



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 $7x - (4 - 3x) + 1$

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

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

$$\begin{aligned} 11m - 1(-m + n) - 12n \\ = 11m + m - n - 12n = 12m - 13n \\ = 12 \cdot 2 - 13 \cdot 7 = 24 - 91 = \boxed{-67} \end{aligned}$$

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 $10 - (6x + 7)$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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