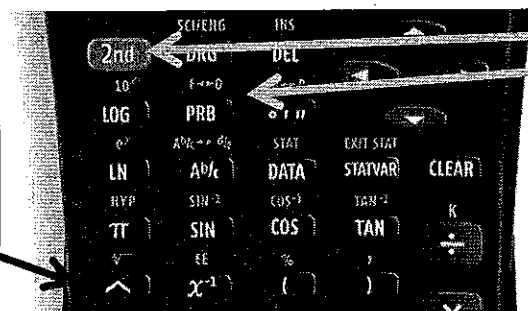


ALG 1 – Unit 7 – Properties of Exponents – Zero and Negative Exponents

Target: I can simplify expressions using exponent rules

exponent button looks like a "carrot" or \wedge



To change a decimal to a fraction, hit "2nd" "PRB" or "F\leftrightarrowD"

Warm - Up: Provide the values in the table. Answer the questions that follow.

2^x	5^x	10^x
$2^1 = 2$	$5^1 = 5$	$10^1 = 10$
$2^0 = 1$	$5^0 = 1$	$10^0 = 1$
$2^{-1} = \frac{1}{2}$	$5^{-1} = \frac{1}{5}$	$10^{-1} = \frac{1}{10}$
$2^{-2} = \frac{1}{4}$	$5^{-2} = \frac{1}{25}$	$10^{-2} = \frac{1}{100}$

1. What do you notice in the row with zero as an exponent?
all answers are 1
2. What do you notice in the rows with a negative for an exponent?
answers are reciprocals of the powers
3. Find a partner and compare your answers.

Zero as an Exponent

For every nonzero number a , $a^0 = 1$

Examples:

Simplify each expression

I do: $2^0 = 1$

$3ab^0 = 3a$
↑
 $b^0 = 1$

We do: $(-2)^0 = 1$

$\left(\frac{6x^2}{5xy}\right)^0 = 1$

You do: $-(-2)^0 = -1$

$5(4xy)^0 = 5$

Negative Exponents

For every nonzero number a and integer n , $a^{-n} = \frac{1}{a^n}$

Examples:

Simplify

I do:

$2^{-1} = \frac{1}{2}$

$x^{-5} = \frac{1}{x^5}$

We do:

$\frac{2}{x^{-4}} = 2x^4$

$2^{-3}x^{-4}y = \frac{y}{8x^4}$

You do:

$2^{-3} = \frac{1}{8}$

$\frac{7x}{y^{-1}} = 7xy$

Partner Practice

Quick Check of Understanding:

$$1. 4^0 = \boxed{1}$$

$$2. 5^{-3} = \boxed{\frac{1}{125}}$$

$$3. \frac{1}{x^{-5}} = \boxed{x^5}$$

$$4. 2(a^{-2}b^5c^3)^0 = \boxed{2}$$

$$5. \frac{r^5}{q^{-2}} = \boxed{q^2 r^5}$$

$$6. 2n^{-2} = \boxed{\frac{2}{n^2}}$$

$$7. \frac{y^4}{x^{-2}} = \boxed{x^2 y^4}$$

$$8. \frac{3x^{-2}}{y^0} = \boxed{\frac{3}{x^2}}$$

Evaluate the following. Using the laws of exponents, explain in words why they are different.

$$1. (-3)^2 = \boxed{9}$$

$$2. -3^2 = \boxed{-9}$$

$$3. 3^{-2} = \boxed{\frac{1}{9}}$$

$$4. (-3)^{-2} = \boxed{\frac{1}{9}}$$

$$5. -3^{-2} = \boxed{-\frac{1}{9}}$$

Error Analysis:

1. Describe the error below

$$\frac{5x^{-3}}{5x^3} = \frac{1}{5x^3}$$

The 5 didn't have the negative exponent... only the x.

The answer should be $\frac{5}{x^3}$

2. Describe the error below

$$= 6 \cdot 3^0 = 6 \cdot 0 = 0$$

← $3^0 = 1$ not 0

The answer should be

$$6 \cdot 3^0 = 6 \cdot 1 = \boxed{6}$$

Challenge:

$$1. \frac{(5^{-1})^2 dhj}{2d^{-5}}$$

$$= \frac{dhj}{5 \cdot 2} = \boxed{\frac{dhj}{10}}$$

$$2. 13^0 cd^0 = 1 \cdot c \cdot 1 = \boxed{c}$$

$$3. \frac{12}{4m^2(y^{-5})}$$

$$= \frac{12y^5}{4m^2}$$

$$= \boxed{\frac{3y^5}{m^2}}$$