Simplifying Expressions

Objectives: To use the Distributive Property and to simplify algebraic expressions.

VOCABULARY
- **Term** - a number, a variable, or a product of a number & variable(s)
- **Constant** - a term that has no variable (a number by itself)
- **Coefficient** - a numerical factor of a term (the number in front of a variable)
- **Like Terms** - exactly the same variable and power
- **Evaluate** - substitute and simplify

Distributive Property
- For every real number \(a\), \(b\), and \(c\),
  \[ a(b + c) = ab + ac \]
  \[ a(b - c) = ab - ac \]

Examples
- a) \(6(m+5)\)  Solutions  a) \(6m + 30\)
- b) \(2(3-7t)\)  b) \(6 - 14t\)
- c) \((0.4+1.1c)(3)\)  c) \(3(0.4) + 3(1.1c) = 1.2 + 3.3c\)

Examples
- d) \(4(2x+1)\)  d) \(8x + 4\)
- e) \(-3(7-5b)\)  e) \(-21 + 15b\) or \(15b - 21\)
- f) \((3-8c)(-1)\)  f) \(-3 + 8c\) or \(8c - 3\)

Combining Like Terms
1. Simplify using the Distributive Property.
2. Find terms that have the same variable to the same power.
3. Combine (add) their coefficients and keep the same variable.
4. Combine any terms are constants (plain numbers with no variables).
Examples

- g) 7y + 6y - 4 \quad \text{Solutions} \quad g) = 13y - 4
- h) 2 + 3t - t - 1 \quad h) = 2t + 1
- i) -9w^3 - (-3w^3) \quad i) = -6w^3
- j) 7 + 8d + d \quad j) = 7 + 9d or 9d + 7

More Examples

- k) 12 - 3(4x - 2) \quad l) -7 - 4(3 - x)
  \quad = 12 - 12x + 6 \quad = -7 - 12 + 4x
  \quad = -12x + 18 \quad = 4x - 19

Evaluating an Expression

1. Substitute the given value for the variable.
2. Simplify using the Order of Operations.

Evaluate if \( x = 2 \).

- m) 4x + 3 \quad \text{Solutions} \quad m) = 4(2) + 3 = 8 + 3 = 11
- n) -3x + 6 \quad n) = -3(2) + 6 = -6 + 6 = 0
- o) x^2 - 10x + 25 \quad o) = 2^2 - 10(2) + 25
  \quad = 4 - 20 + 25 = 9
- p) (x - 5)^2 \quad p) = (2 - 5)^2 = (-3)^2 = 9

Translating words to symbols

1. Read the problem from left to right.
2. Substitute as you read using the key words we've learned.

Translate into symbols.

- q) -2 times the sum of \( t \) and 7
- r) the product of 14 and 8 plus \( w 

\text{SOLUTIONS} 
- q) -2(t + 7)
- r) 14(8 + w)
Translate and find the value if $x = -3$.

- s) The quotient of $x$ and 5
- t) The product of $x$ and -2, decreased by 5

SOLUTIONS

s) $\frac{x}{5} = \frac{-3}{5}$

$-2x - 5 = -2(-3) - 5 = 6 - 5 = 1$

SUMMARY

- Distributive Property – multiply everything inside grouping symbol by term outside grouping symbol
- For example: $3(4 - x) = 3(4) - 3(x) = 12 - 3x$

- Like Terms – combine terms that have the same variable to the same power
- For example: $3x + y^2 - 2x = x + y^2$