MTH1W

Math 9 – Unit 3: Solving Equations

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Lesson #2: Solving with Variables on Both Sides

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Learning Goal: We are learning to solve equations with variable on both sides.

In many equations that you will see for the rest of your Mathematical career (may it be long and fruitful), the variable will be scattered throughout the equation, even on both sides! The goal is to collect the variables on the same side and move all the constants to the other side.

a) $5x = 4x + 7$

$-4x \quad -4x$

$x = 7$

$5(7) = 35$

$4(7) + 7$

$28 + 7$

35

b) $5y = 9y - 8$

$-9y \quad -9y$

$\frac{-4y}{-4} = \frac{-8}{-4}$

$y = 2$

c) $-30 + 5x = 2x$

$-5x \quad -5x$

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

$10 = x$

d) $2w = 0.35 - 5w$

$+5w \quad +5w$

$\frac{7w}{7} = \frac{0.35}{7}$

$w = 0.05$

e) $2m + 3m = 8m - 3$

$5m = 8m - 3$

$-8m \quad -8m$

$\frac{-3m}{-3} = \frac{-3}{-3}$

$m = 1$

f) $5p - 3p = 6 - p$

$2p = 6 - p$

$+1p \quad +1p$

$\frac{3p}{3} = \frac{6}{3}$

$p = 2$

First clean up the sides before solving.

g) $8y = 5y + y + 14$

$8y = 6y + 14$

$-6y \quad -6y$

$\frac{2y}{2} = \frac{14}{2}$

$y = 7$

h) $3n = 10.1 + 9.9 - 2n$

$3n = 20 - 2n$

$+2n \quad +2n$

$\frac{5n}{5} = \frac{20}{5}$

$n = 4$

Variable = constants

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i) $8k-3=4k+17$

$-4k \quad +3 \quad -4k \quad +3$

$\frac{4k}{4}=\frac{20}{4}$

$k=5$

j) $-10x+14=18-2x$

$+2x \quad -14 \quad -14 \quad +2x$

$\frac{-8x}{-8}=\frac{4}{-8}$

$x=\frac{-1}{2}$ or $x=-0.5$

k) $2u+10=9-3u+11$

$2u+10=20-3u$

$-2u \quad -20 \quad -20 \quad -2u$

$\frac{-10}{-5}=\frac{-5u}{-5}$

$2=u$

l) $16+3x-9=-3+8x+10$

$7+3x=7+8x$

$-7 \quad -8x \quad -7 \quad -8x$

$\frac{-5x}{-5}=\frac{0}{-5}$

$x=0$

m) $-29k-18+11=-36k-10k-177$

$-29k-7=-46k-177$

$+46k \quad +7 \quad +46k \quad +7$

$\frac{17k}{17}=\frac{-170}{17}$

$K=-10$

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$0x=0 \qquad 6=6$

$0=0$ True! Infinite Solutions

n) $6x-4-2x=4x+8$

$4x-4=4x+8$

$-4x \quad +4 \quad -4x \quad +4$

$0x=12$

$0=12$ Not true ∴ undefined, no solution.

Success Criteria:

- I can solve equations by grouping variables on one side of the equation, and constants on the other side of the equation