KEY

Foundations of Math & Pre-Calculus 10
Lesson 4.5 ~ Negative Exponents & Reciprocals

Powers with Negative Exponents

When x is any non-zero number and n is a rational number, x^{-n} is the reciprocal of x^n.

$x^{-n} = \frac{1}{x^n}$ For example: $10^{-2} = \frac{1}{10^2} = \frac{1}{100}$

and $\frac{1}{x^{-n}} = x^n$ or $\left(\frac{1}{2^{-4}}\right) = 2^4 = 16$

Example #1: Simplify and evaluate each of the following (where possible).

a) 7^{-2} $= \boxed{\frac{1}{7^2}}$ ← simplified

$= \boxed{\frac{1}{49}}$ ← evaluated

b) $\left(\frac{10}{3}\right)^{-3} = \boxed{\left(\frac{3}{10}\right)^3}$

$= \boxed{\frac{27}{1000}}$

c) $\left(-\frac{10}{3}\right)^{-3} = \boxed{\left(\frac{-3}{10}\right)^3}$

$= \boxed{\frac{-27}{1000}}$

The negative can "attach" to either the 10 or the 3... I like to keep it on top.

d) $x^{-5} = \boxed{\frac{1}{x^5}} = \left(\frac{1}{x}\right)^5$

e) $\frac{1}{a^{-6}} = \boxed{a^6}$

f) $\left(\frac{m}{n}\right)^{-3} = \boxed{\left(\frac{n}{m}\right)^3}$