

## Evaluating Algebraic Expressions With Integers

When evaluating algebraic expressions with integers, we substitute and evaluate exactly the same as when we were only using positive numbers. In this case, the parentheses we add during substitution can be really valuable. Let's look at an example:

**Example 1:** Evaluate  $3A + B^2$  when  $A = -5$  and  $B = -3$ .

We begin by substituting, and then we evaluate using the order of operations.

$$\begin{aligned}
 3A + B^2 &= 3(-5) + (-3)^2 && \longleftarrow \text{Substituting for } A \text{ and } B. \\
 &= 3(-5) + 9 && \longleftarrow \text{Evaluating the exponent part first.} \\
 &= -15 + 9 && \longleftarrow \text{Evaluating the multiplication next.} \\
 &= -6 && \longleftarrow \text{Evaluating the addition last.}
 \end{aligned}$$

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**Example 2:** Evaluate  $x^3 - 4x^2 + 5$  when  $x = -1$ .

We begin by substituting, then evaluate using the order of operations.

$$\begin{aligned}
 x^3 - 4x^2 + 5 &= (-1)^3 - 4(-1)^2 + 5 && \longleftarrow \text{Substituting.} \\
 &= -1 - 4(-1)^2 + 5 && \longleftarrow \text{Evaluating the left exponent first.} \\
 &= -1 - 4 \cdot 1 + 5 && \longleftarrow \text{Evaluating the right exponent second.} \\
 &= -1 - 4 + 5 && \longleftarrow \text{Multiplying comes after exponents.} \\
 &= -1 + -4 + 5 && \longleftarrow \text{Changing the subtraction to addition} \\
 & && \text{and changing the sign of the second} \\
 & && \text{number.} \\
 &= -5 + 5 && \longleftarrow \text{Adding the first two numbers.} \\
 &= 0 && \longleftarrow \text{Finishing the addition to finish} \\
 & && \text{the evaluation.}
 \end{aligned}$$

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Let's try some example exercises together. Evaluate each expression.

•  $5A + 4B$  when  $A = 5$  and  $B = -3$       •  $6x^2 + |5x| - 2$  when  $x = -3$

•  $\frac{A - B}{B - A}$  when  $A = 5$  and  $B = -4$       •  $(3x)^0$  when  $x = -5$

Now it's your turn. Evaluate each expression.

1.  $6B - 7A^2$  when  $A = -3$  and  $B = -2$     2.  $2x^2 + 5x + |x|$  when  $x = 5$

3.  $\frac{A - B}{B - A}$  when  $A = -5$  and  $B = 4$       4.  $|x + 3y| + x^0$  when  $x = 2$  and  $y = -3$