



**Unit 1:**  
**Lesson 05**

**Evaluating expressions that distribute negative numbers**  
**Nested groups**

Using the **distributive property**, we can write:

$$a(b - c + d) = ab - ac + ad$$

Be especially careful when  $a$  is negative as in some of the following examples.

**Example 1:** Simplify  $2p - 6(5 - 4p)$

$$\begin{aligned} 2p - 6(5 - 4p) \\ = 2p - 30 + 24p \\ = \boxed{26p - 30} \end{aligned}$$

**Example 2:** Simplify  $3(5y - 1) - 2(4 + y)$

$$\begin{aligned} 3(5y - 1) - 2(4 + y) \\ = 15y - 3 - 8 - 2y \\ = \boxed{13y - 11} \end{aligned}$$

A lone negative sign in front of a parenthesis means to **distribute in -1**.

$$-(a - b) = -a + b$$

**Example 3:** Simplify  $7x - (4 - 3x) + 1$

$$\begin{aligned} 7x - (4 - 3x) + 1 &= 7x - 4 + 3x + 1 \\ &= \boxed{10x - 3} \end{aligned}$$

**Example 4:** Simplify  $11m - (-m + n) - 12n$  and then evaluate at  $m = 2$  and  $n = 7$ .

$$\begin{aligned} 11m - (-m + n) - 12n \\ = 11m + m - n - 12n &= 12m - 13n \\ = 12 \cdot 2 - 13 \cdot 7 &= 24 - 91 = \boxed{-67} \end{aligned}$$

Grouping can be indicated with:

$$\{ \dots \}, [ \dots ], ( \dots ), \text{ or } | \dots | .$$

Nested grouping occurs when a group appears inside another group.  
For example:

$$\{ [ \dots ] \dots \}, [ \dots ( \dots ) ], \text{ etc.}$$

For such expression, simplify **the innermost group** first and work your way out.

**Example 5:** Simplify  $-x[-x(y - b) + xb]$

$$\begin{aligned} & -x[-x(y-b) + xb] \\ &= -x[-xy + xb + xb] \\ &= -x[-xy + 2xb] = \boxed{x^2y - 2x^2b} \end{aligned}$$

Do not distribute into an “absolute value” group.

If there is only a “+” in front of a parenthesis, simply drop the parenthesis pair (or any other grouping symbol pair except absolute value).

**Example 6:** Simplify  $-2x + (5x + 6) + 2|4 - 7|$

$$\begin{aligned} & -2x + (5x + 6) + 2|4 - 7| \\ &= -2x + 5x + 6 + 2|-3| \\ &= 3x + 6 + 2 \cdot 3 = 3x + 6 + 6 = \boxed{3x + 12} \end{aligned}$$

See **Calculator Appendix A** (and an associated video) for how to nest groups on the graphing calculator.

**Assignment:**

1. Simplify  $10 - (6x + 7)$

$$\begin{aligned}
 & 10 - \overbrace{1(6x+7)} \\
 & = \underbrace{10 - 6x - 7} \\
 & = \boxed{-6x + 3}
 \end{aligned}$$

2. Simplify  $-4(3z - 4) - (-10 + 5z)$

$$\begin{aligned}
 & -4\overbrace{(3z-4)} - \overbrace{1(-10+5z)} \\
 & = \underbrace{-12z + 16 + 10 - 5z} \\
 & = \boxed{-17z + 26}
 \end{aligned}$$

3. Simplify  $2 - 8(5p - 3) - 9p$  and evaluate at  $p = -1$ .

$$\begin{aligned}
 & 2 - \overbrace{8(5p-3)} - 9p = \underbrace{2 - 40p + 24 - 9p} \\
 & = 26 - 49p \\
 & = 26 - 49(-1) = 26 + 49 \\
 & = \boxed{75}
 \end{aligned}$$

4. Simplify  $1 - 2(2 - 5x) - (3x - 14)$  and evaluate if  $x = 2$ .

$$\begin{aligned}
 & 1 - \overbrace{2(2-5x)} - \overbrace{1(3x-14)} \\
 & = 1 - 4 + \underbrace{10x - 3x} + 14 \\
 & = \underbrace{-3 + 7x} + 14 \\
 & = 11 + 7x = 11 + 7 \cdot 2 = 11 + 14 = \boxed{25}
 \end{aligned}$$

