Product Property

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

$x^m \cdot x^n = x^{m+n}$

$x^8 \cdot x^{10} = x^{18}$

$x^7 \cdot x^{-3} = x^4$

Quotient Property

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

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

$\frac{x^{15}}{x^8} = x^7$

Negative Exponent

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

$x^{-4} = \frac{1}{x^4}$

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

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

Power of a Power

$(x^m)^n = x^{mn}$

$(x^2)^3 = x^2 \cdot x^2 \cdot x^2 = x^6$

Power of a Product

$(xy)^m = x^m y^m$

$(x^2y^3)^4 = x^8 y^{12}$

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

Power of a Quotient

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

$\left(\frac{x^4}{y^5}\right)^2 = \frac{x^8}{y^{10}}$

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

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

Zero Power

$x^0 = 1$

y^x

$5^0 = 1$

$127^0 = 1$

$(-12)^0 = 1$

$2x^0y^2z^0 = 2y^2$

ex A $(-5x^3y^4)(2x^7y^{-3}) = -10x^{10}y$

$-5 \cdot 2 \quad x^3 \cdot x^7 \quad y^4 \cdot y^{-3}$

p.314 Study Tip – to simplify

- no power of a power
- each base appears exactly once
- all fractions in simplest form
- no negative exponents

ex. B $(-2x^4y^{-2})^3 = -8x^{12}y^{-6} = \frac{-8x^{12}}{y^6}$

$(-2)^3 \quad (x^4)^3 \quad (y^{-2})^3$

ex. C $\frac{15m^4n^6}{-3m^7n^2} = -5m^{-3}n^4 = \frac{-5n^4}{m^3}$

$\frac{15}{-3} \quad \frac{m^4}{m^7} \quad \frac{n^6}{n^2}$

ex. D $\left(\frac{8x^8y^6}{2x^3y^3z^{-3}}\right)^3 = \left(\frac{4x^6y^4}{z^2}\right)^3 = \frac{64x^{18}y^{12}}{z^6}$

ex. E $(-5a^{-3}b^{2})^{3}(2a^{2}b^{2}c)$

$-125a^{-9}b^{6}(2a^{2}b^{2}c)$

$-250a^{-7}b^{8}c$

$\frac{-250b^{8}c}{a^{7}}$

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ex. F $\left(\frac{45x^{3}y^{6}z^{-8}}{5x^{-6}y^{3}z^{4}}\right)^{0} = 1$

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ex 6. $\frac{45x^{3}y^{6}z^{-8}}{7x^{-6}y^{3}z^{4}} = \frac{45}{7}x^{9}y^{3}z^{-12}$

$= \frac{45x^{9}y^{3}}{7z^{12}}$

$\frac{8^{9175}}{8^{9173}} = 8^{2} = 64$

$10^{5} \cdot 10^{12} = 10^{17}$

$\frac{10^{12}}{10^{5}} = 10^{7}$

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