Lesson 7: Negative Exponents

- Let's explore numbers with negative exponents.

7.1: Math Talk: Powers of Ten

Solve each equation mentally:

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

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

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

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

7.2: Maintain the Pattern

Complete the table.

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

7.3: Matching Equal Expressions

Take turns with your partner to match the original expression with an equal or equivalent expression in the list.

- 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 3^{10}?

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

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}?

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