8.3 Laws of Exponents
Dividing Monomials

Quotient of Powers - one power divided by another power

Quotient-of-Powers Property

$$\frac{x^m}{x^n} = x^{m-n}$$

* Note: Same base : Exponents subtract.

Examples #1: $\frac{2^6}{2^4} = 2^{6-4} = 2^2 = 4$

#2 $\frac{2^{10}}{2^5} = 2^{10-5} = 2^5 = 32$

#3 $\frac{y^{10}}{y} = y^{10-1} = y^9$

#4. $\frac{x^{m+1}}{x} = x^{m+1-1} = x^m$

What about monomials and division?

Example: $\frac{-4x^2y^5}{2xy^3} = \left(\frac{-4}{2}\right)\left(\frac{x^2}{x}\right)\left(\frac{y^5}{y^3}\right) = -2xy^2$

Separate into coefficients and like bases.

Example #2 $\frac{c^4b}{c^2a} = \left(\frac{c^4}{c^2}\right)\left(\frac{b}{a}\right) = \frac{c^2b}{a}$

Power-of-a fraction Property

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

Example #1 $\left(\frac{3}{4}\right)^2 = \frac{3^2}{4^2} = \frac{9}{16}$

#2 $\left(\frac{10}{5}\right)^4 = \frac{10^4}{5^4} = \frac{10000}{625} = 16$

#3 $\left(\frac{x^n}{y^n}\right)^2 = \frac{x^{2n}}{y^{2n}}$

8.4 Negative and Zero Exponents

Definition of a negative exponent

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

Example #1 $x^{-3} = \frac{1}{x^3}$

#2 $2^{-3} \cdot 2^2 = 2^{-1} = \frac{1}{2^1}$

#3 $\frac{7^5}{7^7} = 7^{5-7} = 7^{-2} = \frac{1}{7^2} = \frac{1}{49}$

#4. $(3^{-2})^2 = 3^{-4} = \frac{1}{3^4} = \frac{1}{81}$

Any non-zero number x, $x^0 = 1$

Anything to the zero power is 1.

Ex#1 $4^0 = 1$

#2 $x^0 = 1$

#3 $(xy)^0 = 1$

#4. $\frac{d^4 f^3}{d^6 f^3} = d^{4-6} f^{3-3}$

$d^{-2}(1) = \frac{1}{d^2}$

C.W. Pg 388 29, 32, 38, 52, 64
Pg 393 18, 27, 29, 46, 51

H.W. Pg 393 (20-51 Multiples of 4)
Pg 387 (20-64 Multiples of 4)