

Zero as an exponent

This lesson will cover how to find the value of a nonzero number (or a variable) raised to the power 0.

The rule for 0 as an exponent:

Any nonzero real number raised to the power 0 is equal to 1, which means anything that looks like a^0 is equal to 1 if a is not equal to 0. (It's important for a to be nonzero, because 0^0 is undefined.)

The reason this is true comes from the quotient rule for exponents. We know that x^n/x^n is 1, since the numerator and denominator are equal. But according to the quotient rule for exponents, we also know that

$$\frac{x^n}{x^n} = x^{n-n} = x^0$$

Therefore, we know that $x^0 = 1$. As long as $x \neq 0$, the rule will hold, so let's look at an example.

Example

Simplify the expression.

$$9^0$$

Just remember that any nonzero real number raised to the power 0 is equal to 1, so



$$9^0 = 1$$

Let's look at another example.

Example

Simplify the expression.

$$99,102^0$$

Look different? Don't worry! Just remember that any nonzero real number raised to the power 0 is equal to 1, so

$$99,102^0 = 1$$

Let's try some examples with variables.

Example

Simplify the expression.

$$y^0$$

It's also true that any variable raised to the power 0 is equal to 1 (as long as the value of the variable isn't 0), so



$$y^0 = 1$$

We do need to assume that $y \neq 0$.

Good news! The rule is still true if we have more than one variable, or a combination of variables and numbers.

Example

Simplify the expression.

$$(3xy + a)^0$$

We know that any nonzero real number raised to the power 0 is equal to 1, and that the expression $3xy + a$ really is just a representation of a number. This means that

$$(3xy + a)^0 = 1$$

We do need to make the assumption that the value of the expression $3xy + a$ isn't 0.

