1.6 Solving Eqns W/Variables on Both Sides

Solving Equations with Variables on Both Sides

(1) • Eliminate grouping symbols by using the distributive property or eliminate fractions by multiplying all terms by the LCD or a common multiple.

(3) • Move the variable to one side of the equation by adding or subtracting.

(4) • Move the constant to the other side of the equation by adding or subtracting.

(2) • Combine like terms if there is any on either side of equal sign

(5) • Isolate the variable by multiplying or dividing the variable's coefficient

• It does not MATTER which side the variable is on. Pick a side and keep it consistent.

* Variables on the LEFT SIDE, make life easier in Unit 2! *

Example 1: Solve each equation. USE A SEPARATE SHEET TO DO EXAMPLES ON.

a.) $5y + 2 = 2y - 4$ {-2}

b.) $2n - 5 = 8n + 1$ {-1}

c.) $4x + 6 - 11 = x - 8x - 5$ {0}

d.) $2(x + 1) - 5 = 3 - (6x + 2)$ {1/2}

e.) $\frac{5}{6}x - \frac{1}{3} = \frac{3}{4}x + 2$ {28}

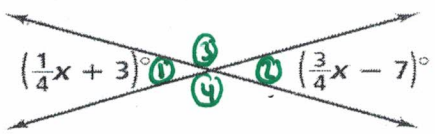
f.) $0.08x - 3 = 0.4x + 1$ {-12.5}

g.) $\frac{x}{5} = \frac{6}{4}$ {7.5}

h.) $\frac{b+2}{14} = \frac{b}{10}$ {5}

i.) $\frac{w+3}{4} = \frac{w-4}{6}$ {-17}

Vertical Angles (aka opposite angles) are opposite of each other when two lines cross. These angles are congruent (or equal) to each other.



∠1 and ∠2 are vertical angles / ∠3 and ∠4 are vertical angles

$\angle 1 = \angle 2$

$\frac{1}{4}x + 3 = \frac{3}{4}x - 7$

LCD = 4

$4(\frac{1}{4}x + 3) = 4(\frac{3}{4}x - 7)$

$1x + 12 = 3x - 28$

$-3x \quad -3x$

$-2x + 12 = -28$

$-12 \quad -12$

$-2x = -40$

$x = 20$

Types of Solutions for equations

There are 3 type of solutions an equation can have:

One solution – there is a variable equal to a constant

$x + 7 = 18 \longrightarrow x = 11$

Infinitely many (or identity) – where the variable cancels out and left with a TRUE STATEMENT.

Identity →

$2x - 5 = -(-2x + 5)$

$2x - 5 = 2x - 5$ ← The same on both sides.

$-2x \quad -2x$

$-5 = -5$ TRUE

All real #'s ← This is what you write

No solution (or $\emptyset$ symbol) – where the variable cancels out and left with a FALSE STATEMENT.

$3x - 7 = 3x + 5$

$-3x \quad -3x$

$-7 \neq 5$ NOT TRUE FALSE

NO SOLUTION

$\emptyset$

$\{\ \}$ ← Empty Set

3 to choose from!

Example 2: Solve each equation. Then determine its type of solution.

a.) $6m - 5 = 7m + 7 - m$

$6m - 5 = 6m + 7$

$-6m \quad -6m$ ← variables canceled out!

$-5 = 7$

(FALSE)

$\emptyset$ ← Solution

NO solution

Type of Solution

b.) $\frac{3x-1}{x+18} = \frac{1}{2}$

$2(3x-1) = 1(x+18)$

$6x - 2 = x + 18$

$-x \quad -x$

$5x - 2 = 18$

$+2 \quad +2$

$5x = 20$

$\frac{5}{5} \quad \frac{20}{5}$

$x = 4$

Variables did not cancel out! NORMAL EQUATION!

Solution ← $\{4\}$ one solution

Type of Solution

c.) $10 - 8a = 2(5 - 4a)$

$10 - 8a = 10 - 8a$ ← SAME ON BOTH SIDES

$+8a \quad +8a$

$10 = 10$

TRUE STATEMENT

ALL REAL NUMBERS

Identity

Solution

Type of Solution