

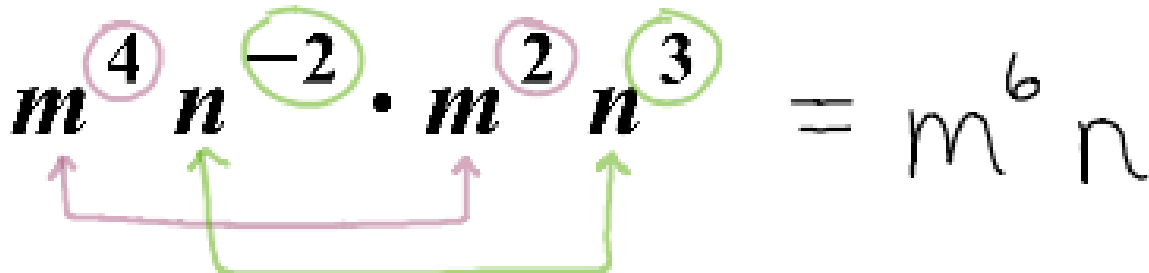
Lesson 4.6:

Applying the Exponent Laws

(part 2)

Examples:

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

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


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

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

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

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

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

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

evaluate

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

$$= 5^3 a^6 b^3$$

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

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

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

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

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

$$\begin{aligned}\left(\frac{50x^2y^4}{2x^4y^7}\right)^{\frac{1}{2}} &= \left(\frac{50}{2} \times \frac{x^2}{x^4} \times \frac{y^4}{y^7}\right)^{\frac{1}{2}} \\ &= (25 \cdot x^{-2} \cdot y^{-3})^{\frac{1}{2}} \\ &= 25^{\frac{1}{2}} \cdot x^{-1} \cdot y^{-\frac{3}{2}} \\ &= 5 \cdot \frac{1}{x} \cdot \frac{1}{y^{\frac{3}{2}}} = \frac{5}{xy^{\frac{3}{2}}}\end{aligned}$$

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

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

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

$$= \frac{-5 - \frac{1}{2}}{\frac{1}{2}}$$

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

$$= \frac{-\frac{11}{2}}{\frac{1}{2}}$$

$$= \frac{5/2 - (-1/2)}{1/6} = \frac{3}{1/6} = 3$$

Example:

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

$$\begin{aligned} \frac{(ab^{-3})^4}{a^{-4}b^2} &= \frac{a^4 b^{-3(4)}}{a^{-4} b^2} && \rightarrow \frac{a^8}{b^{14}} && \frac{2^8}{(-1)^{14}} \\ &= \frac{a^4}{a^{-4}} \cdot \frac{b^{-12}}{b^2} && = \frac{256}{1} \\ &= a^8 b^{-14} && = 256 \end{aligned}$$

Example:

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

$$\begin{aligned} \left(x^{-\frac{1}{3}} y^3 \right)^4 &= \left(\left(a^{-3} \right)^{-1/3} \left(a^{1/3} \right)^3 \right)^4 \\ &= \left(a \cdot a \right)^4 \\ &= \left(a^2 \right)^4 = a^8 \end{aligned}$$

Check your understanding:

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