

Positive Powers Stay Put

Negatives Navigate

$$\frac{x^{-2}}{1} = \frac{1}{x^2}$$

$$\frac{2x^{-2}}{1} = \frac{2}{x^2}$$

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

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

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Negative Exponents - 1st 3 Rules

* ALWAYS **Add/Subtract/Multiply** Powers FIRST before worrying about Negatives.

ex) ① $x^2 \cdot x^{-1} = x^1$
 $2 + (-1) = 1$

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

③ $(xy^{2-3})^2 = \frac{x^4}{y^6}$

What if... ① $\left(\frac{2}{3}\right)^{-2} = \left(\frac{3}{2}\right)^2$

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

$\frac{2^2}{3^2} = \frac{3^2}{2^2}$

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Laws of Exponents (Putting it all together)

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Remember:

- Always Do List
- ① $a^2 \cdot a^4 = a^6 \rightarrow$ Keep Base \rightarrow Add exponents
 - ② $a^5 \div a^3 = a^2 \rightarrow$ Keep Base, Subtract exponents
 - ③ $(a^3)^3 = a^9 \rightarrow$ Keep Base, Multiply exponents
 - ④ $a^0 = 1 \rightarrow$ Zero power ALWAYS = 1
 - ⑤ $a^{-3} = \frac{1}{a^3} \rightarrow$ Make Fraction & Make power positive

* Negative powers go to denominator,
Positive powers stay in numerator

$$\text{ex) } a^{-3} b^3 = \frac{b^3}{a^3}$$

$$\frac{1}{a^3} \cdot \frac{b^3}{1}$$

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Practice

$$\textcircled{1} \quad 3^2 \cdot 3^{-4} = 3^{-2} = \boxed{\frac{1}{3^2}}$$

$$2 + -4 = -2$$

$$\textcircled{2} \quad \frac{4^{-2}}{4^{-6}} = 4^4$$

$$-2 + 6 = 4$$

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

$$x^{-4} \cdot x^4$$

$$-4 + 4 = 0$$

$$x^0 = 1$$

$$\textcircled{4} \quad \frac{3^2}{3^{-2}} = 3^4$$

$$2 + 2$$

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$$\textcircled{5} \quad (d^2)^{-3} \cdot d$$

$$d^{-6} \cdot d^1 = d^{-5}$$

$$\frac{1}{d^5}$$

$$\textcircled{6} \quad \frac{3v^{-2}}{1}$$

$$\frac{3}{v^2}$$

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