

March 23, 2015
 Exponents & Multiplication
 of
 Polynomials

Mar 23-9:10 AM

Exponents
 $5^3 = 5 \cdot 5 \cdot 5$
 $= 25 \cdot 5$
 $= 125$
 ↑ Base
 ↑ Exponent

Mar 23-9:12 AM

Exponent Rules
 ① Product Rule
 $x^n \cdot x^m = x^{n+m}$
 * Same Base
Examples
 $x^2 \cdot x^3 = x^{2+3} = x^5$
 using meaning
 $x \cdot x \cdot x \cdot x \cdot x = x^5$

Mar 23-9:14 AM

- $x^{10} \cdot x^3 = x^{10+3} = x^{13}$
 - $x^{-8} \cdot x^5 = x^{-8+5} = x^{-3}$

Mar 23-9:19 AM

② Power Rule
 $(x^m)^n = x^{m \cdot n}$
 ↑ Base
Examples
 $(y^8)^2 = (y^8) \cdot (y^8)$
 $= y^{8+8} = y^{16}$
 $(y^8)^2 = y^{8 \cdot 2} = y^{16}$
 $(t^{20})^5 = t^{20 \cdot 5} = t^{100}$

Mar 23-9:20 AM

③ Quotient Rule
 $\frac{x^n}{x^m} = x^{n-m}$
Examples
 $\frac{x^3}{x^2} = \frac{\boxed{x} \boxed{x} x}{\boxed{x} \boxed{x}} = 1 \cdot 1 \cdot x = x$
 $\frac{x^3}{x^2} = x^{3-2} = x^1 = x$
 $\frac{x^{13}}{x^7} = x^{13-7} = x^6$

Mar 23-9:27 AM

Negative Exponent Rule

$$\frac{x^3}{x^2} = x^{3-2} = x^1 = x$$

* Meaning

$$\frac{x^2}{x^3} = \frac{\boxed{x} \cdot \boxed{x} \cdot 1}{\boxed{x} \cdot \boxed{x} \cdot \boxed{x}} = \frac{1}{x} = \frac{1}{x}$$

one

* Negative exponent rule

$$\frac{x^2}{x^3} = x^{2-3} = x^{-1} = \boxed{x^{-1}}$$

Same thing!

Mar 23-9:31 AM

Negative Exponent Rule

$$* x^{-n} = \frac{1}{x^n}$$

$$a^{-3} = \frac{1}{a^3}$$

$$3^{-3} = \frac{1}{3^3} = \frac{1}{3 \cdot 3 \cdot 3} = \frac{1}{27}$$

Mar 23-9:37 AM

$$\frac{x^5 y^3}{x^8 y^2} = x^{5-8} \cdot y^{3-2}$$

$$= x^{-3} \cdot y^1$$

$$= \frac{1}{x^3} \cdot \frac{y^1}{1}$$

$$= \frac{y}{x^3}$$

Mar 23-9:37 AM

$$\frac{t^{16} x^5}{t^5 x^8} = t^{16-5} \cdot x^{5-8-3}$$

$$= t^{11} \cdot \frac{1}{x^3} = \frac{t^{11}}{x^3}$$

Mar 23-9:44 AM

$$\frac{x^3}{x^3} = \frac{\boxed{x} \cdot \boxed{x} \cdot \boxed{x}}{\boxed{x} \cdot \boxed{x} \cdot \boxed{x}} = \boxed{1}$$

$$x^{3-3} = x^0 = \boxed{x^0}$$

* So, anything raised to the zero power is one!

Mar 23-9:47 AM