

	Exponent Law	Example
#1	<p><u>Multiplication Law:</u></p> $a^m \times a^n = a^{m+n}$	$a^3 \times a^4 = a^{3+4} = a^7$ $(x^2)(x^7) = x^{2+7} = x^9$ $3^2 \times 3^3 = 3^{2+3} = 3^5 = 243$
#2	<p><u>Division Law:</u></p> $\frac{a^m}{a^n} = a^{m-n}$ <p>or</p> $a^m \div a^n = a^{m-n} \quad (a \neq 0)$	$a^9/a^5 = a^{9-5} = a^4$ $d^5/d^3 = \frac{\cancel{d} \cdot \cancel{d} \cdot \cancel{d} \cdot d \cdot d}{\cancel{d} \cdot \cancel{d} \cdot \cancel{d}} = \frac{d \cdot d}{1} = d^2$ $7^5 \div 7^3 = 7^{5-3} = 7^2 = 49$
#3	<p><u>Power Rules</u></p> $(a^m)^n = a^{mn}$	$(a^2)^3 = a^{2 \times 3} = a^6$ $(2^3)^3 = 2^{3 \times 3} = 2^9 = 512$
#4	$(ab)^m = a^m b^m$	$(2 \cdot 3)^2 = 2^2 \cdot 3^2 = 4 \cdot 9 = 36$
#5	$(a/b)^m = a^m/b^m \quad (b \neq 0)$	$(3/4)^2 = 3^2/4^2 = 9/16$
#6	<p><u>Negative Exponents</u></p> $a^{-m} = 1/a^m \quad (a \neq 0)$	$5^2/5^4 = 5^{2-4} = 5^{-2}$ <p>or</p> $5^2/5^4 = \frac{5 \cdot 5}{5 \cdot 5 \cdot 5 \cdot 5} = \frac{1}{5 \cdot 5} = \frac{1}{5^2}$ <p>Therefore... $5^{-2} = \frac{1}{5^2}$</p>
#7	$(a/b)^{-m} = a^{-m}/b^{-m}$ $= b^m/a^m \quad (a \neq 0)$	<p>Think... $(a/b)^{-m} = 1/(a/b)^m$ (from #6)</p> $= 1/(a^m/b^m)$ (from #5) $= 1 \div (a^m/b^m)$ <p>invert and multiply</p> $= 1 \times (b^m/a^m)$ $= b^m/a^m$

	Exponent Law	Example
#8	<p><u>Exponent of Zero</u></p> <p>$a^0 = 1$</p>	<p>We know... $25 \div 25 = 1$</p> <p>but, $25 = 5^2$ so, $5^2 \div 5^2 = 1$</p> <p>which means, $5^{2-2} = 1$ (from #2)</p> <p>but, $2-2=0$ so, $5^0 = 1$</p>
#9	<p><u>Product Rule for Square Roots:</u></p> <p>$\sqrt{ab} = \sqrt{a} \times \sqrt{b}$</p>	<p>$\sqrt{36} = \sqrt{2} \times \sqrt{18}$</p> <p>or $\sqrt{36} = \sqrt{4} \times \sqrt{9}$</p> <p>or $\sqrt{36} = \sqrt{6} \times \sqrt{6}$</p>
#10	<p><u>Product Rule for Cube Roots:</u></p> <p>$\sqrt[3]{ab} = \sqrt[3]{a} \times \sqrt[3]{b}$</p>	<p>$\sqrt[3]{40} = \sqrt[3]{8} \times \sqrt[3]{5}$</p> <p>$= 2\sqrt[3]{5}$ because $\sqrt[3]{8} = 2$</p>
#11	<p><u>Rational Exponents</u></p> <p>$a^{\frac{1}{n}} = \sqrt[n]{a}$</p>	<p>$8^{\frac{1}{3}} = \sqrt[3]{8} = 2$</p> <p>$125^{\frac{1}{3}} = \sqrt[3]{125} = 5$</p>
#12	<p><u>Rational Exponents</u></p> <p>$a^{\frac{m}{n}} = \sqrt[n]{a^m} = (\sqrt[n]{a})^m$</p>	<p>$27^{\frac{2}{3}} = \sqrt[3]{27^2} = (\sqrt[3]{27})^2 = (3)^2 = 9$</p>