

Laws of Exponents



Preliminaries

- The notation of exponents

$$(10)(10)(10)(10)(10)(10)(10) = 10^7$$

Objectives

- Laws of Exponents

Negative Exponents

$$\begin{aligned} 10^4 &= 10 \cdot 10 \cdot 10 \cdot 10 = 10,000 \\ 10^3 &= 10 \cdot 10 \cdot 10 = 1000 \\ 10^2 &= 10 \cdot 10 = 100 \\ 10^1 &= 10 = 10 \\ 10^0 &= 1 \\ 10^{-1} &= \frac{1}{10} = \frac{1}{10^1} \\ 10^{-2} &= \frac{1}{100} = \frac{1}{10^2} \end{aligned}$$

Multiplication = Adding Exponents

$$(b^3)(b^4)$$

$$(b \cdot b \cdot b) \cdot (b \cdot b \cdot b \cdot b) = b^7$$

$$b^3 \cdot b^4 = b^{3+4} = b^7$$

Division = Subtracting Exponents

$$\frac{b^2}{b^6} = \frac{b \cdot b}{b \cdot b \cdot b \cdot b \cdot b \cdot b}$$

$$= \frac{1}{b \cdot b \cdot b \cdot b} = \frac{1}{b^4}$$

$$= b^{-4}$$

Recap

$$b^1 = b$$

$$b^0 = 1$$

$$b^{-x} = \frac{1}{b^x}$$

$$b^x \cdot b^y = b^{x+y}$$

$$\frac{b^x}{b^y} = b^{x-y}$$

$$(b^x)^y = b^{x \cdot y}$$