Solving Equations

General steps for solving (simple) equations:

1. Use the distributive property to remove parentheses.
   or
   Multiply each term by the least common denominator to remove fractions.
2. Combine like terms on each side of the equation.
3. "Move" all variable terms to one side of the equation.
4. "Move" all constant terms to the other side of the equation.
5. Divide both sides by the coefficient.
6. Check to see that the solution works in the original equation.

Example 1

$$-4(2x+5) = 2(-x-9) - 4x$$

$-8x - 20 = -2x - 18 - 4x$

$-8x - 20 = -6x - 18$

$+8x \qquad +8x$

$-20 = 2x - 18$

$+18 \qquad +18$

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

$-1 = x$

Example 2

$\frac{2}{3}x - 7 = 5$

$+7 \quad +7$

$\frac{2}{3}x = 12$

$\frac{3}{2}\cdot\frac{2}{3}x = \frac{12}{1}\cdot\frac{3}{2}$

$x = 18$

Example 3

$30\left[\frac{2}{5}k + \frac{1}{6} = \frac{3}{10}k + \frac{1}{3}\right]$

$\frac{30}{1}\cdot\frac{2}{5}k = 12k$

$\frac{30}{1}\cdot\frac{3}{10}k$

$12k + 5 = 9k + 10$

$-9k \qquad -9k$

$3k + 5 = 10$

$-5 \quad -5$

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

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

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Solving Literal Equations

**Isolate the desired variable*

1. $P = 2L + 2w$ Solve for w.

$-2L \quad -2L$

$\frac{P-2L}{2} = \frac{2w}{2}$

$\frac{P-2L}{2} = w$ OR $\frac{P-2L}{2} = \frac{P}{2} - \frac{2L}{2} = \frac{P}{2} - L$

2. Solve $2y + xy = 6$ for y.

$y(2+x) = 6$

$\frac{y(2+x)}{(2+x)} = \frac{6}{(2+x)}$

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

CAUTION:

$\frac{6}{2+x} \neq \frac{6}{2} + \frac{6}{x}$

Solve the equation for y. Then find the value of y when $x = 2$.

$3 = 2xy - x$

$+x \qquad +x$

$3 + x = 2xy$

$\frac{3+x}{2x} = \frac{2xy}{2x}$

$\frac{3+x}{2x} = y \longrightarrow \frac{3+2}{2(2)} = \frac{5}{4}$