Algebra 1 7.2

Use the properties of exponents to divide monomials

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

Simplify expressions containing negative exponents

$\frac{t^4}{t^3}$ $\frac{t\,t\,t\,t}{t\,t\,t} = t = t^1$

Simplify expressions containing zero exponer

Compare measurements using order of magnitude

exponent

base

quotient

factors

negative exponent

order of magnitude

$\frac{2\,2\,2\,2\,2\,2\,2}{2\,2\,2\,2} = 2^3 = 8$

Triangle puzzle

whiteboards

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$\frac{9}{12}$ $\left(\frac{5xxxxy}{6}\right)\left(\frac{5xxxxxy}{6}\right) = \frac{25}{36}x^{10}y^{2}$

Simplify each expression.

2A. $\left(\frac{3x^4}{4}\right)^3$ **2B.** $\left(\frac{5x^5y}{6}\right)^2$ $\frac{10}{12}$ **2C.** $\left(\frac{2y^2}{3z^3}\right)^2$ **2D.** $\left(\frac{4x^3}{5y^4}\right)^3$

$\left(\frac{3xxxx}{4}\right)\left(\frac{3xxxx}{4}\right)\left(\frac{3xxxx}{4}\right)$ $\frac{27}{64}x^{12}$ $\frac{25x^{10}y^2}{36}$

$\frac{27x^{12}}{64}$

KeyConcept Zero Exponent Property

Words	Any nonzero number raised to the zero power is equal to 1.
Symbols	For any nonzero number a, $a^0 = 1$.
Examples	$15^0 = 1$ $\left(\frac{b}{c}\right)^0 = 1$ $\left(\frac{2}{7}\right)^0 = 1$

why?

$\frac{b^2x^3}{x^2b^2} = \frac{b \cdot b \cdot x \cdot x \cdot x}{x \cdot x \cdot b \cdot b} = x$

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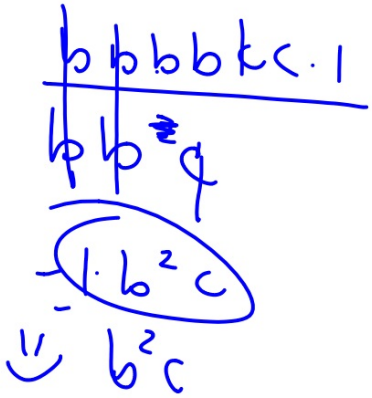
3A. $\dfrac{b^4c^2d^0}{b^2c}$



3B. $\left(\dfrac{2f^4g^7h^3}{15f^3g^9h^6}\right)^0$

1

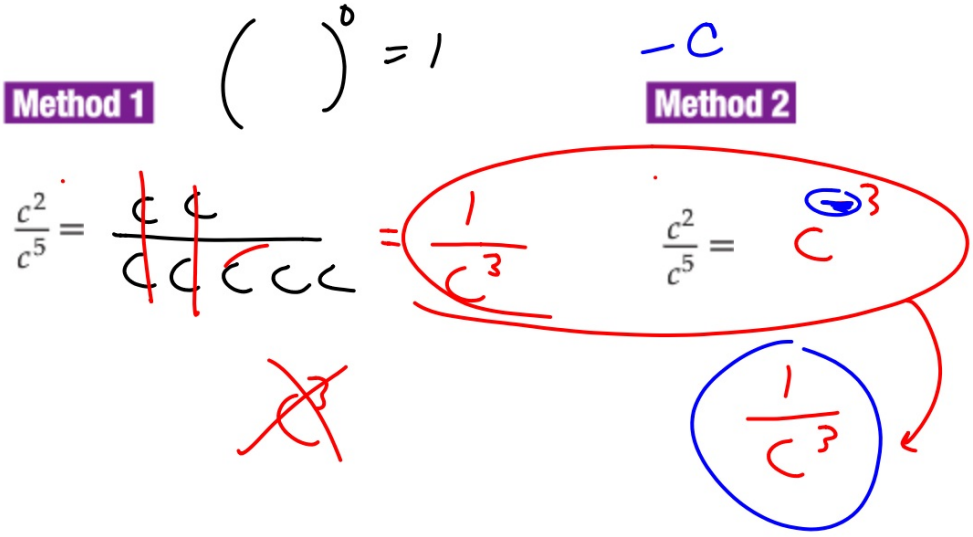
replace zero powers with something =
what would that be?

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. $\frac{x^5y^0}{x^3}$ $\frac{xxxxx \cdot 1}{xxx} = x^2$ $1x^2$



An expression can only have one answer...

exp = neg → move

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

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

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

$\frac{1}{2 \cdot 2 \cdot 2 \cdot 2} = \frac{1}{16}$

negative exponent = code for reciprocal

$\frac{j \cdot j \cdot j \cdot j}{1} = j^4$

Example 4 Negative Exponents

Simplify each expression. Assume that no denominator equals zero.

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

$\dfrac{p\,p\,p\,p\,r\,r}{n\,n\,n\,n\,n}$

$= \dfrac{p^4 r^2}{n^5}$

final answer: exponents positive, no zero exponents

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

final answer: exponents positive
no zero exponents

$$\frac{1 \cdot t\,t\,t\,t \cdot u\,u\,u\,u\,u}{-4 \cdot r\,r\,r\,r \cdot t\,t\,t\,t\,t\,t\,t}$$

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

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final answer: exponents positive
no zero exponents

Simplify each expression. Assume that no denominator equals zero.

4A. $\dfrac{v^{-3}wx^2}{wy^{-6}}$

4B. $\dfrac{32a^{-8}b^{9}c^{-4}}{4a^{3}b^{5}c^{-2}}$

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

$\dfrac{w\,x\times y\,y\,y\,y\,y\,y}{v\,v\,v\,w}$

$\dfrac{x^2y^6}{v^3}$

$\dfrac{8\,b\,b\,b\,c\,c}{a\,a\,a\,a\,a\,a\,a\,a}$

$\dfrac{8}{a^{11}c^{2}b^{2}}$

$\dfrac{5}{25}\,\dfrac{k\,k\,k\,k\,k\,k\,k}{j\,j\,j\,m\,m\,m\,m\,m\,m}$

$\dfrac{1\;k^6}{5\,j^3\,m^6} = \dfrac{k^6}{5j^3m^6}$