

1. Laws of Exponents
2. You should be familiar with exponential notation. In this lesson, we will review the Laws of Exponents
3. Exponents are a shorthand way to keep track of repeated multiplication. For example, if we wish to multiply 10 by itself seven times, we can write the product as 10^7 .
4. If we begin with 10^4 , which is 10,000, and remove one factor of 10 at a time, we are dividing by 10 in each step. $10^3 = 1000$, $10^2 = 100$, $10^1 = 10$. Anything to the first power will be itself. If we divide once more by 10, we now have no tens remaining. This empty product is the same as multiplying by 1. Anything to the zero power is one. If we continue to reduce the exponent by 1, the exponents become negative. On the right hand side, we continue to divide by 10, we now get fractions. 10^{-2} is like dividing by 10 twice. Negative exponents are reciprocals. Ten to a negative power is the reciprocal of 10 to the same positive power.
5. $(b^3)(b^4)$ is the multiplication of 3 b's by 4 b's which gives us a total of 7 b's. When we multiply two terms with exponents, we add powers.
6. (a) When we divide powers, we cancel. In this case, b^2 remains.
(b) We can achieve the same result by subtracting exponents. The b^3 in the denominator removes 3 of the 5 b's from the numerator, leaving two.
7. (a) This works in the other direction as well. When the exponent in the denominator is larger, we will wind up with terms in the denominator.
(b) We can achieve the same result by subtracting exponents.
8. When we put an exponent on an expression with an exponent, we are repeatedly multiplying the expression inside the parentheses by itself. $(b^x)^y$ is y copies of b^x , which means we need to add y copies of x , which is multiplying x and y .
9. To recap: Here are the six Laws of Exponents with which you should be familiar. Anything to the first power is itself. Anything to the zero power is 1. Negative exponents are reciprocals. When multiplying terms with exponents, add the exponents. When dividing terms with exponents, subtract the exponents. When Raising a power to a power, multiply the exponents.