



# Negative Exponents

Let's explore numbers with negative exponents.

## 7.1 Math Talk: Powers of Ten

Solve each equation mentally.

$$\bullet \frac{100}{1} = 10^x$$

$$\bullet \frac{1000}{x} = 10^1$$

$$\bullet \frac{x}{100} = 10^0$$

$$\bullet \frac{100}{1000} = 10^x$$

7.2

Maintain the Pattern

Complete the table. Use the “calculations” columns to show the calculations used to move from the row before to the current row. A few have been filled in as an example.

calculations	exponential form	number form	calculations
	$2^5$		
		16	
$2^4 \div 2 = \frac{2^4}{2} = 2^{4-1} = 2^3$	$2^3$		
$2^3 \div 2 = \frac{2^3}{2} = 2^{3-1} = 2^2$	$2^2$	4	
		2	$4 \div 2 = \frac{4}{2} = 2$
		1	$2 \div 2 = \frac{2}{2} = 1$
	$2^{-1}$	$\frac{1}{2}$	
		$\frac{1}{4}$	$\frac{1}{2} \div 2 = \frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$
	$2^{-3}$		
	$2^{-4}$		
		$\frac{1}{32}$	

## 7.3

## Matching Equal Expressions

Take turns with your partner to match the expressions from the list that are equivalent to the original expression.

- For each match that you find, explain to your partner how you know it's a match.
- For each match that your partner finds, listen carefully to their explanation. If you disagree, discuss your thinking and work to reach an agreement.

Which expressions equal  $8^0$ ?

- 1
- 0
- $8^3 \cdot 8^{-3}$
- $\frac{8^2}{8^2}$
- $11^0$

Which expressions equal  $5^{-2}$ ?

- $-5^2$
- $\frac{5^0}{5^2}$
- $-2^5$
- $\frac{1}{5^2}$
- $5^{-1} \cdot 5^{-1}$

Which expressions are equivalent to  $x^{-4}$ ?

- $\frac{x^9}{x^5}$
- $\frac{x^5}{x^9}$
- $\frac{x^3}{x^{-1}}$
- $x \cdot x^{-5}$
- $\frac{1}{x^4}$

Which expressions equal  $3^{10}$ ?

- $3^5 \cdot 3^2$
- $(3^5)^2$
- $3^7 \cdot 3^3$
- $3^{13} \cdot 3^{-3}$
- $\frac{3^{10}}{3^0}$

