Lesson 2: Solving Simple Equations

* "Solve" means figure out what the variable is
* isolate the variable by using opposite operations

Examples:

1) SOLVE

a) $2 + x = 6$

$x = 4$

b) $3x = -12$

$x = -4$

c) $\dfrac{x}{3} = 10$

$x = 30$

d) $12 - 2x = 3x + 42$

$\quad -3x \quad -3x$

$12 - 2x - 3x = 42$

$12 - 5x = 42$

$-12 \qquad -12$

$\dfrac{-5x}{-5} = \dfrac{30}{-5}$

$x = -6$

e) $12 - 2x = 3x + 42$

$-2x - 3x = 42 - 12$

$\dfrac{-5x}{-5} = \dfrac{30}{-5}$

$x = -6$

f) $2x + 6 = 17$

$2x = 17 - 6$

$\dfrac{2x}{2} = \dfrac{11}{2}$

$x = \dfrac{11}{2}$

* leave as reduced
    fraction

2) SOLVE AND CHECK.

$$1.98y - 3.96 - 0.99y - 2.97 = 1.32y$$
$$0.99y - 6.93 = 1.32y$$
$$0.99y = 1.32y + 6.93$$
$$0.99y - 1.32y = 6.93$$
$$\frac{-0.33y}{-0.33} = \frac{6.93}{-0.33}$$
$$y = -21$$

Check : y = -21

LS	RS
$1.98y - 3.96 - 0.99y - 2.97$	
$= 1.98(-21) - 3.96 - 0.99(-21) - 2.97$	$1.32y$
$= -27.72$	$= 1.32(-21)$
	$= -27.72$

$$\therefore LS = RS, \quad y = -21$$

Lesson 3: Solving Equations With Brackets

* Get rid of brackets first using the distributive property.

EXAMPLE: Solve

$$3(2x-1) - (x+1) = 15 - 3(5x - 2)$$

$$6x - 3 - x - 1 = 15 - 15x + 6$$

$$5x - 4 = 21 - 5x$$

$$5x + 15x = 21 + 4$$

$$\frac{20x}{20} = \frac{25}{20}$$

$$x = \frac{5}{4}$$

* Get rid of brackets first using the distributive property

Example 2   Solve

$$3(2x-1)-[6x+1] = (6-3)(9x-2)$$

$$6x-3-6x-1 = 15-15x+6$$

$$-4 = 21-15x$$

$$-25 = -15x$$

$$\frac{-25}{-15} = \frac{-15x}{-15}$$

$$x = \frac{5}{3}$$

Lesson 4: Solving Equations Involving Rationals

Example: Solve

a) $9 = \frac{3}{2}x + 6$

$9 - 6 = \frac{3}{2}x$

$2(3) = \left(\frac{3}{2}x\right)2 \longrightarrow \frac{2}{3}(3) = \left(\frac{3}{2}x\right)\frac{2}{3}$

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

$2 = x$

$2 = x$

*multiply every term by the lowest common denominator.

b) $\frac{1}{2}x - \frac{4}{5}x = \frac{-1}{10}x - 6$

$\frac{1}{2}x - \frac{4}{5}x + \frac{1}{10}x = -6$

$\frac{5}{10}x - \frac{8}{10}x + \frac{1}{10}x = -6$

$\frac{10}{-2}\left(\frac{-2}{10}x\right) = (-6)\frac{10}{-2}$

$x = 30$

c) $\frac{1}{2}x - \frac{4}{5}x = \frac{-1}{10}x - 6$

$\frac{10}{1}\left(\frac{1}{2}x\right) - \frac{10}{1}\left(\frac{4}{5}x\right) = \frac{10}{1}\left(\frac{-1}{10}x\right) - (6)10$

$5x - 8x = -1x - 60$

$-3x + x = -60$

$\frac{-2x}{-2} = \frac{-60}{-2}$

$x = 30$

d) $7 + \frac{1}{3}(4x-5) = \frac{4}{7}(4x+1)$

$21(7) + (21)\frac{1}{3}(4x-5) = (21)\frac{4}{7}(4x+1)$

$147 + 7(4x-5) = 12(4x+1)$

$147 + 28x - 35 = 48x + 12$

$112 + 28x = 48x + 12$

$28x - 48x = 12 - 112$

$-20x = -100$

$x = 5$