

Algebra 1 7.2

Use the properties of exponents to divide
monomials

Simplify expressions containing negative
exponents

Simplify expressions containing zero exponents

Compare measurements using order of magnitude
exponent

base

quotient

factors

negative exponent

order of magnitude

$$\frac{2^7}{2^4} = 8$$

$\frac{t^4}{t^6}$ $\frac{1}{t^2}$

A handwritten diagram for dividing powers of 2. The dividend is written as 2 2 2 | 2 2 2 2. The divisor is 2 2 2. A horizontal line is drawn under the dividend and divisor. To the right of the divisor, there is a vertical line with a bracket underneath it, and the number 8 is written next to it. Below the dividend, there are several crossed-out t's, indicating cancellation.

Triangle puzzle

Patterns:

10^6 1,000,000

10^5 100,000

10^4 10,000

10^3 1000

10^2 100

10^1 10

10^0 1

$()^0 = 1$

 **KeyConcept** Zero Exponent Property

Words	Any nonzero number raised to the zero power is equal to 1.	why?
Symbols	For any nonzero number a , $a^0 = 1$.	
Examples	$15^0 = 1$	$\left(\frac{b}{c}\right)^0 = 1$

replace zero powers with something =
what would that be?

Example 3 Zero Exponent

Simplify each expression. Assume that no denominator equals zero.

a. $\left(-\frac{4n^2q^5r^2}{9n^3q^2r} \right)^0 = 1$

b. $\frac{x^5y^0}{x^3} = \frac{x^5 \cdot 1}{x^3} = \frac{\cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x}}{\cancel{x} \cancel{x} \cancel{x}} \quad x^2 = \frac{x^2}{1}$

Method 1

$$\frac{c^2}{c^5} = \cancel{\frac{c|c}{c c c c c}} = \frac{1}{c^3}$$

Method 2

$$\frac{c^2}{c^5} = c^{2+5} = c^{-3}$$

An expression can only have one answer...

neg expon = reciprocal

$$2^3 \quad 2 \cdot 2 \cdot 2 = 8$$

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

What do you think - might stand for (in this context)?

 KeyConcept Negative Exponent Property

Words For any nonzero number a and any integer n , a^{-n} is the reciprocal of a^n . Also, the reciprocal of a^{-n} is a^n .

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

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

negative exponent = code for reciprocal

Example 4 Negative Exponents

Simplify each expression. ~~Assume that no denominator equals zero.~~

a. $\frac{n^{-5}p^4}{r^{-2}} =$

final answer: exponents positive,
no zero exponents

b. $\frac{5t^4 u^5}{-20r^2 t^7 r^3}$

final answer: exponents positive
no zero exponents

$$\frac{5t^4 u^5}{-20r^2 t^7 r^3}$$

$$\begin{array}{r} \cancel{5} \cancel{t^4} \cancel{u^5} \\ -20 \cancel{r^2} \cancel{t^7} \cancel{r^3} \\ \hline -\cancel{20} \cancel{r^2} \cancel{t^7} \cancel{t^3} \cancel{r^3} \end{array}$$

$$-\frac{1}{4} \frac{u^5}{r^5 t^3} = -\frac{1}{4} \frac{u^5}{r^5 t^3}$$

Guided Practice

final answer: exponents positive
no zero exponents

Simplify each expression. Assume that no denominator equals zero.

$$4A. \frac{w^3x^2y^6}{w^6v^3}$$

$$4B. \frac{32\cancel{r}^3b^3\cancel{s}^4}{4a^3b^5\cancel{r}^2} \cdot \frac{c^2}{a^8c^4}$$

$$4C. \frac{5j^{-3}k^2m^{-6}}{25k^{-4}m^{-2}}$$

$$\begin{array}{r} \cancel{w}xxx\cancel{y}yyyy \\ \hline \cancel{w}vvv \end{array}$$

$$1. \frac{x^2y^6}{v^3}$$

$$\begin{array}{r} \cancel{32}\cancel{r}\cancel{b}\cancel{b}\cancel{b}\cancel{t}\cancel{c} \\ \hline \cancel{4} \quad \cancel{a}\cancel{a}\cancel{b}\cancel{b}\cancel{b}\cancel{b} \cancel{a}\cancel{a}\cancel{a}\cancel{a}\cancel{a}\cancel{t}\cancel{c} \end{array}$$
$$\frac{8}{\cancel{a}^1\cancel{b}^2\cancel{c}^2}$$

$$\frac{(3x^2)^2 y^3}{24 \cancel{x^2} y} \quad \frac{(3xx)(3xx)}{24 y} \cancel{yyxx}$$

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$$\frac{9x^6y^2}{24}$$

$$\frac{3x^6y^2}{8}$$

