

1.8 Exponents & Order of Operations

Definition 1.8.1 (Exponentiation). shorthand notation for repeated multiplication
 $b^n = b \cdot b \cdot b \cdots$

Example 1.8.1. Evaluate each of the follow exponents.

1. 4^2
2. 6^3
3. $(-4)^3$
4. $(-1)^4$
5. -1^4

Simplifying Algebraic Expressions

- variable terms are like terms *if and only if* the exponent on the variables match
- the same rules as always apply

Example 1.8.2.
Simplify: $16x^2 + 5x^2$

Example 1.8.3.
Simplify: $7x^3 + x^3$

Example 1.8.4.
Simplify: $10x^2 + 8x^3$

PEMDAS - Order of Operations

1. do all operations within grouping symbols: $()$, $[]$, $\{\}$
2. evaluate all exponents
3. multiply and divide in the order they appear from left to right
4. add and subtract in the order they appear from left to right

P - Parenthesis E - Exponents M - Multiplication D - Division A - Addition S - Subtraction

Example 1.8.5.Simplify: $20 + 4 \cdot 3 - 17$ **Example 1.8.6.**Simplify: $6^2 - 24 \div 2^3 \cdot 3 - 1$ **Example 1.8.7.**Simplify: $(3 \cdot 2)^2$ **Example 1.8.8.**Simplify: $3 \cdot 2^2$ **Example 1.8.9.** Simplify fully:

$$4[3(6 - 11) + 5]$$

Example 1.8.10. Simplify fully:

$$\left(-\frac{1}{2}\right)^2 - \left(\frac{7}{10} - \frac{8}{15}\right)^2 (-18)$$

Example 1.8.11. Simplify fully:

$$25 \div 5 + 3[4 + 2(7 - 9)^3]$$

Example 1.8.12. Simplify fully:

$$\frac{2(3 - 12) + 6 \cdot 4}{2^4 + 1}$$

Example 1.8.13. Evaluate $-x^2 - 7x$ for $x = -2$.

Example 1.8.14. Simplify fully:

$$14x^2 + 5 - [7(x^2 - 2) + 4]$$