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Division Properties of Exponents

Unit 7 Lesson 4

DIVISION PROPERTIES OF EXPONENTS

Students will be able to:

Simplify polynomials using the division law of exponent.

Key Vocabulary:

- Positive Exponent
- Properties of Power
- Base
- Division

Division Properties of Exponent

Dividing Same Base

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

Division Properties of Exponent

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

Sample Problem 1: Simplify the following expressions.

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

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

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

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

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. $\dfrac{2xy^3z}{4x^2yw}$

6. $\dfrac{-4^2z^2}{(-4)^2z^3}$

7. $\left(\dfrac{x^5}{2x^3}\right)^2$

8. $\left(\dfrac{4a^2b}{12ab^2}\right)^2$

9. $\dfrac{-2^2}{3x^2}\left(\dfrac{3x}{2}\right)^2$

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

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

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

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

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

$= \dfrac{x^4}{4}$

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

$= \dfrac{a^2}{9b^2}$

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

9. $\dfrac{-2^2}{3x^2}\left(\dfrac{3x}{2}\right)^2$

$= \dfrac{-4}{3x^2}\cdot\dfrac{9x^2}{4}$

$= -3$

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

$= \dfrac{-6a^3b^2}{12a^6b}$

$= \dfrac{-b}{2a^3}$