Exponents + Roots

$a^m a^n = a^{m+n}$	$a^5 a^6 = a^{11}$
$(a^m)^n = a^{mn}$	$(2^3)^4 = 2^{12}$
$\dfrac{a^m}{a^n} = a^{m-n}$	$\dfrac{a^6}{a^2} = a^4$
	$\dfrac{a^2}{a^6} = \dfrac{1}{a^4}$
$(ab)^m = a^m b^m$	$(2x^2)^3 = 2^3 \cdot x^6$
$\left(\dfrac{a}{b}\right)^m = \dfrac{a^m}{b^m}$	$\left(\dfrac{x^2}{y^3}\right)^4 = \dfrac{x^8}{y^{12}}$
$a^0 = 1$	$(4-a)^0 = 1$
$0^0 =$ undefined	
$a^{-n} = \dfrac{1}{a^n}$ and $\dfrac{1}{a^{-n}} = a^n$	$2^{-3} = \dfrac{1}{2^3}$ and $\dfrac{1}{x^{-4}} = x^4$
$\left(\dfrac{a}{b}\right)^{-n} = \left(\dfrac{b}{a}\right)^n$	$\left(\dfrac{2}{3}\right)^{-4} = \left(\dfrac{3}{2}\right)^4 = \dfrac{3^4}{2^4}$

$(\sqrt[n]{x})^n = x$	$(\sqrt[3]{x})^3 = x$
$\sqrt[n]{xy} = \sqrt[n]{x}\sqrt[n]{y}$	$\sqrt[4]{ab} = \sqrt[4]{a}\sqrt[4]{b}$
$\sqrt[n]{\dfrac{x}{y}} = \dfrac{\sqrt[n]{x}}{\sqrt[n]{y}}$	$\sqrt{\dfrac{x}{y}} = \dfrac{\sqrt{x}}{\sqrt{y}}$
n even: $\sqrt[n]{x^n} = \lvert x \rvert$	$\sqrt{x^2} = \lvert x \rvert$
n odd: $\sqrt[n]{x^n} = x$	$\sqrt[3]{-8} = -2$

Exponents & Roots (Cont.)

$$b^{\frac{m}{n}} = \left(\sqrt[n]{b}\right)^{m}$$

(or) $= \sqrt[n]{b^m}$

$$8^{\frac{2}{3}} = \left(\sqrt[3]{8}\right)^2 = (2)^2 = 4$$

(or) $= \sqrt[3]{8^2} = \sqrt[3]{64} = 4$

$$\sqrt[n]{a} = a^{\frac{1}{n}}$$

$$\sqrt[2]{x} = x^{\frac{1}{2}}$$

Absolute Value Answers

n even: $\sqrt[n]{x^n} = |x|$ examples: $\sqrt{x^2} = |x|$

n odd: $\sqrt[n]{x^n} = x$ $\sqrt[3]{-8} = -2$

More specifically, if a and b are even, & c is odd, then the answer is an absolute value.

$$\sqrt[a]{x^b} = |x^c|$$

even even odd absolute value

ex: $\sqrt[4]{x^{12}} = |x^3|$

$\sqrt{x^6} = |x^3|$

$\sqrt[4]{x^4} = |x|$