



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} ?

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