5. After simplifying  $-8y - (4y + 6) + 12y$ , evaluate at  $y = -1$ .

$$\begin{aligned} & -8y - (4y + 6) + 12y \\ & = -8y - 4y - 6 + 12y \\ & = \cancel{-12y} - 6 + \cancel{12y} = \boxed{-6} \end{aligned}$$

6. Simplify  $b[(-x - y) - (x - y)]$

$$\begin{aligned} & b[-x - y - (x - y)] \\ & = b[-x - y - x + y] \\ & = b[-2x] \\ & = \boxed{-2bx} \end{aligned}$$

7. Simplify  $-5 - (-3) - \{-[-6 + 1]\}$

$$\begin{aligned} & -5 - (-3) - \{-[-6 + 1]\} \\ & = -5 + 3 - \{6 - 1\} \\ & = -5 + 3 - \{5\} = -2 - 5 \\ & = \boxed{-7} \end{aligned}$$

8. Simplify  $-2 - |-4 - 9| + (-4)(-4 - 2)$

$$\begin{aligned} & -2 - |-4 - 9| + (-4)(-4 - 2) \\ & = -2 - |-13| + (-4)(6) \\ & = -2 - 13 + 24 = -15 + 24 = \boxed{9} \end{aligned}$$

9. Simplify  $-7 - 2[(6x - 3)^2 - (5x - 7)]$

$$\begin{aligned} & -7 - 2[(6x - 3)^2 - (5x - 7)] \\ & = -7 - 2[12x - 6 - 5x + 7] = -7 - 2[7x + 1] \\ & = \underbrace{-7 - 14x - 2} = \boxed{-14x - 9} \end{aligned}$$

10. Simplify  $\{ x - 3[ 2(x + 4) - 1 ] \}$

$$\begin{aligned} x - 3[ 2(x + 4) - 1 ] &= x - 3[ 2x + 8 - 1 ] \\ &= x - 3[ 2x + 7 ] = x - 6x - 21 \\ &= \boxed{-5x - 21} \end{aligned}$$

11. Simplify  $-8z + (2z + 10) + 2|5 - 8|$

$$\begin{aligned} -8z + 2z + 10 + 2| -3 | \\ &= -6z + 10 + 2(3) \\ &= -6z + 10 + 6 \\ &= \boxed{-6z + 16} \end{aligned}$$

12. Simplify  $\frac{3(-x + 4)}{-(-x - 4)}$

$$\frac{3(-x + 4)}{-1(-x - 4)} = \boxed{\frac{-3x + 12}{x + 4}}$$

13. Simplify  $-2 - |-4 - 6| + (-5)(-1 - 3)$

$$\begin{aligned} -2 - |-4 - 6| + (-5)(-1 - 3) \\ &= -2 - |-10| + (-5)(-4) \\ &= -2 - 10 + 20 = -12 + 20 = \boxed{8} \end{aligned}$$

14. Simplify  $-(g + 4) + (9 - g)$  and then evaluate if  $g = 10$ .

$$\begin{aligned} & -1(\overbrace{g+4}) + 9 - g \\ & = -g - 4 + 9 - g \\ & = -2g + 5 = -2(10) + 5 = \boxed{-15} \end{aligned}$$

15. Simplify  $7x - 2(6x - 7) + 1$

$$\begin{aligned} & 7x - 2(\overbrace{6x-7}) + 1 \\ & = 7x - 12x + 14 + 1 \\ & = \boxed{-5x + 15} \end{aligned}$$

16. Simplify  $-5c - (8 - c) - 11$

$$\begin{aligned} & -5c - 1(\overbrace{8-c}) - 11 \\ & = -5c - 8 + c - 11 \\ & = \boxed{-4c - 19} \end{aligned}$$

17. Simplify  $-4x + (5x - 6) - 2|3 - 8|$

$$\begin{aligned} & -4x + 5x - 6 - 2|-5| \\ & = 1x - 6 - 2 \cdot 5 \\ & = 1x - 6 - 10 = \boxed{x - 16} \end{aligned}$$