What is So Negative About Negative Exponents?

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Abstract / Synopsis
While teaching college-level mathematics (from College Algebra to Calculus to Abstract Algebra), I have observed that students are often uncomfortable using negative exponents in calculations. I believe the fault partially lies in the manner in which negative exponents are taught in Algebra 1 or Algebra 2 courses, especially in rigid instructions always to write answers using only positive exponents. After reviewing a sample of algebra texts used in the United States over the last two centuries, it appears that while attitudes toward negative exponents have varied from author to author over time, the current trend is to declare explicitly that an expression is not simplified if it contains negative exponents. I believe that this negative attitude toward negative exponents is at least somewhat to blame for students of Calculus and higher mathematics being less able to solve problems that require conversion between positive and negative exponents, as their algebraic instruction has only taught them to convert negative exponents to positive.

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Negative exponents might be tricky, but our guide has everything your students need to know. Plus, learn how to teach negative exponents with Prodigy! Many students already struggle to understand negative numbers, exponent rules and fractions. So what happens when you add negative exponents to the equation? Total chaos. Well, not really. But understanding negative exponents is an important building block for high school-level math courses, and it’s also a concept many students find challenging. When you gradually build on your students’ knowledge, you’ll ensure they’re ready to tackle challenging problems in and out of the classroom. The negative exponent rule allows us to move a number with a negative exponent from the numerator to the denominator while changing the exponent from negative to positive; or from the denominator to the numerator while changing the exponent.

Normally, when we simplify fractions with positive and negative exponents in the numerator and denominator, we want to simplify until all exponents are positive. The negative exponent rule allows us to do that. A⁻ᵇ = 1 / Aᵇ. A negative exponent is merely the same mini number but as a negative one. To divide a number or variable with exponents, you must subtract the mini number of the denominator from the mini number of the numerator. Let's learn about negative integer exponents. When we talked about exponents and integers, we assumed that exponent is positive integer. But what if we want to raise number to negative integer exponent? Formula for raising number to negative integer power is: `a⁻ᵇ = 1 / aᵇ`. This formula means that number raised to negative power is reciprocal of the number raised to the same, but positive power. Let's take a couple of examples. Example 1. Find 4⁻³. The base 4 raised to the power of minus 3 is equal to 1 divided by the base 4 raised to the power of 3: 4⁻³ = 1 / 4³ = 1 / (4 × 4 × 4) = 1 / 64 = 0.125. Negative fractional exponents. The base b raised to the power of minus n/m is equal to 1 divided by the base b raised to the power of n/m: b⁻ⁿ/ᵐ = 1 / bⁿ/ᵐ. So this negative right over here, this is what's causing us to go one over. So 2 to the negative 4 is the same thing, based on the way we've defined it just up right here, as reciprocal of 2 to the fourth, or 1 over 2 to the fourth. And so you could view this as being 1/2 times 1/2 times 1/2 times 1/2, if you just view 2 to the fourth as taking four 2's and multiplying them. Or if you use this idea right over here, you could view it as starting with a 1 and multiplying it by 2 four times. Let's try another example. I'll do two or three more. So let's take a negative number to a negative exponent, just to see if we can confuse ourselves. So let's take the number negative 4, and let's take it--I don't want my numbers to get too big too fast. So let's just take negative 2 and let's take it to the negative 3 power.