Lesson 9

Exponent Rules

Lesson

An exponent tells you how many times to multiply a base by itself:

    x^3 = x * x * x

Key exponent rules:

    Product Rule: x^a * x^b = x^(a+b)
    Quotient Rule: x^a / x^b = x^(a-b)
    Power Rule: (x^a)^b   = x^(a*b)
    Zero Exponent: x^0 = 1   (when x is not 0)
    Negative Exp: x^(-n) = 1 / x^n

Example: Simplify (2x^3)(5x^4)

Step 1: Multiply the coefficients: 2 * 5 = 10

Step 2: Apply the product rule to x: x^3 * x^4 = x^(3+4) = x^7

Result: 10x^7

Practice Problems

1) Simplify: x^5 * x^3

2) Simplify: y^8 / y^2

3) Simplify: (a^3)^4

4) Simplify: (3x^2)(4x^5)

5) Simplify: (2^3)^2

6) Evaluate: 5^0 + 3^(-2)

7) Simplify: (6m^7) / (2m^3)

8) Simplify: (x^2)^3 * x^4

9) Simplify: (2a^4)(3a^2) / (6a^3)

10) Evaluate: 4^(-1) + 2^(-2)

11) Simplify: (4x^3 y^2)(2x y^4)

12) Simplify: (3m^2)^3

13) Simplify: 15x^6 y^4 / (5x^2 y)

14) Evaluate: (2^3 * 2^2) / 2^4

15) Simplify: (x^4 / x^2)^3

16) Simplify: (2x^2)^3 * (3x)^2

17) Simplify: (5x^0 y^3)(4x^2 y^(-1))

18) Write 10^(-4) as a decimal.

19) Simplify: (a^2 b^3)^2 / (a^3 b)

20) A bacterium doubles every hour. Starting from 1 bacterium, write an expression for the count after t hours as a power of 2. Then evaluate it for t = 5.