Foundations of Algebra Unit 4: Equations & Inequalities Notes

Day 2 – Solving Multi-Step Equations

Multi-step equations mean you might have to add, subtract, multiply, or divide all in one problem to isolate the variable. When solving multi-step equations, you are using inverse operations, which is like doing PEMDAS in reverse order.

Multi - Step Equations with Combining Like Terms

Practice: Solve each equation, showing all steps, for each variable.

a. $-5n + 6n + 15 - 3n = -3$

$-2n + 15 = -3$

$-15 \quad -15$

$\frac{-2n}{-2} = \frac{-18}{-2}$

$n = 9$

b. $3x + 12x - 20 = 25$

$15x - 20 = 25$

$+20 \quad +20$

$\frac{15x}{15} = \frac{45}{15}$

$x = 3$

c. $-2x + 4x - 12 = 40$

$2x - 12 = 40$

$+12 \quad +12$

$\frac{2x}{2} = \frac{52}{2}$

$x = 26$

Multi - Step Equations with the Distributive Property

Practice: Solve each equation, showing all steps, for each variable.

a. $2(n + 5) = -2$

$2n + 10 = -2$

$-10 \quad -10$

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

$n = -6$

b. $4(2x - 7) + 5 = -39$

$8x - 28 + 5 = -39$

$8x - 23 = -39$

$+23 \quad +23$

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

$x = -2$

c. $6x - (3x + 8) = 16$

$6x - 3x - 8 = 16$

$3x - 8 = 16$

$+8 \quad +8$

$\frac{3x}{3} = \frac{24}{3}$

$x = 8$

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Multi – Step Equations with Variables on Both Sides

Practice: Solve each equation, showing all steps, for each variable

a. $5p - 14 = 8p + 4$

$-8p \quad -8p$

$-3p - 14 = 4$

$+14 \quad +14$

$-3p = 18$

$\frac{-3p}{-3} = \frac{18}{-3}$

$p = -6$

b. $8x - 1 = 23 - 4x$

$+4x \quad +4x$

$12x - 1 = 23$

$+1 \quad +1$

$\frac{12x}{12} = \frac{24}{12}$

$x = 2$

c. $5x + 34 = -2(1 - 7x)$

$5x + 34 = -2 + 14x$

$-14x \quad -14x$

$-9x + 34 = -2$

$-34 \quad -34$

$\frac{-9x}{-9} = \frac{-36}{-9}$

$x = 4$

Error Analysis with Solving Equations

1. Rachel solved the following equation on her homework. However, she solved it incorrectly. Describe the mistake Rachel made and what she should have done instead. Then resolve the equation to find the correct answer.

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$-2(7 - y) + 4 = -4$

$-14 - 2y + 4 = -4$

$-10 - 2y = -4$

$-2y = 6$

$y = -3$

Mistake: did not distribute the negative properly to each term

Correction Solution:

$-2(7-y) + 4 = -4$

$-4 \quad -4$

$-2(7-y) = -8$

$-14 + 2y = -8$

$+14 \quad +14$

$\frac{2y}{2} = \frac{6}{2}$

$y = 3$

2. Mikayla solved the following equation on her homework. However, she solved it incorrectly. Describe the mistake Mikayla made and what she should have done instead. Then resolve the equation to find the correct answer.

$2(x + 3) = -3(-x + 1)$

$2x + 6 = 3x - 3$

$5x + 6 = -3$

$5x = -9$

$x = -\frac{5}{9}$

Mistake: _____

Correction Solution:

$2(x+3) = -3(-x+1)$

$2x + 6 = 3x - 3$

$-3x \quad -3x$

$-x + 6 = -3$

$-6 \quad -6$

$\frac{-1x}{-1} = \frac{-9}{-1}$

$x = 9$