Lesson 4.6:

Applying the Exponent Laws

(part 2)

Examples:

Simplify - write as a single power expressions with no negative exponents

$$m^{4} n^{-2} \cdot m^{2} n^{3} = m^{6} n$$

$$\frac{12x^4y^{-3}}{6xy^2}$$

$$\left(\frac{12}{6}\right)\left(\frac{x^4}{x}\right)\left(\frac{y^{-3}}{y^2}\right)$$

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

$$\left(25a^4b^2\right)^{\frac{3}{2}}$$

$$= \left(25^{\frac{3}{2}}\right)\left(a^4\right)^{\frac{3}{2}}\left(b^2\right)^{\frac{3}{2}}$$

evaluate

$$= \left(\sqrt{25}\right)^3 a^6 b^3$$

$$= 5^3$$

$$= 125a^6b^3$$

$$\left(x^3 y^{-\frac{3}{2}}\right)\left(x^{-1} y^{\frac{1}{2}}\right)$$

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

$= (x^2)(y^{-1})$

$= (x^2)\left(\frac{1}{y}\right) = \frac{x^2}{y}$

$$\left(\frac{50x^2y^4}{2x^4y^7}\right)^{\frac{1}{2}} = \left(\frac{50}{2}\times\frac{x^2}{x^4}\times\frac{y^4}{y^7}\right)^{\frac{1}{2}}$$

$$= (25\cdot x^{-2}\cdot y^{-3})^{1/2}$$

$$= 25^{1/2}\cdot x^{-1}\cdot y^{-3/2}$$

evaluate $\sqrt{25}$

$$= 5\cdot\frac{1}{x}\cdot\frac{1}{y^{3/2}} = \frac{5}{xy^{3/2}}$$

$$\frac{12x^{-5}y^{\frac{5}{2}}}{3x^{\frac{1}{2}}y^{-\frac{1}{2}}}$$

$$\left(\frac{12}{3}\right)\left(\frac{x^{-5}}{x^{1/2}}\right)\left(\frac{y^{5/2}}{y^{-1/2}}\right)$$

$$= 4x^{-11/2}y^{3} = \frac{4y^{3}}{x^{11/2}}$$

$$-5 - \tfrac{1}{2}$$

$$= -\tfrac{10}{2} - \tfrac{1}{2}$$

$$= -\tfrac{11}{2}$$

$$\tfrac{5}{2} - \left(-\tfrac{1}{2}\right)$$

$$= \tfrac{5}{2} + \tfrac{1}{2}$$

$$= \tfrac{6}{2} = 3$$

Example:

Simplify - then evaluate if a = 2 and b = -1

$$\frac{(ab^{-3})^4}{a^{-4}b^2} = \frac{a^4 b^{-3(4)}}{a^{-4}b^2}$$

$$= \frac{a^4}{a^{-4}} \cdot \frac{b^{-12}}{b^2}$$

$$= a^8 b^{-14}$$

$$\frac{a^8}{b^{14}} \quad \frac{2^8}{(-1)^{14}}$$

$$= \frac{256}{1}$$

$$= 256$$

Example:

If $x = a^{-3}$ and $y = a^{1/3}$, write this expression as a power in terms of "a"

$$\left(x^{-\frac{1}{3}}\, y^{3}\right)^{4} = \left((a^{-3})^{-1/3}\,(a^{1/3})^{3}\right)^{4}$$

$$= (a^{1} \cdot a^{1})^{4}$$

$$= (a^{2})^{4} = a^{8}$$

Check your understanding:

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#8, 11, 14, 15, 16, 17, 19, 21, 22, 23