Negative Exponents

$\frac{1}{x^1} = x^{-1}$ OR $\frac{1}{x^{-1}} = x^1$ They are reciprocals

Ex) Simplify: Our goal is to not have any negative exponents!

$\frac{x^{-3}}{1}$ $\frac{1}{x^3}$ $\frac{1}{x^{-4}}$ x^4 $\frac{1}{2^{-2}} = 2^2 = 4$

2^{-2} $\frac{1}{2^2} = \frac{1}{4}$ 3^{-4} $\frac{1}{3^4} = \frac{1}{81}$ $\frac{1}{3^{-3}} = 3^3 = 27$

* Always **move** the negative exponent first then solve.

Negatives and Rational exponents

Ex) Evaluate:

$4^{-\frac{1}{2}} = \frac{1}{4^{1/2}} = \frac{1}{\sqrt{4}} = \frac{1}{2}$

$(-8)^{-\frac{1}{3}} = \frac{1}{(-8)^{1/3}} = \frac{1}{\sqrt[3]{-8}} = \frac{1}{-2}$

$27^{-\frac{2}{3}} = \frac{1}{27^{2/3}} = \frac{1}{(\sqrt[3]{27})^2} = \frac{1}{3^2} = \frac{1}{9}$

$16^{-\frac{3}{4}} = \frac{1}{16^{3/4}} = \frac{1}{\sqrt[4]{16}^3} = \frac{1}{(2)^3} = \frac{1}{8}$

$(-64)^{-\frac{2}{3}} = \frac{1}{(-64)^{2/3}} = \frac{1}{(\sqrt[3]{-64})^2} = \frac{1}{(-4)^2} = \frac{1}{16}$

$4^{-\frac{3}{2}} = \frac{1}{4^{3/2}} = \frac{1}{(\sqrt{4})^3} = \frac{1}{8}$

To write the reciprocal of a fraction,
switch the numerator and denominator.

ex) $\frac{2}{5}$ and $\frac{5}{2}$

Ex) $\left(\frac{2}{5}\right)^{-3} = \left(\frac{5}{2}\right)^{3}$

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

$= \frac{125}{8}$

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

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

$= \frac{9}{16}$

$\left(\frac{25}{49}\right)^{-\frac{1}{2}} = \left(\frac{49}{25}\right)^{1/2}$

$= \frac{\sqrt{49}}{\sqrt{25}}$

$= \frac{7}{5}$

$\left(\frac{16}{81}\right)^{-\frac{3}{4}} = \left(\frac{81}{16}\right)^{3/4}$

$= \frac{(4\sqrt{81})^3}{(4\sqrt{16})^3}$

$= \frac{3^3}{2^3} = \frac{27}{8}$