1-2 Order of Operations and Evaluating Expressions

1

Vocabulary

1. **power:** has two parts - a base and an exponent.
   Ex. 2^5 ← exponent (base: 2; power: 2^5)
2. **Exponent:** tells you how many times to use the base as a factor. Ex. $2^5 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2$
3. **base:** the number at the bottom of the power.
4. **simplify:** reducing an expression until it is a single numerical value. Ex: $2^5 = 32$

PEMDAS

- P – Parenthesis (grouping symbols) → parenthesis, brackets, braces, absolute value, divider bar
- E – Exponents (also includes roots $\sqrt{}$)
- MD – Multiply and Divide from left to right →
- AS – Add and subtract from left to right →

Example 1: Simplifying Powers

What is the simplified form of the expression?

A. $10^7 = 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 \cdot 10$
$= 10,000,000$

B. $(0.2)^5 = 0.2 \cdot 0.2 \cdot 0.2 \cdot 0.2 \cdot 0.2$
$= 0.00032$

Example 2:

What is the simplified form of each expression?

A. $(6-2)^3 \div 2$ parenthesis

$= (4)^3 \div 2$ exponents

$= 64 \div 2$ division

$= \boxed{32}$

B. $\frac{2^4 - 1}{5}$ exponent

$= \frac{16 - 1}{5}$ ← simplify numerator first by subtraction

$= \frac{15}{5}$ divide

$= \boxed{3}$

Example 3: Evaluating Algebraic Expressions

A. $x^2 + x - 12 \div y^2$

* what is the value of the expression for $x=5$ and $y=2$?

step 1: substitute values for x and y

$(5)^2 + (5) - 12 \div (2)^2$

step 2: solve using order of operations

$(5)^2 + (5) - 12 \div 2^2$ exponents

$= 25 + 5 - 12 \div 4$ division

$= 25 + 5 - 3$ addition + subtraction from L to R

$= 30 - 3$

$= \boxed{27}$

B. $(xy)^2 = (5 \cdot 2)^2$ substitute for x and y

$= (10)^2$ multiply inside parenthesis

$= \boxed{100}$ simplify the power