Exponent Rules - Review

Match

$a^4 \cdot a^4$ a^{16}

$\dfrac{a^{20}}{a^4}$ a^6

$a \cdot a \cdot a \cdot a \cdots$
$\overline{a \cdot a \cdot a \cdot a}$

$(a^3)^2$ a^8

$(a \cdot a \cdot a)^2$
$(a \cdot a \cdot a)(a \cdot a \cdot a)$

1. $a^m \cdot a^n = a^{m+n}$,

2. $\dfrac{a^m}{a^n} = a^{m-n}$, $(a \neq 0)$,

3. $(ab)^m = a^m b^m$,

4. $\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}$, $(b \neq 0)$,

5. $(a^m)^n = a^{mn}$.

Simplify | Expand and simplify

$$\frac{x^6}{x^6} = x^{6-6}$$

$$= x^0$$

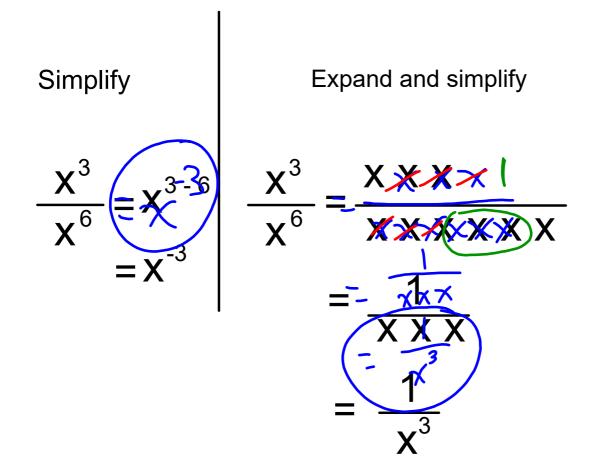$$\frac{x^6}{x^6} = \frac{x\,x\,x\,x\,x\,x}{x\,x\,x\,x\,x\,x} \cdot \frac{1}{1}$$

$$= 1$$

Therefore

$$x^0 = 1$$

Is this true for ALL terms that have a zero exponent?

Yes, any term to the power zero equals 1

ex. $(235.892 x^4 y^7 z^{-3} \text{🐸})^0$

$$= 1$$

$$\left(7.35x^6 y^{17} z^{\text{🚌}}\right)^0$$

$$= 1$$

$$7^{-2}$$

$$\frac{2x^2}{x^2}$$

$$= 2$$

Simplify | Expand and simplify

$$\frac{x^3}{x^6} = x^{3-6}$$

$$= x^{-3}$$

$$\frac{x^3}{x^6} = \frac{x \; x \; x \; 1}{x \; x \; x \; x \; x \; x}$$

$$= \frac{1}{x \; x \; x}$$

$$= \frac{1}{x^3}$$

Therefore

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

This is true for ALL negative exponents

$$x^{-y} = \frac{1}{x^y} \quad \text{AND} \quad \left(\frac{a}{b}\right)^{-x} = \left(\frac{b}{a}\right)^{x}$$

$$7^{-5} = \frac{1}{7^5}$$

Examples

Simplify

$$\frac{7^5}{7^7} = 7^{-2}$$

$$= \left(\frac{1}{7}\right)^2$$

$$= \frac{1}{7^2}$$

$$= \frac{1}{49}$$

$$\left(\frac{2}{3}\right)^{1}\left(\frac{2}{3}\right)^{4}\left(\frac{2}{3}\right)^{-7}$$

$$= \left(\frac{2}{3}\right)^{-2}$$

$$= \left(\frac{3}{2}\right)^{2}$$

$$= \frac{9}{4}$$

Homework

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