**.

Combine Like Terms

$5x - 4y + 3x + 18 - 12x + 7y - 9$

$-4x + 3y + 9$

Distribute



$40x - 24y + 16z - 96$

Distribute AND Combine Like Terms

$7x - 5(2x - 4)$

$7x - 10x + 20$

$-3x + 20$

Combine Like Terms AND Distribute

$8(3x - 7 + 4x + 2)$

$8(7x - 5)$

$56x - 40$

Solving 1-variable equations

Step 1: Simplify each side by distributing and combining like terms.

Step 2: Move all variables to one side by eliminating the variables on the other side.

Step 3: Solve the resulting 2-step equation.

Not all steps will be used every time

$$4(2x - 3) = 12x + 4 - 2x$$

Step 1: $8x - 12 = 10x + 4$

Step 2: $-10x \qquad -10x$

$$-2x - 12 = 4$$

Step 3: $+12 \qquad +12$

$$\frac{-2x}{-2} = \frac{16}{-2} \qquad x = -8$$

Ex. A $3x - 8 = 5(x - 4)$ ck $3(6)-8=5(6-4)$

$10 = 10$ ✓

$3x-8=5x-20$

$-5x \quad -5x$

$-2x-8=-20$

$+8 \quad +8$

$-2x=-12$

$\frac{-2x}{-2}=\frac{-12}{-2}$

$x=6$

Ex. B $8(2x - 3) = 4(4x - 8)$

$16x - 24 = 16x - 32$

$-16x \qquad -16x$

$-24 \neq -32$ ✓

no solution

Ex. C $\frac{5x-2}{4} = 2x+7$

$5x-2 = 8x+28$

$-8x \quad -8x$

$-3x-2 = 28$

$+2 \quad +2$

$\frac{-3x}{-3} = \frac{30}{-3}$

$x = -10$

Ex. D $-3(x - 3) = x + 9 - 4x$

$-3x + 9 = -3x + 9$

$+3x \qquad +3x$

$9 = 9$

all $\mathbb{R}$ solutions

Ex. E $5(x + 2) = 7(3x - 6)$

$5x + 10 = 21x - 42$

$-21x \quad -21x$

$-16x + 10 = -42$

$-10 \quad -10$

$-16x = -52$

$\frac{-16x}{-16} = \frac{-52}{-16}$

$x = 3.25$

$\frac{13}{4}$

Ex. F $3 - 2(x - 1) = 4x + 7$

$3 - 2x + 2$

$-2x + 5 = 4x + 7$

$-4x \qquad -4x$

$-6x + 5 = 7$

$-5 \qquad -5$

$\frac{-6x}{-6} = \frac{2}{-6}$ $\quad x = -\frac{1}{3}$

Ex. G $2x-6=-\frac{1}{2}x+4$

$2x-6=-\frac{1}{2}x+4$

$+\frac{1}{2}x \qquad +\frac{1}{2}x$

$2.5x-6=4$

$+6 \quad +6$

$\frac{2.5x}{2.5}=\frac{10}{2.5}$ $x=4$

Ex. H $6\left(\frac{2}{3}x - 4\right) = \left(4x + \frac{5}{2}\right)6$

CD: 6

$4x - 24 = 24x + 15$

$-24x \qquad -24x$

$-20x - 24 = 15$

$+24 \qquad +24$

$\frac{-20x}{-20} = \frac{39}{-20}$

$x = -1.95$

Challenge: $\frac{3}{5}x - 3(x-6) = \frac{2}{3}x + \frac{8}{5}$