

Math 10-C Investigate Negative Exponents

Name: KEY

Complete the chart by dividing each row by 2.

Exponential Form	Expanded Form	Value
2^3	$2 \cdot 2 \cdot 2$	8
$\frac{2^3}{2} = 2^{3-1} = 2^2$	$\frac{2 \cdot 2 \cdot 2}{2} = 2 \cdot 2$	4
$\frac{2^2}{2} = 2^{2-1} = 2^1$	$\frac{2 \cdot 2}{2} = 2$	2
$\frac{2^1}{2} = 2^{1-1} = 2^0$	$\frac{2}{2} = 1$	1
$\frac{2^0}{2} = 2^{0-1} = 2^{-1}$	$\frac{1}{2}$	$\frac{1}{2}$
$\frac{2^{-1}}{2} = 2^{-1-1} = 2^{-2}$	$\frac{1}{2} \div 2 = \frac{1}{2 \cdot 2}$	$\frac{1}{4}$
$\frac{2^{-2}}{2} = 2^{-2-1} = 2^{-3}$	$\frac{1}{2 \cdot 2} \div 2 = \frac{1}{2 \cdot 2 \cdot 2}$	$\frac{1}{8}$

Complete the chart by dividing each row by 3.

Exponential Form	Expanded Form	Value
3^2	$3 \cdot 3$	9
$\frac{3^2}{3} = 3^{2-1} = 3^1$	3	3
$\frac{3^1}{3} = 3^{1-1} = 3^0$	$\frac{3}{3} = 1$	1
$\frac{3^0}{3} = 3^{0-1} = 3^{-1}$	$\frac{1}{3}$	$\frac{1}{3}$
$\frac{3^{-1}}{3} = 3^{-1-1} = 3^{-2}$	$\frac{1}{3} \div 3 = \frac{1}{3 \cdot 3}$	$\frac{1}{9}$
$\frac{3^{-2}}{3} = 3^{-2-1} = 3^{-3}$	$\frac{1}{3 \cdot 3} \div 3 = \frac{1}{3 \cdot 3 \cdot 3}$	$\frac{1}{27}$

Based on the patterns in the previous charts, please determine the value of the following:

$$4^{-1} = \frac{1}{4}$$

$$4^{-2} = \frac{1}{16}$$

$$4^{-3} = \frac{1}{64}$$

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

$$5^{-2} = \frac{1}{25}$$

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

$$6^{-1} = \frac{1}{6}$$

$$6^{-2} = \frac{1}{36}$$

$$6^{-3} = \frac{1}{216}$$

$$8^{-2} = \frac{1}{8^2} = \boxed{\frac{1}{64}}$$

$$7^{-2} = \frac{1}{7^2} = \boxed{\frac{1}{49}}$$

$$10^{-3} = \frac{1}{10^3} = \boxed{\frac{1}{1000}}$$

$$12^{-1} = \boxed{\frac{1}{12}}$$

$$2^{-4} = \frac{1}{2^4} = \boxed{\frac{1}{16}}$$

$$9^{-2} = \frac{1}{9^2} = \boxed{\frac{1}{81}}$$

$$7^{-3} = \frac{1}{7^3} = \boxed{\frac{1}{343}}$$

$$144^{-1} = \boxed{\frac{1}{144}}$$

$$10^{-4} = \frac{1}{10^4} = \boxed{\frac{1}{10000}}$$