

Division Properties of Exponents Notes

Division Properties of Exponent

Dividing Same Base

$$\frac{a^m}{a^n} = \begin{cases} a^{m-n}, & \text{If } m > n \\ 1, & \text{If } m = n \\ \frac{1}{a^{n-m}}, & \text{If } m < n \end{cases}$$

Power of a Quotient

$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Sample Problem 1: Simplify the following expressions.

1. $\frac{x^7}{x^4} = x^3$

2. $\frac{y^4}{y^7} = \frac{1}{y^3}$

3. $\frac{-a^2}{a^2} = -1$

4. $\frac{(3x)^3}{6x^3} = \frac{9x^3}{6x^3} = \frac{3}{2}$

Sample Problem 2: Evaluate the following using properties of powers.

5. $\frac{2xy^3z}{4x^2yw} = \frac{y^2z}{2xw}$

6. $\frac{-4^2z^2}{(-4)^2z^3} = \frac{-1}{z}$

7. $\left(\frac{x^5}{2x^3}\right)^2 = \left(\frac{x^2}{2}\right)^2 = \frac{x^4}{4}$

8. $\left(\frac{4a^2b}{12ab^2}\right)^2 = \left(\frac{a}{3b}\right)^2 = \frac{a^2}{9b^2}$

9. $\frac{-2^2}{3x^2} \left(\frac{3x}{2}\right)^2 = \frac{-4}{3x^2} \cdot \frac{9x^2}{4} = -3$

10. $\frac{(-2ab)(3a^2b)}{12a^6b} = \frac{-6a^3b^2}{12a^6b} = \frac{-b}{2a^3}$