

Digits 3-3/3-4

10/18/2018

Multiplication/Division of Exponents

Goal: I will be able to multiply and divide exponents

Try It! Practice, explain, consider, etc.

Here's How - Note & Examples

Vocabulary

$3x$
 ↑ ↑
 Coefficient Variable (base)
 ↑ ↑
 5 1x
 base Coefficient = 1
 base = x exponent = 1

$$5^4 = 5 \cdot 5 \cdot 5 \cdot 5$$

$$5^3 = 5 \cdot 5 \cdot 5$$

$$5^4 \cdot 5^3 = (5 \cdot 5 \cdot 5 \cdot 5)(5 \cdot 5 \cdot 5) = 5^7$$

$$3^5 \cdot 3^2 = 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 = 3^7$$

Rule to Multiply Exponents

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

$7a^3 \cdot 4a^5 = 28a^8$

you cannot simply add they need the same base to simplify

Try

$2x^2 = 2 \cdot x^2$

$7^3 \cdot 7^4 = 7^7$

$2x^2 \cdot 5x^2 = 10x^4$

$2x^2 \cdot 5x^3 = 10x^5$

$5x^2 \cdot 2x^2 = 10x^4$

Example

$$(3^2)^3 = (3^2)(3^2)(3^2)$$

Keep the same base = 3^6

$$(4^3)^5 = (4^3)(4^3)(4^3)(4^3)(4^3)$$

$$= (4 \cdot 4 \cdot 4)(4 \cdot 4 \cdot 4)(4 \cdot 4 \cdot 4)(4 \cdot 4 \cdot 4)(4 \cdot 4 \cdot 4)$$

$$= 4^{15}$$

Power to a Power

$$(x^m)^n = x^{m \cdot n}$$

Example

$$\frac{5^6}{5^2} = \frac{5 \cdot 5 \cdot 5 \cdot 5 \cdot 5 \cdot 5}{5 \cdot 5} = 5^4$$

$5^3 \cdot 5^4 \cdot 1$

$$\frac{x^5}{x^3} = \frac{x \cdot x \cdot x \cdot x \cdot x}{x \cdot x \cdot x} = x^2$$

Rule to Divide Exponents

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

Example

$$\left(\frac{5}{8}\right)^4 = \left(\frac{5}{8}\right)\left(\frac{5}{8}\right)\left(\frac{5}{8}\right)\left(\frac{5}{8}\right)$$

$$= \frac{5 \cdot 5 \cdot 5 \cdot 5}{8 \cdot 8 \cdot 8 \cdot 8}$$

$$= \frac{5^4}{8^4}$$

Rule

$$\left(\frac{x}{y}\right)^5 = \left(\frac{x}{y}\right)\left(\frac{x}{y}\right)\left(\frac{x}{y}\right)\left(\frac{x}{y}\right)\left(\frac{x}{y}\right)$$

$$= \frac{x \cdot x \cdot x \cdot x \cdot x}{y \cdot y \cdot y \cdot y \cdot y}$$

$$= \frac{x^5}{y^5}$$

$$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$$