

Dividing Monomials with the Same Base

Division is the inverse of multiplication. When monomials are multiplied, exponents of like bases are added. When monomials are divided, exponents of like bases are subtracted. Study the examples. When monomials have coefficients other than 1, remember to divide the coefficients.

Recall that expressions such as $\frac{5}{5}$ and $\frac{a}{a}$ equal 1. If you use the rule for dividing monomials, you will see why $a^0 = 1$.

$$\frac{a}{a} = a^{1-1} = a^0 = 1.$$

EXAMPLE 1

Simplify: $\frac{a^7}{a^4}$

$$\frac{a^7}{a^4} = a^{7-4} = a^3$$

Check:

$$\frac{a^7}{a^4} = \frac{\overset{1}{a} \cdot \overset{1}{a} \cdot \overset{1}{a} \cdot \overset{1}{a} \cdot a \cdot a \cdot a}{\underset{1}{a} \cdot \underset{1}{a} \cdot \underset{1}{a} \cdot \underset{1}{a}} = a^3$$

EXAMPLE 2

Simplify: $\frac{b^3}{b}$

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

Check: $\frac{b^3}{b} = \frac{\overset{1}{b} \cdot b \cdot b}{\underset{1}{b}} = b^2$

EXAMPLE 3

Simplify: $\frac{3c^2}{c^2}$

$$\frac{3c^2}{c^2} = 3c^{2-2} = 3c^0 = 3(1) = 3$$

Check:

$$\frac{3c^2}{c^2} = \frac{3}{1} \cdot \frac{\overset{1}{c} \cdot \overset{1}{c}}{\underset{1}{c} \cdot \underset{1}{c}} = 3$$

PRACTICE

Simplify.

1. $\frac{a^4}{a^4} =$	$\frac{d^6}{d^3} =$	$\frac{b^8}{b^4} =$	$\frac{m^8}{m^3} =$	$\frac{c^9}{c^5} =$
2. $\frac{x^5}{x^3} =$	$\frac{y^5}{y^3} =$	$\frac{a^6}{a^4} =$	$\frac{m^7}{m^2} =$	$\frac{s^5}{s^2} =$
3. $\frac{x^2}{x} =$	$\frac{a^5}{a^4} =$	$\frac{c^7}{c^4} =$	$\frac{c^9}{c^3} =$	$\frac{m^2}{m^2} =$
4. $\frac{4z}{2z} =$	$\frac{3a^5}{a^3} =$	$\frac{5e^5}{e} =$	$\frac{9t}{t} =$	$\frac{6d^4}{3d} =$
5. $\frac{2x^3}{x^2} =$	$\frac{10a^2}{a^2} =$	$\frac{20b^3}{4b^2} =$	$\frac{2d^6}{d^4} =$	$\frac{3b^5}{b^4} =$
6. $\frac{4a}{2} =$	$\frac{2y^3}{y} =$	$\frac{5e^6}{5e} =$	$\frac{6d^6}{6} =$	$\frac{8f^8}{2f^2} =$