

Ch 8.5 Division of Exponents

Ex 1a) $\frac{x}{x} = 1$

Ex 1b) $\frac{x^3}{x^2} = \frac{xxx}{xx} = x$

Ex 1c) $\frac{x^3}{x^5} = \frac{xxx}{xxxxx} = \frac{1}{x^2}$

Ex 1d) $\frac{5^4}{5^7} = \frac{5555}{5555555} = \frac{1}{5^3} = \frac{1}{125}$

Rule for division:

Mar 9-3:38 PM

Problem	Simplify	Answer
Ex 2a) $\frac{9^4 \cdot 9^2}{9^7}$		
Ex 2b) $\frac{c^{-1}d^3}{c^5d^{-4}}$		
Ex 2c) $\frac{m^3n^{-4}p^5}{mnp^{-3}}$		

Mar 9-3:59 PM

1 Simplify each expression.

a. $\frac{b^4}{b^9}$ b. $\frac{z^{10}}{z^5}$ c. $\frac{a^2b}{a^4b^3}$

d. $\frac{m^{-1}n^2}{m^3n}$ e. $\frac{x^2y^{-1}z^4}{xy^4z^{-3}}$

Mar 9-4:19 PM

EXAMPLE Real-World Problem Solving

Recycling In 2000, the total amount of paper and paperboard recycled in the United States was 37 million tons. The population of the United States in 2000 was 281.4 million. On average, how much paper and paperboard did each person recycle?

$\frac{37 \text{ million tons}}{281.4 \text{ million people}} = \frac{3.7 \times 10^7 \text{ tons}}{2.814 \times 10^8 \text{ people}}$ Write in scientific notation.

$= \frac{3.7}{2.814} \times 10^{7-8}$

$= \frac{3.7}{2.814} \times 10^{-1}$

$\approx 1.3 \times 10^{-1}$

$= 0.13$ Write in standard notation.

Mar 9-4:29 PM

Find each quotient. Write each answer in scientific notation.

a. $\frac{2 \times 10^3}{8 \times 10^8}$ b. $\frac{7.5 \times 10^{12}}{2.5 \times 10^{-4}}$ c. $\frac{4.2 \times 10^5}{12.6 \times 10^2}$

d. In 2000 the total amount of glass recycled in the United States was 2.7 million tons. The population of the United States in 2000 was 281.4 million people. On average, about how many tons of glass were recycled per person?

Mar 9-4:32 PM

EXAMPLE Simplifying an Exponential Expression

Simplify each expression.

a. $\left(\frac{3}{5}\right)^{-2}$ b. $\left(-\frac{2x}{y}\right)^{-4}$

4 Simplify each expression.

a. $\left(\frac{3}{4}\right)^{-3}$ b. $\left(\frac{-1}{2}\right)^{-5}$ c. $\left(\frac{2x}{s}\right)^{-1}$ d. $\left(\frac{7a}{m}\right)^{-2}$

Feb 17-2:54 PM