Curriculum Outcome

(N1) Demonstrate an understanding of powers with integral bases (excluding base 0) and whole number exponents by: representing repeated multiplication using powers; using patterns to show that a power with an exponent of zero is equal to one; solving problems involving powers.

(N2) Demonstrate an understanding of operations on powers with integral bases (excluding base 0) and whole number exponents.

Student Friendly:
“Laws of exponents : Reviewing all laws"

a) $\dfrac{(3m^4n^3)^4\,(2mn)^3}{(m^2n^4)^2}$

b) $\dfrac{(5x^3y^4)^2}{(3xy^2)^3}$

c) $\left(\dfrac{(a^4b^5)\,(2ab)^5}{(4a^3b)^2}\right)^2$

a) $\dfrac{(3m^4n^3)^4\,(2mn)^3}{(m^2n^4)^2}$

Top

$(3m^4n^3)^4$ $(2mn)^3$

$(3^4 m^{16} n^{12})$ $2^3 m^3 n^3$

$(81 m^{16} n^{12})$ $(8 m^3 n^3)$

$648\ m^{19} n^{15}$

Bottom

$(m^2n^4)^2$

$m^4 n^8$

$$\frac{\text{Top}}{\text{Bottom}} = \frac{648\ m^{19} n^{15}}{m^4 n^8}$$

$$\boxed{648\ m^{15} n^7}$$

b) $\dfrac{(5x^3y^4)^2}{(3xy^2)^3}$

Top

$(5x^3y^4)^2$

$5^2x^6y^8$

$25x^6y^8$

Bottom

$(3xy^2)^3$

$3^3x^3y^6$

$27x^3y^6$

$$\frac{25x^6y^8}{27x^3y^6}$$

$$= \frac{25}{27}x^3y^2$$

c) $\left(\dfrac{(a^4b^5)\,(2ab)^5}{(4a^3b)^2}\right)^2$

Top: $(a^4b^5)(2ab)^5$

$(a^4b^5)(2^5a^5b^5)$

$32a^9b^{10}$

Bottom: $(4a^3b)^2$

$4^2a^6b^2$

$16a^6b^2$

$\dfrac{\text{Top}}{\text{Bottom}} = \left[\dfrac{32a^9b^{10}}{16a^6b^2}\right]^2$

$[2a^3b^8]^2$

$2^2a^6b^{16}$

$4a^6b^{16}$

$(3x^3y^0)^2 \cdot (2xy^4)$

$3^2 x^6 y^0$

$(9x^6)(2x^1y^4)$

$18x^7y^4$

$$\frac{(4x^5y^2)^2}{(2x^2y)^3}$$

Top: $(4x^5y^2)^2$

$4^2 x^{10} y^4$

$16x^{10}y^4$

Bottom: $(2x^2y)^3$

$2^3 x^6 y^3$

$8x^6y^3$

$$\frac{16x^{10}y^4}{8x^6y^3} = 2x^4y^1$$

$$\frac{x^6}{x^8} = x^{-2} = \frac{1}{x^2}$$

Negative Exponent Law

If you have a negative exponent move it to the denominator

Example: $x^{-2} = \frac{1}{x^2}$

Example:

a) $3rx^{-5} = \frac{3r}{x^5}$

b) $2x^{-5}y^{6} = \frac{2y^6}{x^5}$

$$\frac{(2x^3) \cdot (3x^5y)}{(2x^2y^3)^2}$$

Top:

$(2x^3)(3x^5y)$

$6x^8y$

Bottom:

$(2x^2y^3)^2$

$2^2 \cdot 4x^4y^6$

$$\frac{6x^8y}{4x^4y^6} = \frac{3}{2}x^4y^{-5} = \frac{3x^4}{2y^5}$$

Exponent Laws

1) Zero Rule

-Anything raised to the exponent of zero is 1

$(-x)^0 = 1$ or $(x)^0 = 1$

2) Product of Powers Rule

When you multiply like bases you add the exponents

$$(a)^m \times (a)^n = (a)^{m+n}$$

3) Quotient Rule

When you divide like bases you Subtract the exponents

$$(a)^m \div (a)^n = (a)^{m-n}$$

4) Power to a Power Rule

With a power to a power we multiply exponents

$$(a^m)^n = (a)^{mxn}$$

5) Power of Product Rule

With a power of products we multiply exponents

$$[(a^m) \cdot (b^n)]^p = (a)^{mxp} \cdot (b)^{nxp}$$

6) Power of Quotient Rule

With a power of quotient we multiply exponents

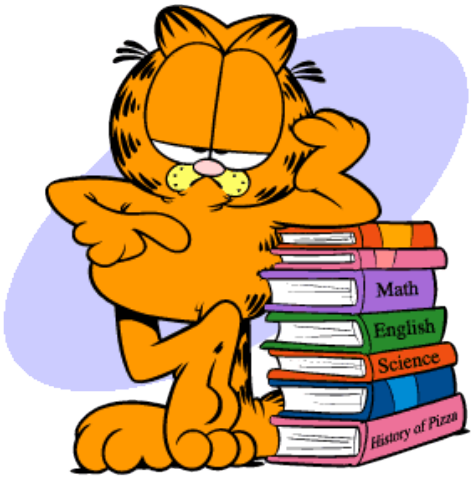
$$\left[\frac{(a)^m}{(b)^n}\right]^p = \frac{(a)^{mxp}}{(b)^{nxp}}$$

7) Negative Exponent Rule

If you have a negative exponent move it to the denominator

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

Exponent Laws



Class/Homework

Worksheet 2

Worksheet 3